Home Office

SCIENCE AND INNOVATION STRATEGY 2009–12

Foreword by Meg Hillier
Parliamentary under secretary of state

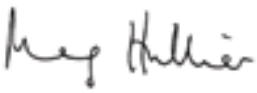
I am delighted to introduce this Home Office Science and Innovation Strategy for 2009-12. At the Home Office we work to help people to feel safe and confident in their homes and neighbourhoods, to live freely, contribute to society and prosper in their daily lives. To do this we put protecting the public at the centre of everything we do.

As the Home Office minister with responsibility for science, I have seen, at first hand, where our research and development has supported a wide range of policies and operations to protect the public, including detecting illegal drugs, identification and characterisation of new explosive materials, setting standards for police protective equipment and less lethal weaponry, and improving the recovery of fingerprint and other forensic evidence. Equally important is the role of social sciences in informing our policies. For example, we need to understand how people behave to reduce crime and prevent radicalisation; economic analysis to help inform our policies to manage migration; and we need data to understand trends in crime to help us and local delivery partners to respond to the needs of the public both at a national and local level.

There is an ever-increasing pace of change in technology. It is vital that we keep pace with such changes, to use technologies to protect the public, to capture the perpetrators of crimes and ensure that we stay one step ahead of those who wish to subvert our security and way of life.

This strategy builds on a strong legacy of investment in science in the Home Office; we currently spend around £50m per annum on science. We are proud of our record in working in partnership with industry and particularly with small and medium-sized enterprises to help us innovate and develop technologies, as well as working across government and with academia.

We will continue to work closely with other government departments both nationally and internationally, other research funders, academia and industry to deliver this strategy. I very much hope that the publication of this strategy will be the start of many conversations across the scientific community to work together to deliver our mutual objectives of protecting the public.



Contents

Foreword i

Contact iv

Executive Summary v

Section 1 Introduction 1

Background 1

Scope of the strategy 2

Principles and aims of the strategy 2

How the strategy was developed 2

Policy priorities 3

Section 2 Science requirements 5

Cross-cutting priorities 5

Improving understanding and analysis of policy interventions 5

Knowledge and data management 6

Understanding and building public confidence 6

Population demographics 6

Internet-enabled crime (cyber crime) 7

Surveillance and responding to local needs 7

Crime 8

Young people 8

Violent crime, including guns, gangs and knife crime 9

Acquisitive crime 9

Drugs and alcohol 9

Organised crime 10

Designing out crime 10

New and emerging crimes 10

Anti-social behaviour 11

Understanding behaviours 11

Policing 12

Improving police effectiveness 12

Police capabilities 14

Forensic science 15

Police workforce planning 15

Protecting the police 15

Detecting crime 15

Identity management 17

Planning and preparing for the future 18

Biometrics 18

Societal aspects and security 18

Border control and migration 20
Improving understanding of the drivers of migration 20
Understanding the costs and benefits of migration 21
Border security 21
Enforcement 22
Security and counter-terrorism 23
Cross-government approach to science and technology 23
Horizon scanning 24
International collaboration 24
Cultivating a strong and innovative counter-terrorism market 24
Next steps 25

Section 3 Science regulation 27
Forensic science regulation 27
Animals in science 28

Section 4 Delivering the Science and Innovation Strategy 29
Home Office science capacity 29
Managing statistical information 30
Delivering in partnership 30
Research Councils and universities 30
Industry 31
Other government departments 32
International 32
Procuring science 33
Horizon scanning 33
Quality assurance 34
Project Quality Approval Board 34
Quality assurance in HOSDB 35
External reviews 35
Science Advisory Committees 35
Dissemination and data security 36

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The Home Office Science and Innovation Strategy 2009-12 is posted on the internet and can be found on the Home Office Science and Research website:

www.homeoffice.gov.uk/science-research

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Executive Summary

The Home Office is the lead government department responsible for crime, policing, immigration, passports, drugs and counter-terrorism. Science is essential to the Home Office for informing, developing and implementing policies to deliver our objectives of protecting the public. To do this, we rely on a wide range of science, including physical sciences and engineering, social sciences, statistics, economics and operational research.

This Science and Innovation Strategy describes our priorities for science for the next three years and the processes by which we will manage this science. It also describes our future approach to the science regulatory functions the Home Office is responsible for in the areas of animal scientific procedures and forensic science. Key to this strategy is how we will work with partners across government, industry and academia as our science requirements cut across Whitehall boundaries and are beyond that which can be delivered by the Home Office alone.

This strategy starts by describing the policy context in which it was prepared, and how we developed it to help support our policy requirements and to help us prepare for future challenges. The strategy describes the science priorities over the next three years that will have the greatest impact on delivering our objectives. This is divided into six sections:

- **Cross-cutting priorities** – science that will support the work of all business areas in the Home Office, including responding to developments in new technologies and increasing our capacity to understand the impact of our policies;
- **Crime** – science that will increase our knowledge of trends in crimes and how we can reduce crime, including that associated with drug and alcohol use, and organised crime;
- **Policing** – science that we need to help support the police, including research to support developing a police workforce for the future, improving police effectiveness and capability through using social science and applying new and existing technologies to support the police in their work;
- **Identity management** – the science we need to manage future identity-related services and how we can use biometrics to support identity management systems to assure identity;
- **Border control and migration** – social research to help understand the drivers, costs and benefits of migration, and physical sciences to improve border security and to use technology to ensure that passenger throughput is maintained;
- **Security and counter-terrorism** – the science we need to help protect the public from terrorism, including reducing our vulnerability to terrorism and reducing the impact of a terrorist attack.

The final section outlines our approach to delivering this Science and Innovation Strategy, including how we will work with partners in and outside government, how we will manage statistical information, assure the quality of our research and carry out horizon scanning to help us identify future threats and opportunities.

Many of the priorities described in this strategy build on existing work carried out or funded by the Home Office. Throughout this strategy, case studies describe examples of how the science we have conducted in recent years has delivered to increase our knowledge base to inform policies and drive forward the use of technology to protect the public.

Home

SECTION 1
Introduction

BACKGROUND

The Home Office is working to deliver a challenging series of objectives that are set out in our strategy **'Working together to protect the public'**[1]. We aim to put public protection very clearly at the heart of our work to counter terrorism, cut crime, provide effective policing, secure our borders and protect personal identity. Science is vital to delivering our aim by providing evidence for policy development, understanding which interventions are likely to have the greatest impact and providing the technological innovation to support our operational requirements.

Science in the Home Office is remarkably diverse and includes a wide range of disciplines in the physical, social and statistical sciences. The science we fund includes:

- research to protect the public against explosives and chemical, biological, radiological and nuclear (CBRN) threats;
- technology to support the police and other agencies, including setting standards for protective body armour and less lethal weaponry and investigating new technologies to detect drugs;
- pioneering the use of biometrics to assure identity;
- understanding the extent of crime, the effectiveness of measures to reduce crime and the behaviour of those wishing to perpetrate crimes; and
- understanding the drivers and impacts of migration.

We fund research both to help evidence-based policy decisions and to support the delivery of policies. For example, our scientists have been involved in designing the security arrangements at Heathrow's new Terminal 5, preparing the security arrangements for the 2012 Olympics in London and providing technological assistance to the police in sensitive, covert operations.

The Home Office also has two important functions regulating the use and practice of science. We are responsible for implementing the Animals (Scientific) Procedures Act 1986, which regulates the use of animals in science, and in 2007 we created the role of Forensic Science Regulator, whose job is to ensure the scientific quality of forensic evidence in the criminal justice system.

We need to continue our efforts to ensure that policy and delivery are informed by the highest quality and

1 www.homeoffice.gov.uk/about-us/purpose-and-aims/

latest scientific advice. This strategy takes forward our first Science and Innovation Strategy 2005-2008[2], the findings of the 2008 Capability Review[3] and Government Office for Science Review of the Home Office[4] to re-focus our efforts on delivering and communicating the science we need.

SCOPE OF THE STRATEGY

This science strategy covers all the science[5] disciplines the Home Office uses to support and inform the delivery of its objectives. This is important as the challenge of integrating scientific disciplines is one that has been brought to the fore across government in recent years and is vital to being able to provide comprehensive advice to ministers. We need to consider whole 'systems', and only by bringing together different scientific disciplines will we be able to effectively integrate science and technology into both policy making and delivering the operations that the public can expect. Therefore, integration of scientific disciplines is a theme that will run through this strategy.

Delivering in partnership is also going to be key for the department over the next three years (see Section 4). This strategy describes the science that the Home Office needs to draw on over that time. However, it goes beyond the science that can be funded or carried out by the department itself, and includes science which we will increasingly need to rely on other partners for – including other government departments, industry and universities, to help us deliver our mutual objectives.

PRINCIPLES AND AIMS OF THE STRATEGY

The overall aim of the Science and Innovation Strategy is to communicate the key priorities for the science we will need over the next three years and how we will deliver and manage this science. The specific aims of this strategy are to:

- inform stakeholders and scientists of our science requirements and the processes we will use to deliver the science we need;
- put policy and operational requirements at the forefront of driving and delivering our science;
- bring together the scientific disciplines to deliver Home Office priorities in an integrated and effective way;
- ensure the science we undertake and procure includes broad long-term priorities as well as more policy-specific short to medium-term priorities; and
- embed and lead best practice across government in delivering the strategy.

HOW THE STRATEGY WAS DEVELOPED

This strategy was developed to deliver the above aims, by considering the two primary drivers for our science:

- **Internal factors** – the science we need to provide information for our policies and operational delivery, given our objectives and ministerial priorities.

- **External factors** – the issues that have the potential to impact, either positively or negatively, on delivering our objectives, but are beyond our immediate control. Considering external factors will help us to use science to inform our operational and policy response to such changes and help us anticipate such challenges and opportunities.

The science priorities were developed through a series of workshops and discussions with the Home Office Board, members of the Home Office Strategic Policy Network (a sub-group of the Board) and the Home Office science community.

Discussion on external factors was informed by an analysis, carried out in spring 2008, of a number of futures studies[6] undertaken by government, plus a wider range of socio-economic data from government, academic and private-sector institutions. These studies were analysed to consider what potential future socio-economic or technological changes would affect Home Office business. These potential trends were grouped into seven themes relevant to the Home Office: the economy; social mobility; demographic change; globalisation; community issues; the environment; and technological developments; and analysed for their possible implications for the Home Office. These themes were then used to consider how our science could further investigate, alleviate or exploit such changes to support the delivery of our objectives.

These workshops benefited from the regular discussions Home Office staff have with stakeholders, practitioners and the wider scientific community. The Home Office science community benefits from the input that Home Office Scientific Development Branch (HOSDB) Police Advisers provide to HOSDB's science programme and we routinely take part in major

2 www.homeoffice.gov.uk/science-research/
3 www.homeoffice.gov.uk/about-us/organisation/home-office-reform/?view=Standard
4 www.berr.gov.uk/dius/science/science-reviews/CompletedReviews/page26646.html
5 Physical/natural sciences, social sciences, statistics, engineering, economics and operational research.
6 *Realising Britain's potential* (Strategy Unit, February 08); Future economic trends and possible responses (HMT, June 08) and *Long-term opportunities and challenges for the UK* (HMT, November 06).

international networks and conferences and talk to researchers working in comparable areas.

We are also grateful to the Home Office Science Advisory Committee (Section 4) for their input into the strategy.

Finally, while we were developing this strategy, as part of our commitment to delivering in partnership, we were also contributing to a number of cross-government Science and Innovation Strategies on a number of policy-specific areas, including policing and security and counter-terror. These strategies also helped develop this strategy.

POLICY PRIORITIES

One of this strategy's aims is to put policy and operational requirements at the forefront of driving and delivering our science. In 2008, the Home Office published its strategy – 'Working Together to Protect the Public'[7]. This outlines what we want to achieve and how we aim to achieve it over the next three years. This Science and Innovation Strategy describes how we will use science to both help *deliver* our policy priorities and *inform* future policies and strategies.

To achieve our overall purpose of 'Working together to protect the public' we have seven objectives. How we prioritise our science will also be driven by these objectives:

- help people feel secure in their homes and local communities;
- cut crime, especially violent, drug and alcohol-related crime;
- lead visible, responsive and accountable policing;
- support the efficient and effective delivery of justice;
- protect the public from terrorism;
- secure our borders and control migration for the benefit of our country; and
- safeguard people's identity and the privilege of citizenship.

