



Home Office

Areas of research interest relevant to the Home Office

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Background

In making and implementing policy, and in supporting operations, science, in its broadest possible interpretation, has a crucial role in all the Home Office's priority areas: crime, policing and fire, migration and borders; countering terrorism and extremism, promoting growth, and transformation. This document sets out some of the key areas where the Home Office would welcome further research. It has been produced by the Home Office's independent Chief Scientific Adviser and the Home Office Science Advisory Council both