The strategy emphasises the need to work better with our partners, including the police, intelligence agencies, local authorities, voluntary bodies, other departments and other governments. Most important is our need to work with the public, devolving more decision making to a local level so that our services are responsive and accountable. In prioritising our science to support the delivery of any of our objectives it will be vital that we consider how our research can inform decision making at a local level.

The Home Office values describe how we will work. Our science strategy, both in terms of the science we fund and carry out and how we manage our science, will be led by our values.

- We deliver for the public.
- We are professional and innovative.
- We work openly and collaboratively.
- We treat everyone with respect.

Our Public Service Agreements (PSAs) are embedded within the Home Office strategy. These set out our specific delivery objectives in the priority areas for 2008-11. We lead on four PSAs (see below) and provide the indicators of many others across government[8]. We will aim for the most appropriate science to be in place to both deliver and measure our performance against these indicators.

Home Office Public Service Agreements

The Home Office leads on four government Public Service Agreements:

- PSA 3 – Ensure controlled, fair migration that protects the public and contributes to economic growth.
- PSA 23 – Make communities safer.
- PSA 25 – Reduce the harm caused by alcohol and drugs.
- PSA 26 – Reduce the risk to the UK and its interests overseas from international terrorism.

We also have an indicator in PSA 24 (Deliver a more effective, transparent and responsive criminal justice system for victims and the public) that is led by the Ministry of Justice and we contribute to a number of other PSAs led by other government departments.

7 www.homeoffice.gov.uk/about-us/purpose-and-aims/

8 www.hm-treasury.gov.uk/pbr_csr07_psaindex.htm

SECTION 2
Science requirements

CROSS-CUTTING PRIORITIES

During the development of this Science and Innovation Strategy we identified a number of key science priorities that will support delivery across all our aims.

The cross-cutting priorities are either areas of science in which we have previously invested little resource and now require a significant investment, or where we have ongoing research, but a more concerted and co-ordinated effort is needed to increase its value and impact. The cross-cutting priorities also include research to develop an evidence base on how we use, and protect the public from the misuse of, relatively new technologies.

Areas of research where we need to significantly increase our investment or currently have existing research but require a more concerted and co-ordinated effort to make a significant impact on the delivery of our priorities include:

Improving understanding and analysis of policy interventions

It is essential over the next three years that we significantly improve our understanding of both what works in social policy and the related cost benefit analysis of such interventions. Research is critical:

- to help us understand and prioritise our interventions;
- to help future policy making by increasing understanding of what has had the most positive impact in the past; and
- to inform our decision making and internal discussions across government.

Understanding what causes local variations or variations over time in how effective interventions are will also be increasingly important as we aim to deliver services tailored to local communities.

This work will need a variety of different approaches to evaluate policy interventions that control for the counter factual, and where experimental approaches are not possible we will investigate alternative approaches including quasi-experimental design, 'natural experiments' and the database linkage. To help support this we will build the cost of conducting evaluations

into the cost of new policy interventions, rather than funding the evaluations from research budgets as we have usually done previously. Not all policy initiatives and interventions will need evaluating. We will concentrate on the policy interventions where the evaluation is likely to create new knowledge or where it is likely that new knowledge will have a significant impact on future policy development or practice.

This work is also linked with that below on data management and ensuring we have the correct data to evaluate the impact our strategies and policies have on improving public protection.

Knowledge and data management

During the next three years we are likely to see the continuation of increased amounts of data and knowledge available to us and an increase in the variety of formats of data, including video images, text and numerical data and biological information.

Using and managing the knowledge and data we have effectively is essential to how we will work in the future. We will work to ensure we obtain data efficiently with minimal burdens to frontline services. Understanding and using appropriate technologies and statistical techniques to find the correct balance between sharing data and safeguarding individual privacy will become an increasing priority over the period of this strategy. In particular, we need to work across government to ensure that similar data are not collected for different purposes and that we can access and use data appropriately for a variety of defined reasons, including reducing the threat from terrorism, organised crime and for research.

This is important to much of what we do, including assessing the impact of our interventions and generating knowledge to inform our research and policy making. It is highly dependent on having access to appropriate IT and we will be working over the next few years to draw together some of the mutual requirements of our IT and science strategies. We will be looking at these requirements further in 2009. To do this we will set up a Home Office Information, Systems and Technology Advisory Group, a sub-committee of the Home Office Science Advisory Committee, to work with and advise the office of the Chief Information Officer and Home Office scientists.

Understanding and building public confidence

If we are to have an impact on some of the real concerns of the public, we need to understand more about what builds public confidence and the public's perceptions of the interventions we carry out. This research is strongly driven by our objective to help people feel secure in their homes and communities, and cuts across all our objectives. This research needs to consider both how we measure public perceptions and how we can increase our understanding of how our interventions affect the target audience and the broader population and how this relates to substantive changes. We currently fund some research in this area, monitoring and understanding what drives public perceptions. This programme will initially draw these two strands together to help improve our understanding, before looking at what new research we need in this area.

Population demographics

We need to understand how changes to population demographics will affect our future ability to deliver our objectives and how we need to build services for the changing population. A major factor is the increasing proportion of elderly people in the UK and the increase in the number of single-person households. Older people tend to be more fearful of crime and we need to understand how to engage with them and address their concerns. Another key area affecting demographic change is the role of migration and migrant labour. We also need to increase our understanding of what works to engage young people in our services, both directly (e.g. reporting crime) and indirectly (e.g. information campaigns). Other population demographics that will affect our ability to deliver our objectives, are cultural changes, local changes in ethnicity and nationality and increased geographical mobility.

This will be a new area of research for the department. We will start by investigating possible areas of research across the department and exploring potential links across other government departments, particularly the Department of Communities and Local Government and the Office for National Statistics.

The final two cross-cutting priorities are where there have been recent rapid and significant changes in the capability of new technologies. These technologies have become widespread and commonplace in the lives of many people in the UK and so we need to understand public acceptability of positive use and how the technologies are used, misused or evaded by potential criminals.

Internet-enabled crime (cyber crime)

We will be increasing our evidence base on internet-enabled crime (cyber crime) particularly the different types and the degree of internet-enabled crime and how we can work across government and with industry to reduce people's vulnerability to this relatively new type of crime. In particular, there are three types of crime conducted via the internet that we will be considering:

- traditional crime now conducted using the internet (e.g. deception, fraud, illegal pornography);
- new forms of internet-enabled crime (e.g. on-line 'life crimes', computer misuse, viruses); and
- cyber terrorism.

We also need to increase research to support the conviction of criminals through computer activity. This will include understanding where individuals are located, using patterns of activity, building networks of association and recovering data from seized computers, on-line or from embedded systems (e.g. mobile telephones). This will help pursue those using the internet for criminal purposes.

We also need to improve our data on how we can use the internet to influence and promote positive messages about helpful and safe behaviour.

As cyber crime is not limited by geography we need to understand the potential tension between local crimes and crimes that cut across borders and areas.

We are planning new research in this area, co-ordinated centrally and funded from across the department. To start with we will look at what research is currently being carried out in this area, both in the private and public sector.

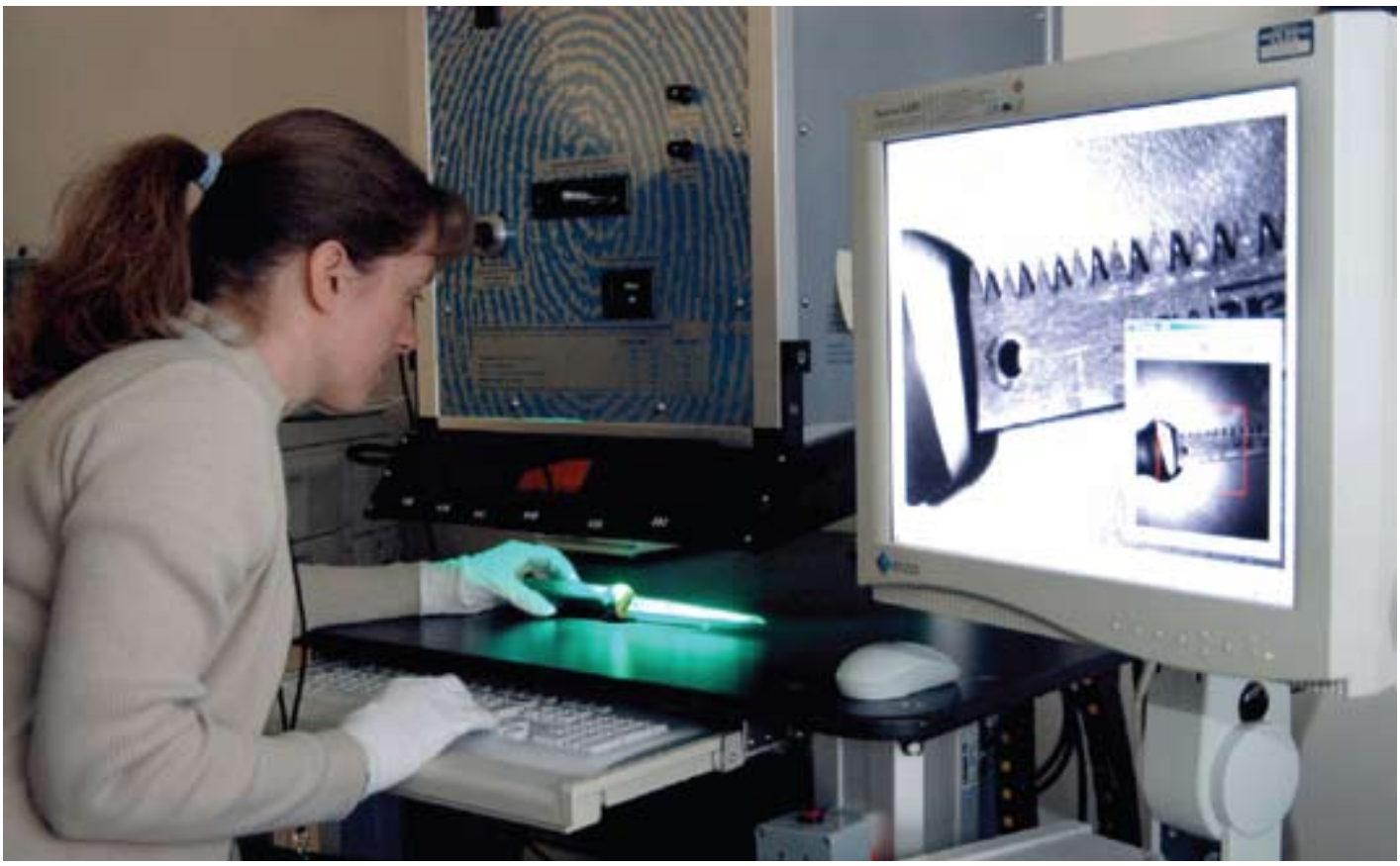
Surveillance and responding to local needs

Increasing our understanding of the relative effectiveness of, and public attitudes to, all forms of surveillance is important. This includes the use of CCTV, remote detectors (for example metal detectors at secure sites, transport locations or nightclubs), Automatic Number Plate Recognition and identity management. This will help us identify different approaches to policing, countering terrorism and how we deliver for the public. We need to understand the costs and benefits of increased surveillance compared with other approaches which improve public protection in a way that increases the public's confidence. In particular, we need to better understand the balance between the value of surveillance and individual privacy and civil liberties. This particularly applies to policing where understanding the balance between hidden policing and traditional visible policing is essential, as is the need to guard against the police becoming more detached from the public.

This priority also closely aligns with our priorities for data management and internet-enabled crime. Surveillance schemes have the potential to yield significant amounts of data. The data need to be safeguarded, used and handled appropriately and managed in a way that demonstrate their contribution to protecting the public and maintaining individual privacy. It will be important to maintain the integrity of surveillance information to ensure it cannot be used for criminal activities. Understanding and communicating the benefits and safeguards associated with such approaches will also be essential to this work.

We have considerable expertise in some aspects of this priority. However, considerably more needs to be done on understanding public perceptions and wider social science aspects. We will fund research to understand more about public attitudes and the 'human interface' of surveillance.

CRIME



Our objective is to:

> *Cut crime, especially violent, drug and alcohol-related crime.*

This sub-section sets out our strategy for developing our knowledge base on crime and effective approaches to tackling it. We will continue to support and develop the long-running British Crime Survey[9], and look for new ways to use the data that the survey provides. We will also look to extend our knowledge of key topic areas, by reviewing existing evidence and conducting new empirical research. We will also develop our knowledge of how new technology may increasingly feature in crime, particularly fraud, and in crime prevention.

Young people

Young people (under 16s) are a particular priority for the Home Office as they are more likely to become a victim of crime and are also least likely to report crimes. In 2008 we produced the Youth Crime Action Plan, a cross-government analysis of how the government is going to tackle youth crime[10]. We will ensure that the evidence base on all three strands of the strategy proposed in the Action Plan – enforcement and punishment; prevention; and support – is developed to underpin policy delivery.

As part of our focus on young people, we are extending the British Crime Survey to include under 16s, to increase our understanding of the types of crime young people experience and to monitor trends. We also need research to improve our understanding of:

- what crime young people commit;
- how young people engage with our services;
- how we can improve our communications with young people;
- how the criminal justice system can work best to support young people; and
- how to support young people to help them feel safer in their communities.

We will build on research carried out elsewhere, including overseas, and work closely across government, particularly with the Department for Children, Schools and Families, Ministry of Justice and the Youth Justice Board for England and Wales, to develop more robust evidence to guide working with young people.

9 www.homeoffice.gov.uk/rds/bcs1.html
10 www.homeoffice.gov.uk/documents/youth-crime-action-plan/

Violent crime, including guns, gangs and knife crime

Serious violent crime covers a wide range of offences, including homicide and serious wounding, offences involving weapons, domestic violence, hate crime and serious sexual offences, including rape. These crimes are extremely rare: together they account for only about one per cent of all crime. Yet when they do occur they cause significant harm, both to individual victims and their families who suffer physical injury and psychological trauma, and to society more widely in terms of fear.

In 2008, we published 'Saving Lives. Reducing Harm. Protecting the Public: An action plan for tackling violence 2008-11'[11]. This sets out a range of actions we will be taking to reduce priority crime types, including gun and gang-related crime; knife crime; and sexual and domestic violence. To support this action plan we need to increase our longer-term evidence base on effective interventions in relation to guns, gangs and knife crime. We are already monitoring our operational response to this type of crime, but it is important that we build on this to develop a longer-term evidence base to understand the effectiveness and value for money of interventions.

It is also important that we continue to acquire more evidence to help us understand trends, motivations and the effect of positive interventions to reduce domestic violence and sexual crimes.

The technology to detect knives and guns electronically is well established, although further development to assist the deployment of such technologies in novel sites (for example railway stations and other transport hubs) may be required. This would be alongside operational research to ensure that they cause minimal disruption to the majority of the public. Research in stand-off (at a distance) detection and hand-held technology for the police would significantly increase their capability to respond quickly and so potentially reduce knife and gun crime. We also need more understanding of the social environment that causes people to carry and use weapons, and the effectiveness of interventions to prevent this.

Acquisitive crime

The evidence base on many aspects of acquisitive crime such as shoplifting, burglary, vehicle crime and robbery, is generally well developed, and the levels of these crimes have mostly fallen markedly over the past decade or more. Nevertheless, we will keep monitoring trends and will consider whether we need more information in response to any changes in trends.

Drugs and alcohol

We are currently working with colleagues across government and in academia to develop a cross-government research strategy to support the government's drugs strategy outlined in the Action Plan 2008-2011 ('Drugs: protecting families and communities'[12]). The cross-government research strategy will be published in 2009, covering both physical and social sciences. The Home Office will prioritise its research resources in those areas where it has significant policy responsibility, for example in understanding supply and enforcement.

Technologies for detecting drugs in a variety of situations is an important area of research to reduce the availability and use of drugs. Present methods of finding drugs in parcels can be slow and time-consuming; we are currently working on the *Drug Identification by Low-Angle X-Ray Scatter* project to detect drugs more quickly and effectively. We are also working with industry on further developments to the technique of surface enhanced Raman spectroscopy to improve its capability for roadside drug detection. We will continue this important work and will also research the development of roadside drug detectors with the Department for Transport (see Policing), an equivalent to the breathalyser for alcohol.

11 www.homeoffice.gov.uk/documents/violent-crime-action-plan-08/

12 www.drugs.homeoffice.gov.uk/drug-strategy

We will also continue our work with the forensic science providers to investigate the changing strengths of drugs, and in particular the THC (tetrahydrocannabinol) content of cannabis.

We will support others, particularly the Department of Health, National Treatment Agency and National Institute for Health Research, to understand the effectiveness of treatments for young people suffering from alcohol and drug dependencies. Many of the known treatments have been developed for adults and more needs to be known about the effectiveness of treatments for young people (under 16s). Generally government needs more evidence on the effectiveness and outcomes of drug treatment programmes for different sub-groups of drug users.

Crime and anti-social behaviour associated with alcohol misuse is also a priority and where, compared to what we know about illicit drug misuse, we have less evidence. We need to know more about the effectiveness of interventions and communications. For example, as a priority, we will continue with work to assess the impact of alcohol interventions delivered in a criminal justice setting through the Alcohol Arrest Referral pilots.

Organised crime

Key priorities in this area are understanding the scale and nature of organised crime, its impact, how it is policed and how organised criminals operate. To underpin the PSA target of reducing crime, particularly violent crime, further research is needed on the links between violent and organised crime and the careers of organised criminals. Much of this also supports the work of the Serious Organised Crime Agency (SOCA), and we will be looking to build on and expand our collaborative working arrangements. We will also make effective links to the drugs research and analysis in the Home Office in relation to organised crime and drug markets. Another key priority is to improve our operational response for recovering a larger share of the proceeds of crime, and we will need to carry out further research into the criminal economy, particularly improving the effectiveness of asset recovery.

Improving the covert surveillance of those involved in serious organised crime will be a significant priority in the coming years and we will work with industry to develop technologies to support this area. We will also research the cost-effectiveness of such approaches and the operational benefits that derive from new technologies.

Increased use of biometrics and data sharing between law enforcement agencies (including border control agencies), both nationally and internationally, is an area that is likely to increase in coming years. We will need to investigate technologies that may improve and facilitate processes for data sharing, validating identity, and safeguarding such processes (see the cross-cutting priority on data management).

Designing out crime

We will continue our work with the Design Alliance[13] to work with industry, law enforcement and other stakeholders to use design methods innovatively to help in the fight against crime. In particular, we will work with the Alliance on five key themes, all with a strategic focus on youth crime. We will look at:

- schools – applying design solutions to reduce bullying, fighting and theft in schools;
- 'hot' products – developing innovations to help make personal electronics more crime-proof;
- housing – embedding crime-reducing approaches in the planning and construction of housing;
- alcohol-related crime – finding design-led approaches to reduce the harm caused by alcohol-related anti-social and criminal behaviour; and
- business crime – helping businesses to minimise crimes such as shoptlifing.

The Alliance will also help to hold the public and private sector to account to confirm that designing out crime is being properly considered at all levels of their operations.

New and emerging crimes

We will maintain a watching brief by liaising with the police services and the British Crime Survey to monitor new and emerging crimes. Economic and social conditions can drive new forms of crime. For example, environmental crime such as illegal dumping,

13 www.designcouncil.org.uk/en/Live-Issues/Can-design-help-in-the-fight-against-crime/

or illegal activities in relation to waste management and recycling could increase as efforts are made to improve the environment. Similarly, global commodity prices can increase the theft of valuable metals. New developments and innovations in consumer products can also create new crime opportunities, for example increased computer access and internet use (see cross-cutting priorities) and the marketing of high-value desirable goods. We will monitor new and emerging crimes to ensure that policies and police activities respond accordingly.

Case study: Crime

The Home Office Scientific Development Branch (HOSDB) lent search equipment to a local police force to tackle gun/knife crime. The force used Walk Through Metal Detectors (WTMDs) and a Secure 1000 X-ray system outside train stations. It was believed that people were travelling out of London and committing violent knife crime in the surrounding region. The police set up the systems at various stations and asked people at random to walk through the WTMD. They also watched other individuals to spot those who were avoiding the WTMD. This approach noticeably reduced anti-social behaviour in the area and led to a number of arrests for knife and drug possession. The same force also used the WTMD outside a nightclub where passing through the archway was made a condition of entry. This deterred knife crime in the club and a number of knives were found in the surrounding area where people had deposited them before entering the club.

HOSDB has also used its drug detection and X-ray equipment to support the police search effort at various music festivals around the UK. At a single event approximately £12,000 of drugs for personal use (street value, not including dealer quantities still to be valued pending court cases) were seized following narcotic dog and swab testing. Around a further £7,500 of narcotics were deposited into the amnesty bins due to the visual deterrent of the police, narcotics dogs and X-ray machine. The X-ray equipment was used to check camping gear being taken into the event, with several knives and hammers found in addition to the narcotics, potentially reducing violent crime.

Anti-social behaviour

Tackling anti-social behaviour remains a priority for the Home Office and its partners. Policy responsibility for anti-social behaviour is divided between the Home Office and the Department for Children, Schools and Families (DCSF). We will work with DCSF to ensure that both young people's and older people's involvement in the range of anti-social behaviours is monitored and appropriate responses generated. New approaches and interventions to combat anti-social behaviour are being introduced and we will continue to assess their usefulness for the community and their impact on the perpetrator. We will also look at what drives perceptions of anti-social behaviour (including drug use and dealing, drunkenness and rowdy behaviour) and what works in changing them.

Understanding behaviours

Further fundamental research examining the impact of behavioural change might help us understand how changes in behaviours (via changing demographics or other factors) affect the ability of the Home Office to achieve its objectives. For example, greater understanding of what behaviours people consider acceptable, how this has, and is likely to, change over time; when will people intervene and under which circumstances; and, have demographic and cultural changes influenced this?

We will aim to understand more of the relative influence of the *pull* effect of the 'well-behaved majority' of the population compared to the *push* factors of the criminal justice system to deter criminal behaviour. Testing what works in preventing positive behaviours breaking down will be useful as will testing how changes to behaviours affect the frequency of negative behaviour and criminality.

Increased understanding of how the public view the difference between 'public' and 'private' space is an area of research that has the potential to affect our thinking. Evidence shows that the public are protective of their private space but expect the police service to manage public spaces. Our evidence on crimes committed in private space is well developed, but we need to look further at effective interventions and strategies to reduce crime in public spaces. To do this we will work closely with our partners, particularly in the academic sector and through the Research Councils (see Section 4).

Research to understand how people begin and end criminal careers will also be an important area to help target preventative interventions appropriately. We will work with Ministry of Justice and Office of Criminal Justice Reform (OCJR) on this area, to build on their work in reducing re-offending.

POLICING

Effective policing is essential to delivering many of our objectives. Our objective is to:

Lead visible, responsive and accountable policing.

In April 2007 the National Policing Improvement Agency (NPIA) was formed with the main purpose of making a unique and significant contribution to improving public safety.

The NPIA aims to bring this about by :

- driving improvement and leading-edge practice where it matters, fostering self-improvement and helping to shape the future of policing;
- delivering and developing critical essential services and infrastructure to support policing day-in and day-out; and
- providing accessible, responsive and joined-up solutions, enabling the police services to put more time into frontline police work.

We are working closely with the NPIA and other stakeholders, including the Association of Chief Police Officers (ACPO), to develop the next Police Science and Technology Strategy which will be published in 2009. These two strategies combined will form a complete picture of police science and research priorities. The Police Science and Technology Strategy will provide governance and organisational structures and processes to ensure synergies across scientific disciplines are fully exploited to meet the challenges of modern policing. In particular, it will enable the police service to benefit from a coherent approach to prioritising the resources of the NPIA, individual police forces and Home Office Scientific Development Branch, and to present a set of priorities to industry, the Research Councils and other funders.

Improving police effectiveness

The Home Office social research on policing will focus on strategic support for and evaluation of police reform, workforce, powers and the effectiveness of the Home Office-led policing strategy. The NPIA team will cover research and analysis on all other policing issues, particularly focusing on operational and tactical policing issues and NPIA priorities. It is also responsible for knowledge management for the police service. The Home Office and NPIA research and analytical research teams work closely together to ensure that programmes are complementary.

In 2005 the Home Office published 'Neighbourhood Policing – your police, your community, our commitment'[14], which set out the Government's strategy for delivering Neighbourhood Policing.

For the past three years, the Home Office police research programme has focused on evaluating the effectiveness of Neighbourhood Policing, both

14 www.neighbourhoodpolicing.co.uk

nationally and locally. Options for the next stage of evaluating the initiative are currently being drawn up, and may include qualitative work, focusing on *how* Neighbourhood Policing affects key outcome measures such as confidence and satisfaction.

Following the publication of the Policing Green Paper, 'From the neighbourhood to the national: policing our communities together'[15], in July 2008, and the adoption of the single target for measuring police performance, the Home Office will explore issues around public confidence in the police and local councils dealing with the crime and anti-social behaviour that matter to people within the locality. This target is likely to have a continuing impact on the focus of policing research within the Home Office. This could include, for example, conducting evaluations of specific initiatives to increase people's levels of confidence, or undertaking qualitative work to explore what drives people's confidence in the police. We will also need to monitor progress against the PSA targets over the three years at both national and force level.

In addition to the current programme of work on Neighbourhood Policing, we need a greater understanding of the effectiveness (e.g. in reducing crime, detecting crime and improving confidence) and cost-effectiveness of other policing strategies on a wide range of geographical scales. This will give us the evidence to demonstrate what types of policing are most effective in different circumstances. Examples include research into the relative effectiveness and cost-effectiveness of surveillance policing (CCTV cameras) and neighbourhood policing. This research will need to build on our economic resource analysis and management, moving on from straightforward evaluation to developing models for understanding what works best in varying circumstances.

Key to this is having the right statistical information for modelling cost-effectiveness. We are committed to reducing the bureaucracy and paperwork involved in policing as outlined in our response to the Review of Policing led by Sir Ronnie Flanagan[16]. We will be working to ensure that key data to inform policy development are collected in an effective way that minimises burdens on the police.

This will include the continued development of the repository for police data, the Home Office Data Hub. During 2009/10 this will progressively replace aggregate data collection systems for crime, detections and human resources by automatic collection of data direct from police management systems. This will result in a significant reduction in bureaucracy for forces and provide much more detailed information, subject to safeguards agreed with ACPO, to support policy development and feed into Home Office research and statistical reporting. This is a key strategic development in a climate where there are significant pressures to reduce burdens of central data collection on forces, but where there are inevitably demands for research and monitoring of police activity that go well beyond what can be gleaned from our existing aggregate returns.

Case study: Policing – evaluations of Neighbourhood Policing

The National Reassurance Policing Programme (NRPP) was trialled across 16 wards between 2003 and 2005 to reduce fear of crime and anti-social behaviour, and increase public confidence in the police. The NRPP impact evaluation focused on six trial sites, which were matched to six control sites. The evaluation measured change after one year, using crime and incident data and longitudinal surveys. Comparing results from the trial and comparison sites, the programme had a significant positive impact on crime, perceptions of crime and anti-social behaviour, feelings of safety and public confidence in the police. Importantly, the three NRPP delivery mechanisms – foot patrol, community engagement and problem-solving – were all found to be critical in improving the public's confidence in the police. The positive findings from the NRPP evaluation provided evidence to support the roll-out of Neighbourhood Policing across England and Wales. The three-year Neighbourhood Policing programme was launched in 2005. Since April 2008 all neighbourhoods in England and Wales have been covered by a dedicated Neighbourhood Policing team.

15 www.police.homeoffice.gov.uk/publications/police-reform/Policing_GP/

16 www.police.homeoffice.gov.uk/police-reform/flanagan-police-review/

Police capabilities

The Home Office Scientific Development Branch (HOSDB) provides a range of essential services to the police and policy makers to ensure that the police can undertake their role effectively while protecting both the public and themselves. Ongoing areas of science where we will continue to provide advice and support include:

- advising on the effectiveness of less lethal weapons;
- vehicle stopping;
- supporting police operations using our technical skills and specialised equipment; and
- looking at the technical aspects of type-approval for speed cameras.

Less lethal weaponry. In advising on the effectiveness of less lethal weapons, the Home Office is integral in testing and monitoring the safety of less lethal weapons and in particular conductive energy devices (commonly known as TASERs). A particular capability gap for the police is the lack of a 'long-range' TASER or a 'wireless TASER'. We will continue to monitor developments in this area to ensure that police forces have the most up-to-date devices available to protect themselves and the public.

Road policing. Supporting the policing of our roads continues to be an important research priority. In particular, we are researching novel ways of remotely stopping vehicles. Research into the development of roadside drug detectors, equivalent to the breathalyser for alcohol, will be required. This will be carried out in conjunction with the Department for Transport and will enable us to address public concerns associated with 'drug-driving'. Research to assess drivers' 'impairment' may also be important. We will continue to look at the technical aspects of type-approval for speed cameras.

Detecting difficult targets. We will continue to research into the significant technical challenges of detecting difficult targets using scanning and CCTV techniques. Such targets include:

- suicide bombers;
- chemical, biological, radiological, nuclear and explosive (CBRNE) materials;
- drugs;
- anomalous behaviour of individuals; and
- guns and knives.

While the science in some of these areas is well developed, increasing the capacity of the police is important. For example, the detection of knives and guns using electronic detection is well developed, although further work is still required to increase throughput with a low false alarm rate. Research into stand-off detection and hand-held technology for the police would also significantly increase capability in this area.

Imaging and closed circuit television (CCTV). Closed circuit television is used by public-sector and private organisations for a wide range of purposes, from private companies guarding their perimeters and premises to local authorites and the police protecting public safety (see Cross-cutting priorities, Surveillance and responding to local needs). The Home Office currently produces a range of publications to help in this area, including:

- guidance on recruiting, selecting and training operators;
- the best layout for control rooms;
- advice on performance standards; and
- how to retrieve videos from CCTV systems.

During the period of this strategy we will carry out a programme of research and development to support the National CCTV Strategy[17]. This will build on the development of the Universal Viewer to assist police forces in viewing recordings from CCTV cameras. It will also develop systems for handling major incidents and integrating information from a large number of cameras – for example sorting according to geography, timelines and specific 'events'. Facial recognition from CCTV cameras is another major challenge we will be investigating.

Unmanned Aerial Vehicles. Unmanned Aerial Vehicles are likely to become an increasingly useful tool for the police in the future, potentially reducing the number of dangerous situations the police may have to enter and also providing evidence for prosecutions. However, we will need to investigate how such vehicles could be used, and their ability to provide high quality evidence for convictions and to support police operations in 'real time'.

Cultural and societal issues. The capacity for the police to be involved in cultural and societal issues is an area that needs further research and consideration. For example, increased migration has raised the issue of the role the police could play in assisting the integration of migrants. There are cultural differences in the perceptions of law enforcement. We need to understand what role the police can, and should, play in this.

17 www.crimereduction.homeoffice.gov.uk/cctv/cctv048.pdf

Forensic science

We created the role of the Forensic Science Regulator in 2007 to regulate quality standards for forensic science used in the criminal justice system (see Section 3). The Regulator's role was created partly in response to recent problems with quality standards and some scientific expert evidence in this area, but also because of the need to regulate the Forensic Science Service alongside other forensic suppliers as it gains more independence from the Home Office.

We also have our own forensic capability to research techniques and support the police in the development of fingerprint and footmark forensic analysis (but not DNA-related forensics). We will continue to undertake research, particularly on taking samples in challenging and difficult environments. A specific challenge is the development and validation of probabilistic matching of forensic patterns, including fingerprints, and potentially for facial comparison.

We will maintain a wider interest in forensics, including the use of DNA, to ensure that policy and practice in the criminal justice system keep up to date with the latest scientific developments, although we do not anticipate funding any research in the area of DNA forensics during the period of this strategy.

Police workforce planning

The recruitment and career progression of officers from Black and Minority Ethnic (BME) backgrounds is important for the police service. We need research to explore the use and effectiveness of Positive Action strategies in recruiting BME officers. We also need to find out why BME communities are better represented among PCSOs than among police officers and how this could be improved. We also need to undertake research on staff retention, exploring why some officers leave the police service within the first six months of service; whether there are any differences in the age, sex or ethnicity of those who leave early; and what, if anything, could be done to improve retention among BME officers.

Workforce demographics may also present challenges in the future and may require research to understand how they may affect our ability to ensure we can attract the right numbers of police who are trained or qualified to carry out the roles required in the future (see Cross-cutting priorities for research on population demographics and understanding its impact on police workforce planning). We also need to maintain an understanding of how changes in technology and strategies may affect policing including, for example, the use of hand-held computer devices, surveillance techniques and Neighbourhood Policing, and their impact on police numbers and roles.

Protecting the police

We will continue to set and develop standards for body armour for the police and other enforcement agencies (e.g. immigration officers). Although we do not envisage a significant expansion of this work over the period of this strategy, it is vital to the safety of our police that we maintain a strong capability in this area.

Detecting crime

The research literature on how authorities can detect crime effectively and efficiently is relatively modest. In recent years, studies have been dominated by evaluating new forensic techniques. Few studies have applied experimental or quasi-experimental approaches and hence the 'what works' evidence is limited. However, crime detection remains a critical, resource-intensive policing process, consuming a sizeable proportion of police resources. Crime detection is also an area where administrative data continue to indicate a wide range of performance by police forces and Basic Command Units (BCUs), and one where different offence types often require different approaches. The relationship between crime detection and a deterrence effect remains complex and poorly understood and requires further research.

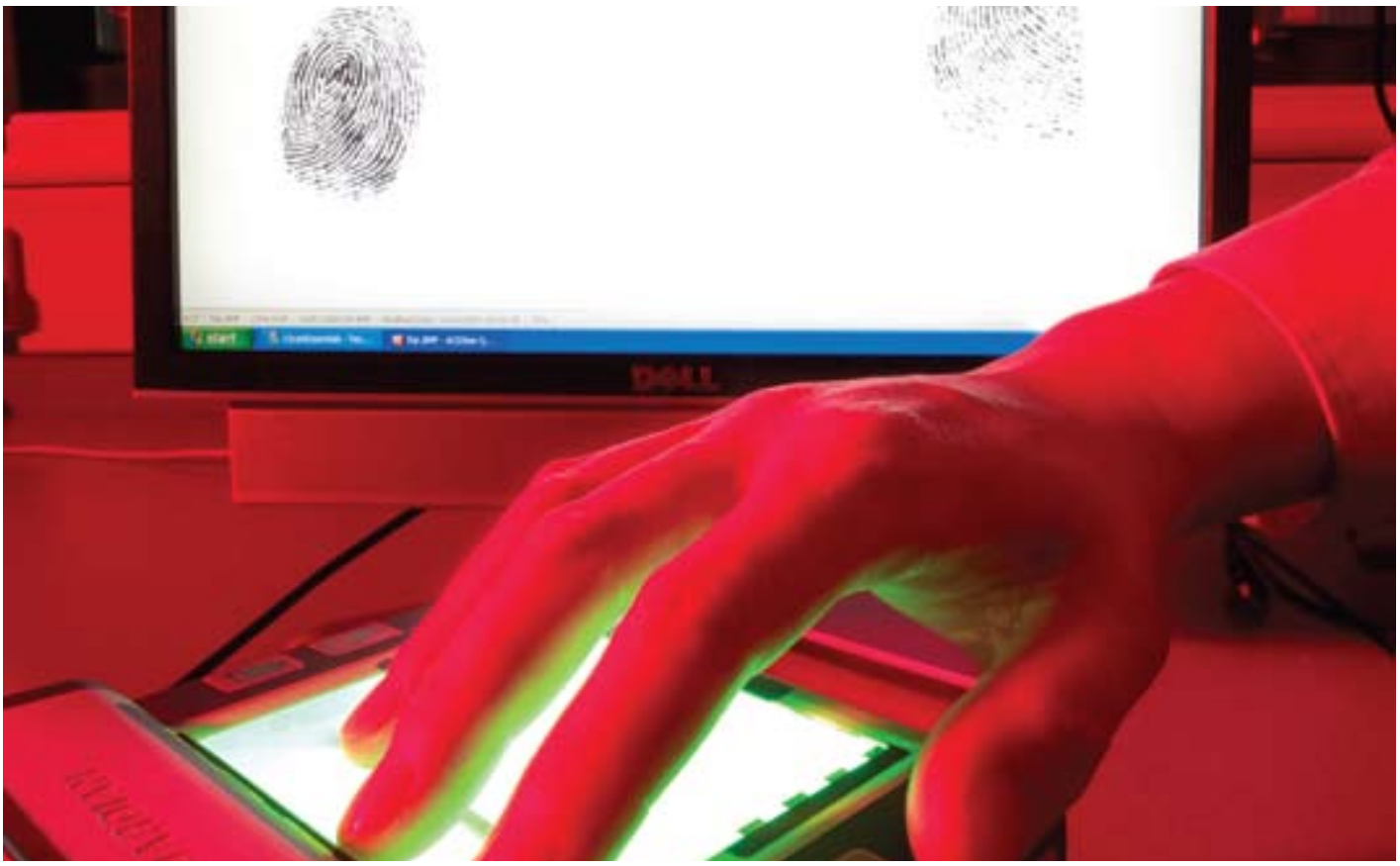
We need a clearer understanding of how organisational, human and technological factors can influence the detection of particular crime types. Identifying the most effective processes by which lower-level offences are selected for further investigation and improving

'effective' investigators' problem-solving techniques are key knowledge gaps. We will consider how research can generate additional evidence to guide investigators' decision making and whether dedicated investigators and specialist investigator units should be developed. We need to know more about how investigator training and accreditation adds value in securing improved outcomes. Finally, looking at the cost benefits of using technical and non-technical investigative tools and identifying the merits of proactive versus reactive investigative approaches are other themes which would improve our information.

Case study: Policing – Statistics on knife crime

Data collection on knife/sharp instrument crime was instituted from April 2007, covering robbery and categories of serious violent crime. To set this in place it was necessary to plan early in 2006, developing suitable definitions and steering the request through the Annual Data Requirement Consultation process. Although the profile of knife crime had been rising, there was a need to convince police stakeholders to support an appropriate central requirement. The support of the ACPO lead for knife crime was essential in gaining acceptance for this data collection and was also important in extending the scope of the collection from April 2008. This is a good example of the need to anticipate emerging issues well in advance as time is needed to convince the police of the need for a collection and to alter police source systems. It also led to the high-profile release of knife/sharp instrument figures as part of the annual bulletin on crime published in July 2008. This was then followed up by information on trends in the next quarterly bulletin.

IDENTITY MANAGEMENT



Our objective is to:

Safeguard people's identity and the privilege of citizenship

Sir David Varney's service transformation review (December 2006), which followed the Transformational Government Strategy, included key recommendations for transforming public services, with good identity management playing an essential role. A consistent approach to identity management improves access to services for those entitled to them, facilitates the design of services tailored to the needs of users and is central to protecting people's personal details from misuse.

The cross-government Identity Management Strategy Group – chaired by the Permanent Secretary of the Home Office – is leading the work to develop an identity management strategy for public services in the UK. Current plans are to publish the strategy for consultation in early 2009.

The National Identity Scheme forms a major part of the strategy. This will help protect against identity fraud and illegal working, reduce the use of multiple identities in organised crime and terrorism, make it more difficult for those trying to abuse positions of trust and make it easier for individuals to prove who they are.

The first UK identity cards were issued in November 2008 to foreign nationals from outside the European Economic Area (EEA) who had successfully applied to remain in the UK. The cards show the holder's photograph, name, date of birth, nationality and immigration status and contain a secure electronic chip holding biometric details, including fingerprints and a digital facial image.

As we continue working towards the National Identity Scheme and other identity management systems, we will use a mix of sciences – social science, physical sciences, operational science and economics – to deliver and ensure the integrity of the scheme. We will also draw on knowledge and practice developed overseas.

The Identity and Passport Service (IPS) will publish its Science and Innovation Strategy in 2009. This will set out the need for a coherent innovation strategy to meet the future needs of the National Identity Scheme and the IPS's intention to invest in innovation and develop new approaches. It will be forward-looking and bring together innovation and horizon-scanning work with the IPS's operational business, risk management and policy work. It will provide details of the broad 'futures' thinking behind the National Identity Scheme and the specific thinking in particular areas of science, technology, business processes etc.

Planning and preparing for the future

We will develop a greater horizon-scanning capability to understand the potential futures for identity-related services. This will influence the business changes that the Identity and Passport Service (IPS) will need to make.

Preparing for the potential future of identity services will require a thorough knowledge of technologies and in particular, relevant ICT developments. For example, significant step-changes in computing speed could enable 'one-to-many' matches to be completed within a matter of seconds. This could change the way biometrically-enabled identity 'tokens' are used. We will maintain a high level of understanding of what is possible in terms of technological and scientific advances and their application to identity management. We will continually monitor how advances in physical sciences and IT can improve the processes of securely creating and using the identity token/card and enrolling biometrics. Current identity 'tokens' are credit card-sized cards. We will need to consider both future technological and sociological changes that may make alternative kinds of token more attractive.

Biometrics

Biometric technologies can be used as part of a wider identity management system to link an identity with an individual – they are not a solution on their own. They are used across identity management systems, including for biometric residence documents, visas, the IRIS (Iris Recognition Immigration System) project, and the proposed National Identity Scheme. Specifically, there are areas of research which offer potential benefits, such as the relationship between biometric quality and the characteristics of the enrolee, and biometric ageing, or ensuring that the biometrics we enrol can still be easily matched as individuals age. We need to stay abreast of ways of countering biometric 'spoofing'. There is potential for standards to be developed to deal with handling of exceptions, user-friendly signage and testing in operational situations. We will carry out our work on standards in conjunction with international standards bodies.

We will also maintain our understanding of, and evaluate, a wide range of biometric technologies to ensure that they are used to benefit the public and the department. Key biometric technologies, in addition to those currently used, include two-dimensional face recognition, speaker recognition and iris recognition. Others with potential include signature, hand/finger geometry and three-dimensional face recognition.

Societal aspects and security

We will need to understand what the public wants from government identity management systems and how best we can enrol individuals. Any change needs to be balanced against the need to protect privacy and prevent fraud. We need to use and develop fraud analysis techniques, building on existing work, to understand patterns of behaviour in document use to reveal patterns of fraud. Understanding what makes fraudulent identity documents valuable will inform our decision making, and reduce the value of being involved in crime. We also need to increase our understanding of what drives fraud, including understanding who is carrying it out and what is likely to have an impact on levels of fraud.

Technologies to detect deception will be important for ensuring the integrity of the National Identity Scheme, for example technologies to ensure the integrity of the biometric sample, photograph integrity checking and voice risk analysis. Other technologies may also be useful, including thermal imaging and computer surveillance.

In addition to fraud we will continue to research technological advances to reduce criminal activity in relation to identity management. This will include assessments of susceptibility to new types of criminal attack – for example, the impact of 'denial-of-service' attack and biometric spoofing. We also need to constantly review the vulnerability of Public Key Infrastructure (PKI) and how we can maintain systems that are secure.

As we increase our interviewing of passport and visa applicants to reduce fraudulent applications, research is needed to improve our understanding of the science and the psychological aspects of 'interviewing' to help ensure that the right decisions are made consistently by interviewers throughout the UK and overseas. This research will need to build on existing research in this area, but tailored to the specific needs of the IPS.

Finally, we need to understand the wider benefits that making better use of identity information could deliver and how we might be able to use this. For example, how it could improve social cohesion by helping to counter discrimination and build trust as those legally entering the country will be able to prove their right to be here and to access services.

Case study: Identity management – using biometrics

The Technology Strategy Board, working in partnership with HOSDB and the IPS, set a challenge to the academic and commercial communities of developing a new generation of tools to safeguard the privacy of users of enhanced services. These public and private-sector services will benefit from increased personalisation to the user, alongside uniform user interfaces from a wide range of providers. At present there are no simple and easy-to-use solutions which offer comprehensive ways of enforcing privacy commitments, while implementing tightly defined and informed consent to the use of personal data. Social scientists and technologists in three consortia (EnCoRe, VOME and Privacy Value Networks) are developing integrated solutions to be validated across diverse social and demographic groups. With additional support from the Engineering and Physical Sciences Research Council (EPSRC) and the Economic and Social Research Council (ESRC), this work represents an investment of almost £7m, placing the UK in the forefront of meeting the demand for privacy-preserving services.

BORDER CONTROL AND MIGRATION

Our objective is to:

> *Secure our borders and control migration for the benefit of our country.*

To achieve this we need a wide range of science across all scientific disciplines.

Improving understanding of the drivers of migration

We will need to increase our knowledge about the drivers of migration, including considering the totality of forces across the world that affect population movements, such as global and regional economies, food shortages, climate change, EU policies, development of human rights legislation and agreements, and civil unrest. We also need to improve our understanding of what encourages people to come to the UK in particular, where in the UK they go, and why and what would induce them to stay, including the drivers of take-up of British citizenship, or leave.

Differentiating between European citizens exercising their rights to free movement from non-Europeans that are subject to immigration control will be an important research priority to inform policy and operational decisions, as will be differentiating between different routes of entry for non-European citizens (for example work, family and asylum).

We will also need research to improve our understanding of emigration of foreign nationals and UK citizens from the UK, especially recent A8 migrants – those from the eight Eastern European countries which joined the EU in 2004. This will include understanding which groups are, and will be, leaving the UK, their motives for leaving, and destination.

Understanding the costs and benefits of migration

Controlling migration to benefit our country, and supporting the Points-Based System, will require a greater understanding of what migration is needed in terms of numbers and skills of migrants. Further understanding of the economic and social impacts of migration at both a national and local level will also be required and how these are affected by changes to the general economic climate. We will continue to use and develop the use of the Migration Advisory Committee and Migration Impacts Forum to help with this (see Section 4).

There is a need to improve our understanding of public perceptions and confidence in relation to migration, including: the role of citizenship, the impact of local economic conditions on social cohesion and migrant integration, and the public perception of migrant integration. In deepening our understanding in this area we will engage with other departments particularly the Department of Communities and Local Government (DCLG) and other sources of funding.

Case study: Migration – Points-Based System

The UK Border Agency's research on employers' perceptions of migrant labour and the new sponsorship arrangements for the Points-Based System (PBS) supported the Agency's strategic objective to 'implement fair and fast decisions'. The research consulted key stakeholders – employers and educational organisations – to ensure that key concerns regarding PBS implementation were addressed.

In-depth interviews conducted with employers of migrant labour formed part of the preparation for the PBS and aimed to improve the knowledge underpinning policy and operational improvement in systems for employing migrant labour in the UK. The research demonstrated employers' heavy reliance on migrant labour and their positive perceptions of migrant workers, as well as examining attitudes towards the PBS to inform early policy development.

Focus groups conducted with potential PBS sponsors (for Tier 2 – skilled workers and Tier 4 – students) explored attitudes towards the proposed sponsorship arrangements to inform policy development for the sponsorship rules. Overall, the research found support for the proposed arrangements, with Tier 2 employers in particular citing advantages in terms of increased control and streamlined processes. Findings also identified pertinent concerns about the new arrangements, particularly for educational organisations, that required consideration and in some cases changes to policy, prior to final policy development.

Border security

A key priority for us over the next three years will be developing the single integrated border force, combining the work of immigration officers and customs. Both technological innovation and operational research, examining the end-to-end processes of border control and customs, could help us develop this single border force and maximise efficiencies.

Research into the significant technical challenges of detecting difficult targets will continue to be an important priority for us. In addition to targets outlined in the crime sections, the identification of drugs, people and large volumes of paper money is of specific importance to the border environment. Screening for multiple targets quickly and reliably remains a significant challenge.

We also need to ensure that frontline staff benefit from technical developments, both for personal protection and to help their work. We can learn from the development of technology for the police, but UKBA officers specifically need both static (for immigration desks) and mobile (for enforcement officers) technologies.

Making our borders secure means continually assessing threats. This will help us to stay ahead of criminals with regards to biometric and other technologies used for identification and in documents to support operational activity at the border.

Research to understand trafficking of people, including motivations, routes, links to wider criminality and understanding the effectiveness of appropriate counter-measures will also be important.

We require research into technologies to further automate border processes. This will include both technological solutions and operational research to ensure that passenger throughput and human interfaces are maintained. It will also need to include reliable and efficient biometric technologies. This research will also need to consider the diverse range of ports where new technologies will need to be deployed, from large passenger airports to small-scale seaports. A consistent roll-out of new technologies and processes for automating border movements will be essential.

Enforcement

We need to develop our evidence base to help us tackle illegal working and other forms of immigration crime. In particular, what best works in terms of making the country less attractive to illegal immigrants.

Over the next three years we also need to consider technologies that can be used to ascertain information (where there is doubt) about an immigrant's identity, age, and country of origin, including where people have travelled from and through. This will include assessing how reliable such technologies are and potential legal and ethical considerations.

Case study: Borders – detecting stowaways

The Home Office Scientific Development Branch (HOSDB) has been working with the UKBA on methods for detecting stowaways attempting to illegally enter the UK hidden in trucks or other vehicles. Methods of detecting human heartbeats is one area being investigated.

HOSDB, because of its experience in both physics and acoustics, was asked to provide technical advice to the UKBA on procuring a new specialist building facility for this purpose (costing around £1million) and suitable heartbeat detection equipment, which would be based at ports of entry.

In order to offer the most effective advice, it was essential to understand the environments in which UKBA search teams operate. Therefore HOSDB visited several UKBA sites both in the UK and Europe. These visits proved invaluable, allowing HOSDB to identify specific environmental parameters that might have affected the viability of some of the technical solutions currently available, as well as highlighting difficulties with other non-technical aspects. As a result of this research UKBA decided to consider other technological approaches that might better tackle the stowaway detection problem. It also provided them with a scientific basis for future stowaway detection studies.

SECURITY AND COUNTER-TERRORISM

Our objective is:

> *To reduce the risk to the United Kingdom and its interests overseas from international terrorism so that people can go about their daily lives freely and with confidence.*

The government strategy to achieve this objective was established in 2003 and is known as CONTEST. A new version of this strategy is soon to be published to reflect the evolving threat, its underlying causes, our achievements to date and future priorities. The Office for Security and Counter Terrorism (OSCT) within the Home Office is responsible for the continued development of this strategy, and its implementation and governance. CONTEST is an integral part of the wider National Security Strategy of the UK published in March 2008[18].

CONTEST continues to be based around four work streams (*'the four Ps'*), each with a specific objective:

- **PREVENT** **To stop people becoming terrorists or supporting violent extremism**
- **PURSUE** **To stop terrorist attacks**
- **PREPARE** **Where an attack cannot be stopped, to mitigate its impact**
- **PROTECT** **To strengthen our protection against terrorist attack**

Science and technology plays a role in underpinning all four Ps.

The current approach to science and technology in CONTEST is set out in the UK Security and Counter-Terrorism Science and Innovation Strategy[19], published in June 2007. It aims to:

i) establish a cross-government approach to science and technology in support of CONTEST;
ii) improve horizon-scanning for future threats and new scientific developments;
iii) increase collaboration with international partners; and
iv) cultivate a strong and innovative counter-terrorism market.

Cross-government approach to science and technology

Scientific and technological support to CONTEST is provided by a wide range of government departments and agencies. This work is co-ordinated by OSCT and is underpinned by a planning framework that maps science and technology against CONTEST priorities. The Government's Chief Scientific Adviser, policy leads, end-users and scientific experts are all involved in the governance.

18 www.cabinetoffice.gov.uk/reports/national_security_strategy.aspx

19 www.security.homeoffice.gov.uk/news-publications/publication-search/general/science-innovation-strategy1

Stronger links have been developed between OSCT and key government science and technology bodies, including the Ministry of Defence Science and Technology Counter-Terrorism Centre, and those involved in the delivery of science and technology to the security and intelligence agencies.

The Government's Chief Scientific Adviser has set up a panel of Departmental Chief Scientific Advisers to consider counter-terrorism issues. The group has met several times and has considered issues such as CBRN and CT Horizon Scanning. They will also be peer reviewing the science and technology work within OSCT.

Horizon scanning

In support of the broader CONTEST strategy we have developed improved arrangements for reviewing future developments in science and technology that may have an impact on terrorism. This has identified a number of new technologies which could have considerable impact either on the threat we face from terrorism or on our ability to counter that threat. They include the pace of change in technical domains and the access and speed of adoption of technical advances. The horizon scanning in the Office for Security and Counter-Terrorism is part of the wide Home Office horizon-scanning community (see Section 4, Horizon scanning) and collaborates with the Home Office central horizon-scanning team, the Horizon Scanning Centre in the Government Office for Science and the National Security Secretariat in the Cabinet Office.

International collaboration

Our closest international partners remain the US and the EU. We will continue to strengthen our partnerships with the US through the Department of Homeland Security (DHS) and, through the Ministry of Defence (MOD), the US Department of Defense.

Case study: CCTV

Collaboration between government, industry and academics has produced a library of CCTV images that can be used to improve the effectiveness of video analytic systems, i.e. the automated tracking of individuals or objects. Companies can use these images to test and develop their own systems while government maintains a secure library of statistically similar images. These can be used to robustly test any systems that are marketed as having an automatic analysis capability.

This cooperation takes place across the wide range of science and technology capabilities. These include those related to chemical, biological, radiological and nuclear (CBRN) threats where, for example, we will continue to benefit from the US's experience in the clean-up and remediation of contamination resulting from the anthrax letters in 2001.

In Europe, our principal engagement will continue to be through the EU and the Framework 7 mechanism. This brings UK industry, small and medium-sized enterprises (SMEs) and academia together with international partners to fund the use of available and evolving technologies in support of European security. The first Framework 7 security programme was launched in 2007, with 26 of the 44 selected projects involving the UK.

Cultivating a strong and innovative counter-terrorism market

The private sector has a key role to play in the local, national and international delivery of CONTEST. The UK possesses many world-class capabilities in the defence and security field, in part reflecting the legacy of Irish terrorism but also reflecting the UK's strong scientific and academic base.

Government has a long track record of working with the science and technology private sector across the military, security and intelligence markets. However, the emergence of the current threat and the development of CONTEST requires new thinking about the ways in which this engagement should be managed collectively with key suppliers, involving trade associations, Research Councils and academia.

In 2007 we supported the creation of the Security and Resilience Industry Suppliers' Council (RISC)[20] as a

20 www.sbac.co.uk/community/cms/content/preview/news_item_view.asp?i=14888&t=0

focal point for government to liaise with the private sector on counter-terrorism requirements. RISC is an alliance of suppliers, trade associations and academics, comprising over 2,000 companies. They range from prime contractors and global leaders through to small and medium-sized enterprises (SMEs) and start-ups.

Case study: Tolerability of residual hazard guidance

No guidance had previously existed for local authority emergency plans or to inform Recovery Working Groups about how much chemical or radiological material could be left within an environment following a terrorist (or similar) event. Guidance has been produced which indicates such levels for members of the public and workers. The guidance is being disseminated to local authorities via the Cabinet Office Gateway Portal and directly to departments, agencies and services. To our knowledge this is the first time that such guidance has been produced, worldwide.

Working with RISC, we have set up joint Industry Advisory Groups to exploit government-funded research, develop CONTEST requirements, focus private-sector investment and enable access to innovation. The groups cover:

- CBRN;
- the Critical National Infrastructure;
- Information and Communications Technology; and
- suicide bombers.

Next steps

Following the forthcoming publication of an updated CONTEST Strategy we intend to update and republish the Security and Counter-Terrorism Science and Innovation Strategy. This will be followed by a brochure offering more specific guidance for industry and key partners on the challenges we face and how science and technology can contribute to addressing them. It will also outline the Government's priorities for developing capabilities and the engagement routes to access the UK's world-leading private-sector innovation base. This work is still underway, but our current priorities for development include the following.

- Social Sciences – whilst there is a growing body of research relating to the process of radicalisation to violent extremism, more needs to done to develop robust models and measure the impact of government programmes. This understanding is central to the PREVENT agenda. The application of social science techniques in other areas of the counter-terrorist agenda is relatively new, but examples of potential use include research into the identification of behaviours displayed by individuals with hostile intent, which links strongly into ongoing developments in PROTECT.
- Communications – the communications revolution has made easier the spread of violent extremist ideology and propaganda. Our priority is to understand the new ways terrorists are communicating and how they use new media to spread their violent ideology. This is also key to the work in PREVENT.
- Biometrics – this area of technology is becoming ever more important for its uses in security and identity management, which are core parts of the PROTECT programme. Similarly, improvements in non-compliant recognition and real-time analysis could yield significant results, which would aid in PURSUE.
- Chemical, biological, radiological and nuclear threats (CBRN) – significant science and technology input is required both to understand the threat we face and to develop solutions across the range of CONTEST priorities, particularly PREPARE and PROTECT.

Case study: A CBRN release in an urban area

OSCT worked with academia to produce a highly acclaimed training aid for first responders. This demonstrates visually how CBRN (chemical, biological, radiological and nuclear) material disperses in an urban area. This has been shared with the US, and Japan is now developing a similar aid.

- Explosives – the threat from the terrorist use of new explosive materials is real and potentially more innovative than we have faced in the past. Timely identification and characterisation of these new explosives is a large piece of technical work that needs to be carried out in a co-ordinated cross-government manner. This work is essential in carrying out the PROTECT programme. In adddition, science and technology can help our understanding of the likely impact of an explosion and the best way to respond, which is a key part of the PREPARE programme.

This is only a small selection of the areas where science and technology can help in the fight against terrorism.

SECTION 3
Science regulation

FORENSIC SCIENCE REGULATION

The post of Forensic Science Regulator was established in 2007 in response to a recommendation from the Parliamentary Science and Technology Committee following the opening up of the market to competitive tendering for the supply of forensic services. In light of these changes it was seen as essential to ensure that the integrity of, and confidence in, the criminal justice system was maintained and that a level playing field existed for all suppliers.

The main role of the Forensic Science Regulator[21] is to set and maintain quality standards for the use of forensic science for the criminal justice system in England and Wales, so that the courts and the public can have confidence in the reliability of forensic science evidence. The scope of regulation spans the whole investigative and judicial process from the supply and use of suitable materials, through the crime scene collection and analysis of forensic exhibits, to the presentation of evidence in court.

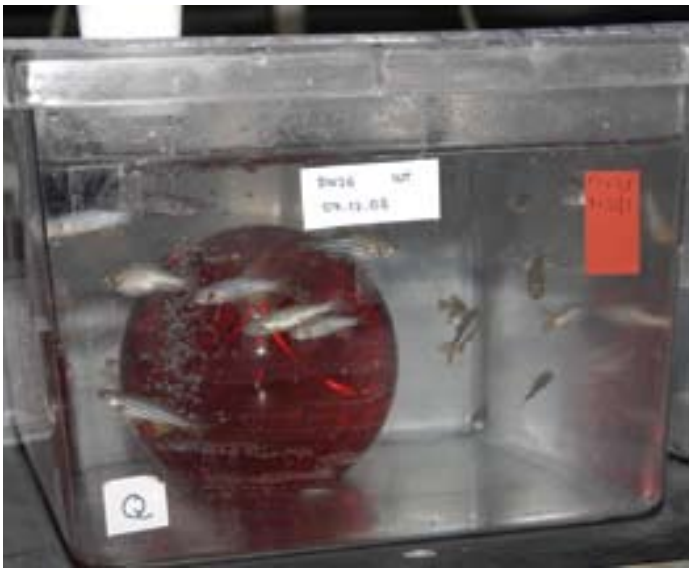
The work of the Regulator involves, but is not limited to:

- identifying the requirement for new and improved quality standards;
- leading on the development of new standards where necessary;
- providing advice and guidance so that service providers will be able to demonstrate compliance with common standards – for example, in procurement and in the courts; and
- ensuring that satisfactory arrangements exist to provide assurance and monitoring of the standards.

The Forensic Science Regulator is appointed by the Home Secretary and sponsored by the Home Office, but is a public appointee and as such operates independently of the Home Office on behalf of the criminal justice system as a whole. This independence allows the Regulator to make unbiased recommendations and decisions. The authorities in Scotland and Northern Ireland have agreed to contribute to and adopt the regulation of forensic science quality standards. This means that the standards will apply to all three criminal justice systems across the United Kingdom.

21 www.police.homeoffice.gov.uk/operational-policing/forensic-science-regulator/

The Regulator is supported by the Forensic Science Advisory Council. Its membership is drawn from a wide range of relevant organisations and provides the Regulator with a wide breadth of skills and experience.



ANIMALS IN SCIENCE

The Home Office has policy and operational responsibility for the impartial, effective and efficient regulation of animal research in Great Britain.

Public and political confidence in the regulatory system are essential if the UK is to maintain successful and sustainable biomedical research and contract-testing sectors while at the same time preventing any unnecessary suffering to animals. Not only are these sectors important to the UK economy but also their outputs are critical to developing improved healthcare technologies, and better protecting man and the environment.

At the same time, accepting that much of the science base can operate transnationally and need not remain or invest in the UK if better opportunities are available elsewhere, the regulatory system must not only be impartial and effective but must also minimise the regulatory burden it imposes on the science base in terms of resource and compliance costs and time taken to make decisions.

There are three Home Office priorities relevant to this startegy.

1. There are both government and departmental commitments to reduce the regulatory burdens by 25 per cent by 2010. While some economies and efficiencies can still be made with the current operating systems, the immediate imperative is to fund, develop and deploy a modern IT infrastructure (and associated working practices) to enable end-to-end e-business. This will generate substantive savings in resource costs to be passed on to users. Investment in such a system at this time is considered to be business critical.

2. In November 2008 the European Commission published its proposal to revise Directive 86/609/EEC, which provides the European legal provision for the regulation of animal research. While the UK negotiating position will welcome the introduction of new, harmonised measures which provide a level playing field within Europe and which incorporate technical progress, it will also seek to ensure that these benefits are achieved by means which benefit science and animal welfare without compromising the success, sustainability or competitiveness of those we regulate.

3. The Government is committed to assisting with the development, validation and acceptance of alternative methods which replace, reduce or refine the use of animals in science. The Home Office previously funded research in these areas, but in order to ensure that government spending in this area is used to best effect, we now part-fund the National Centre for the 3Rs.

Thus, although we do not directly commission research relevant to our policy and regulatory functions, the commitment to, and delivery of, impartial, effective and efficient regulation are critical to the success and sustainability of key elements of the UK science base.

SECTION 4
Delivering the Science and Innovation Strategy

HOME OFFICE SCIENCE CAPACITY

The Home Office uses fair and transparent recruitment processes to identify the best staff to do the wide range of jobs available. Staff are recruited into specialist disciplines either through externally run open and fair competitions, or through internal trawls. Science and Research Group (SRG) has staff from the specialist disciplines such as social researchers, statisticians, economists, operational researchers, veterinarians, engineering and the physical sciences as well as administrative and support staff providing corporate services. For its specialist roles, SRG has developed strong links with a wide range of universities to ensure it continually attracts diverse and appropriately skilled and qualified applicants. SRG also provides opportunities to the diverse community of staff within the Home Office who support the delivery of science and research, allowing them to develop and progress. This investment in staff ensures that SRG has a flexible and highly skilled in-house capability.

The Home Office works closely with a network of Heads of Profession to ensure its specialist recruitment processes are compliant with Professional Skills for Government standards and test a mixture of core people and programme skills as well as specialist skills. Often recruitment involves some form of assessment centre including tests and an interview. External competitions are advertised in the media and on the Home Office website.

Once recruited, learning and development is a key part of a career in science and research, including a range of corporate specialist training, opportunities for mentoring, continuous professional development and developing new skills. We work with the National School for Government and central Home Office and universities to run bespoke specialist courses, which link directly to an overall Science and Research Learning and Development plan. Within the physical sciences we actively encourage and support the attainment and maintenance of professionally recognised designations such as CPhys, CChem, CEng and CSci with the appropriate professional bodies. Links with the

institutes, societies and other bodies are formalised through virtual "professional networks" which are each overseen by a member of the HOSDB senior management team.

Science and Research Group (SRG) staff are based a various sites across the country including central London, Croydon, Sandridge (St Albans), Langhurst (Horsham), Cambridge, Dundee, Shrewsbury and Swindon.

HOSDB site, Sandridge

MANAGING STATISTICAL INFORMATION

In April 2008 the Home Office made organisational changes to ensure that all statisticians reported directly to the Home Office Chief Statistician. This change means that the statisticians no longer work in embedded teams reporting to policy directors. This change intentionally coincided with the launch of the UK Statistics Authority as an independent body reporting directly to Parliament as legislated for in the Statistics and Registration Service Act 2007. As Head of Profession for Statistics, the Home Office Chief Statistician reports to the National Statistician on professional matters.

The Home Office offers all statistical staff the opportunity to join the Royal Statistical Society (RSS) to allow them to develop their professional experience and expertise through RSS activities and literature. The Surveys Design and Statistics sub-committee, a sub-committee of the Home Office Science Advisory Committee, regularly meets to advise the department on matters relating to the use and production of statistics and surveys, including the quality of statistical data, its collation and analysis, survey design and, statistical developments outside the Home Office and how they might impact on the department.

Building on the theme of independence and improving trust in statistics, the Home Office led the way for the Government Statistical Service with the first independent statistical press conference. This was held off site and was hosted by the UK Statistics Authority. This first event covered the annual crime statistics published in July 2008 and was followed by a Home Office joint event with the Office for National Statistics and Department for Work and Pensions (DWP) on the publication of population and migration statistics in August 2008. These events will continue in the coming years. The legislation also requires, from 1 December 2008, a significant reduction in pre-release access to National Statistics, both in terms of the time and the number of people who are allowed access to prepare briefing for Ministers, allowing them to respond completely at the time of publication. These changes were applied to all Home Office National Statistics publications from 1 December 2008.

The UK Statistics Authority will carry out assessments against the new Codes of Practice for Official Statistics for all National Statistics produced by the Home Office as part of a programme of departmental assessments over the next two to three years. In addition, the Authority will be carrying out a series of Monitoring Reviews, examining the production and publication of official statistics. The first reviews of Home Office statistics will include "Barriers to trust in relation to crime statistics" and "Progress with improving migration statistics". They will be reported on early in 2009.

Major improvements to Home Office Statistics in the next few years include: extending the British Crime Survey to under 16s; improving the quality and the coherent reporting of population and migration statistics across government; and the development of a fully operational Data Hub to allow improved and more efficient collection of data from police forces.

DELIVERING IN PARTNERSHIP

The science required by the Home Office cannot be delivered exclusively by the department; we will continue to work with others to use the best available evidence, technology and expertise to inform and support the implementation of our policies and operations.

Research Councils and universities

The Research Councils are an important route for us to access the wider research community in universities that we need to deliver the science we require. We have, for some time, had very productive relationships with a number of Research Councils. The Home Office

Chief Scientific Adviser will continue to meet with all the Research Councils relevant to Home Office business at least annually. We also have a long-standing concordat with the Economic and Social Research Council (ESRC) and have recently put in place a concordat with the Arts and Humanities Research Council (AHRC) to formalise these relationships.

We will work with the Research Councils to investigate areas of common interest in both research and regulatory roles through, for example, providing expertise to contribute to research programmes (see case study below), joint funding research programmes, and ensuring the efficient and effective regulation of animal research.

Case study: Working with the Research Councils

Recently we worked with the Engineering and Physical Sciences Research Council (EPSRC) in leading a "Sandpit" on screening cargo containers for drugs and other illicit substances. We defined the scope and issue, supplied a Director for the sandpit, and supplied further Home Office technical and operational help to facilitate the process. We worked closely with around 20 academics from across the UK to ensure that they had a clear picture of the practical and operational issues to inform scoping research projects in this technically challenging area. This was very successful and resulted in around £2.7m worth of collaborative and innovative research projects being funded to address this issue. We have established a network to continue interaction with and monitor the progress of the projects.

We have also recently jointly funded ESRC studies on British Crime Survey data looking at public perceptions of anti-social behaviour. In addition, the Home Office also makes regular use of conferences – for example, the British Crime Survey's 25th conference, October 2006, brought together a number of senior international academics to discuss the future of victimisation surveys and related issues. The papers were published as a book[22]. This has improved the quality, relevance and use of science in this area as well as working relationships. We will continue to develop these relationships in the future to help deliver this strategy.

We will also work directly with universities, by funding individual research projects, supporting a number of student projects (BSc sandwich year, MSc and PhD) at HOSDB and providing support and oversight to both academic and industrial applications for research funding. This may range from the supporting and monitoring of interesting projects to becoming fully fledged partners in the work.

Industry

Working closely with industry is vital to ensure that technologies developed in research are delivered to the market.

We will continue to work with industry and others in developing the innovation fund to facilitate research and development (R&D) into new and emerging technologies to address threats from terrorism in the areas of chemical, biological, radiological, and nuclear (CBRN) and Explosives. We will develop strong working relationships with small and medium-sized enterprises (SMEs) to identify new approaches to these threats and to ensure that good ideas are supported. This will enable the effective exploitation of novel technologies. We will encourage innovative ideas and where these show commercial potential we will help find commercial partners to carry these products forward to the market place for use by first responders. We will further develop relationships and effective partnering with industry, building on the Her Majesty's Government and Security and Resilience Industry Suppliers Council[23] (HMG-RISC) framework and on the effectiveness of Industry Advisory Groups.

HOSDB will continue its close engagement with industry. This includes supporting bids for research and development funding into novel areas as well as providing direct funding to address specific Home Office science and technology needs. This will primarily be carried out by working with SMEs. HOSDB also supports and advises organisations that are developing products for use by government. The standards for equipment and technology produced by HOSDB will continue to be made available publicly. This allows industry to generate business based on complying with these standards.

We will continue to develop our networks and relationships within industry to effectively identify and implement relevant novel technology produced by the private sector.

22 Hough, M. and Maxfield, M. (2007) *Surveying Crime in the 21st Century: Crime Prevention Studies.*

23 www.sbac.co.uk/community/cms/content/preview/news_item_view.asp?i=14888&t=0

Across the Home Office we will continue to meet government targets for investing in SMEs via the Small Business Research Initiative to promote innovation in the private sector. Traditionally, the Home Office, largely through HOSDB, has a strong record in this area with around 20 per cent of our external science funding being spent at SMEs. We will work closely with the Technology Strategy Board to support their work in promoting technology-enabled innovation.

Other government departments

Increasingly, the issues the Home Office faces cut across government departments and agencies, and therefore it is vital that we work with colleagues across government to ensure that the scientific contribution to these issues is co-ordinated and effective.

We will continue to work closely with the Chief Scientific Advisers' network and to contribute to the Chief Scientific Advisers' Committee to promote and co-ordinate the use of good quality science across government. Similarly, we will also work with the cross-government professional groups: Government Social Research (GSR), Government Economic Service (GES), Government Operational Research Service (GORS) and Government Statistical Service (GSS) to promote the use of high quality analytical skills within the Home Office and across government.

We will work closely with other government departments, particularly on joint programmes with the Department for Transport (transport security), the Centre for the Protection of National Infrastructure (protection of national infrastructure), the Ministry of Justice (offender management and prison security), the Department of Health and the Department for Children, Schools and Families (alcohol and drug misuse; young people) and the Department of Communities and Local Government (migration and community integration research) and others where these meet each departments' objectives. We will also continue to work with the wider government agencies including the National Police Improvement Agency (NPIA), the Serious Organised Crime Agency (SOCA), the Association of Chief Police Officers (ACPO) and individual police forces. This enables us to share the expertise, costs and risks in partnership, increases the quality and scope of the work while decreasing the potential for any duplication of effort. We will continue to explore these opportunities where appropriate.

Where the scientific requirements are spread across government, we will strengthen co-ordination and prioritisation by leading and contributing to cross-government sector-specific science strategies. In particular, we are developing, with colleagues, the cross-government drug research strategy and the Police Science and Technology Strategy, both of which are due to be published later this year (2009), and in 2007 we published the Government's Security and Counter-Terror Science and Innovation Strategy, which will be updated in 2009.

International

Links with the international science community are vital to ensure we gain best value for money in our research investment. Since 2004 we have had a treaty with the United States Government for Co-operation in Science and Technology for Critical Infrastructure Protection and Other Homeland Security Matters and we will continue to work with the US and other partners in this area. In the US we also work closely with the National Institute of Justice.

The Home Office Chief Scientific Adviser is a member of the group of International Government Research Directors and the Home Office currently provides secretarial support jointly with the Ministry of Justice in the Netherlands. The current main interest of this group is organising a new International Crime Victimisation Survey for 2009.

Recently we have taken a leading role in establishing the European Migration Network, to bring additional resources into knowledge co-ordination and sharing. We are also one of a number of states participating in a new European Network of Police Technology Services.

We will continue to contribute to the Government Office for Science's Global Science and Innovation Forum as a vehicle for cross-government exchange of information to improve co-ordination of the UK effort in international science and innovation.

PROCURING SCIENCE

The Science and Research Group (SRG) and the Home Office has a diverse range of science and research business requirements. For example, the Home Office externally commissions science and research services where in-house capacity is not available, or will work in collaboration with in-house staff to get optimal outcomes from partnership working. SRG has an in-house procurement and contract management team delivering professional procurement services for all science sourcing across the department. In addition, the team provides shared services support covering externally commissioned social research and analysis for both the Home Office and Ministry of Justice.

The team works closely with both internal and external stakeholders, including the Home Office Commercial Directorate, to deliver value for money to the department by providing commercial and procurement expertise, ensuring the consistent application of policy, procedures and best practice as well as providing access to markets. We are also rolling out new ways of conducting procurement exercises through wider use of frameworks and e-portal options. Overall in 2007/08 the team procured £22m of new social research and achieved £1.7m of savings (7.6%) and £14.7m of new science and technology contracts delivering value for money savings of £1.13m (7.7%).

All social research and analysis under £100K (with limited exceptions) is conducted via the new Social Research and Analysis Framework Agreement, with larger value work (such as contracts for the British Crime Survey) tendered through the competitive route. Science and technology procurement is undertaken for the full range of HOSDB projects and services through a range of framework, call-off contracts and competitive tendering sourcing routes. In addition, the team offers professional advice on the management of intellectual property which is of strategic importance when the department is letting innovative research and development contracts to organisations in academe and industry.

Case study: Establishing the Social Research and Analysis Framework Agreement

The SRG Social Research and Analysis Framework Agreement has transformed the procurement of social research and analysis services for clients within the Home Office, Ministry of Justice and other government departments. It has made the process simpler, more manageable and cost/time efficient in terms of the savings generated during the tendering process and time saved due to pre-negotiated terms and conditions. The Agreement has also resulted in a substantial increase in the number of suppliers for Home Office and Ministry of Justice research with 80 contracts awarded covering a range of seven research topic Lots. Approximately 50 per cent of the suppliers on the Framework Agreement are new to the Home Office.

The Framework Agreement took effect from May 2007 following an OJEU (Official Journal of the European Union) competition and was awarded for two years, with an option to extend for a further two years.

Once the SRG Framework Agreement was let, the second key element of the strategy was to strengthen contract management procedures. To achieve this, a series of procurement seminars were arranged and led nationally by SRG Procurement, with presentations delivered by the Home Office Chief Scientific Adviser and senior representatives from the Ministry of Justice. In addition we produce regular newsletters on framework use and procurement issues and these are available on the Home Office website.

The implementation of the Social Research and Analysis Framework Agreement won external recognition when it was short-listed in the category of "Best Process Improvement" in the CIPS Supply Management Awards 2008.

HORIZON SCANNING

The Government Office for Science's review of Home Office science identified a specific need for horizon scanning to help us identify future threats and opportunities and plan appropriately. While it is obviously not possible to identify all the risks that may arise over a long period, it is possible to plan for those contingencies which are indicated by long-term trends as we perceive them today – and even this level of planning allows us to reduce a range of risks. A central horizon-scanning team has been established within the Economics and Resource Analysis Unit (ERA) which provides technical support

and knowledge management for horizon scanners within the Home Office. It has established a working group to co-ordinate horizon-scanning activities across the department. There are embedded horizon scanners and futures co-ordinators in the Crime Reduction and Community Safety Group, the Office for Security and Counter Terrorism, the Home Office Scientific Development Branch, the National Police Improvement Agency and the Identity and Passport Service.

Case study: Migration Advisory Committee

The Migration Advisory Committee (MAC) undertook a programme of in-house analysis to support its advice to government about shortage occupations under the new Points-Based System (PBS) for immigration. The MAC is independent of government and consists of six labour market experts, whose first task was to advise the Government on which occupations should be included on the "Shortage occupation lists" to be used under Tier 2 (skilled workers) of the PBS. The shortage occupation lists are designed to ensure that UK firms can access skilled migrant labour for occupations that are in shortage, and where it is sensible for that shortage to be filled by migrants. This supports the Home Office's objective to 'secure our borders and control migration for the benefit of the country'.

The Committee adopted a twin approach: combining top-down analysis of national data with bottom-up evidence from employers, unions and other stakeholders. The top-down analysis used quantitative indicators of skill and shortage from national datasets at the most detailed occupational level available. The use of a number of indicators within an economic framework allowed a range of potential factors to be taken into account, while making consistent judgements across different occupations and sectors. The analysis enabled the Committee to critically assess assertions about shortages made by employers and other stakeholders. In November 2008 the Government announced that the MAC's recommended shortage occupation list would be implemented within the PBS in its entirety, with the temporary addition of social workers, while the MAC considered the evidence on that occupation.

The priorities for this central horizon-scanning team for 2008/09 are to:

- identify in more detail the factors of greatest relevance to the Home Office in understanding the future and the evidence base for future trends and shocks;
- develop a knowledge management process for the evidence and findings from system-wide and futures work; and
- identify system-wide risks.

The team has already completed a rapid review of future documents and identified key themes for the Home Office.

Horizon-scanning activities planned for 2008/09 by embedded horizon scanners within the Home Office include:

- a detailed review and scenario-building exercise on crime and the criminal justice system (a joint exercise between ERA, Crime Reduction and Community Safety Group and Ministry of Justice horizon scanners);
- a detailed review and scenario-building exercise by Office for Security and Counter Terrorism horizon scanners as part of CONTEST planning;
- a technical horizon scan (with a strong science focus) being initiated by the Identity and Passport Service;
- two parallel near-future horizon scans focused respectively on strategic and technical issues by the National Police Improvement Agency; and
- a technical horizon scan by HOSDB.

QUALITY ASSURANCE

Project Quality Approval Board

The Home Office Project Quality Approval Board (PQAB) procedure, run by Science and Research Group, is applied to all social research projects and impact evaluations in the core Home Office and its agencies. All Home Office social research projects undergo this quality assurance process before they commence, to drive up the standards of research design and planning and to improve the fit to policy or operational needs. The PQAB process is carried out after the research project has been included in the research programme for the area, and specified in detail, in conjunction with the policy lead.

Part of this process is the "triple key" approval, which ensures that research projects are approved by:

- the responsible Minister;
- the relevant Home Office policy or operations lead, at Director level or above; and
- the PQAB review, under control of the Home Office Chief Scientific Advisor.

Quality assurance in HOSDB

ISO 9001:2000: HOSDB's Business Management System is certified to ISO 9001:2000 and provides assurance to our customers that our work is of high quality and meets their requirements. It consists of a number of reference documents, procedures, work instructions and guidance documents which cover the broad range of business activities undertaken in HOSDB.

Project review: HOSDB holds project approval boards (PABs) to ensure that a project is consistent with Branch strategy, that a range of options have been considered, the identified project approach is likely to succeed, and the project thinking and documentation is mature enough to proceed.

Technical review: is carried out to assess the technical or scientific validity of the approach chosen, the extent of technical or scientific progress and the likelihood of a successful project outcome. Reviewers also ensure that all appropriate technical approaches are considered, technical problems and/or risks are identified and managed early and appropriate external and/or peer review takes place. The first technical review is part of the PAB and subsequent reviews are scheduled as necessary for larger projects.

External reviews

The Home Office science programme is also subject to external review. Individual research projects are peer reviewed by external scientists before publication (see Dissemination and data security). The department's science is also reviewed periodically by the Government Office for Science, as part of the departmental Capability Review and through specialist reviews by the Government Economics Service and UK Statistics Authority.

SCIENCE ADVISORY COMMITTEES

We value the importance of bringing in external specialist scientific advice to scrutinise our policies and scientific programmes.

To this end the Home Office has a number of advisory committees to advise on scientific issues (see Box below for a list of advisory committees and links to further information). Some committees are statutory Non-Departmental Public Bodies (NDPBs), while others provide advice on a less formal basis. We manage our advisory committees according to best practice across government, including following the Commissioner for Public Appointments guidelines[24] for appointments to NDPBs and the Government Office for Science's Code of Practice for Scientific Advisory Committees[25] to inform their management.

Science Advisory Committees in the Home Office

Home Office Science Advisory Committee (www.homeoffice.gov.uk/documents/science-advisory-committee/) (Incorporating the CBRN and Surveys, Design and Statistics sub-committees)

Animal Procedures Committee (www.apc.gov.uk)

Advisory Council on the Misuse of Drugs (www.drugs.homeoffice.gov.uk/drugs-laws/acmd/)

Biometrics Assurance Group (www.homeoffice.gov.uk/documents/science-advisory-committee/)

The National DNA Database Ethics Group (www.police.homeoffice.gov.uk/operational-policing/forensic-science-regulator/about-the-regulator/ndnad-ethics-group)

Forensic Science Advisory Council (www.police.homeoffice.gov.uk/operational-policing/forensic-science-regulator/about-the-regulator/forensic-advisory-council)

Migration Advisory Committee (www.ukba.homeoffice.gov.uk/aboutus/workingwithus/indbodies/mac/)

Migration Impacts Forum (www.ukba.homeoffice.gov.uk/managingborders/managingmigration/migrationimpactsforum/)

24 www.publicappointmentscommissioner.org/
25 www.dius.gov.uk/publications/file42780.pdf

We aim for these committees to operate in as transparent a way as possible; the advice from these committees is published and the minutes of meetings are published on the relevant web pages where appropriate, taking into account security and commercial considerations.

In addition to committees advising on specific areas of the department's remit, since 2003 we have been advised by the overarching Home Office Science Advisory Committee (HOSAC). Members of HOSAC are drawn from the learned societies that are pre-eminent in the areas of science used by the Home Office and, since 2007, the Chairs of the other major science advisory committees in the department. HOSAC is co-chaired by an independent member of the committee and the Home Office Permanent Secretary.

HOSAC has two dedicated sub-groups: the Surveys, Design and Statistics sub-committee (established in 2007) and the CBRN sub-committee. Both these committees are chaired by members of HOSAC with members drawn from acknowledged experts in the field.

DISSEMINATION AND DATA SECURITY

Effective internal and external dissemination of our research is vital to ensure that our messages effectively reach key stakeholders involved in policy and delivery across the department. Additionally, our science and research is available to the public both to allow scrutiny of scientific methods and for public debate on our key outputs, including National Statistics. We produce a variety of publications available on the Home Office website on a wide range of Home Office issues to ensure that our findings are accessible to all those with an interest.

A number of communication specialists work across the science disciplines. For example:

- We provide the Home Office and Ministry of Justice with internet, intranet and editorial support services for social research and analysis. We edit and proof-check research reports and statistical bulletins, keep the websites updated and provide web-ready reports. All research reports are now produced in the user-friendly Home Office research report format as standard, ensuring we focus our research by effectively communicating both key results and policy and delivery implications.

Case study: Statistics on the Internet
We are improving access to our statistics by introducing Statistics on the Internet (SOTI). This is a suite of software designed to allow the public to analyse Home Office and Ministry of Justice datasets (www.homeoffice.gov.uk/rds/soti.html). The system was first made available alongside the release of the latest data on Crime in England and Wales in July 2008. Initial results and feedback suggest that there has been a good take-up of both the Superstar suite of software to view and analyse results at local authority level over a five-year period and the InstantAtlas software that generates maps based on the same data. We are looking now to move beyond the pilot phase to make more of our statistics accessible in this way, although timing will depend on available resources and priorities.

- We manage a pool of external consulting editors and design and layout artists to ensure a professional standard of presentation of research and analysis and National Statistics.

- We manage an external website on which all unclassified physical science and research publications produced by HOSDB are available.

- HOSDB also runs an information service which can be contacted either by telephone or email by our customers, the public and wider stakeholders. We endeavour to ensure all enquiries are answered by the appropriate technical expert.

In addition, science and research conforms fully to Home Office policies on data and physical security, particularly the careful use of personal data within the context of new Cabinet Office Guidelines.

Notes

www.homeoffice.gov.uk/science-research

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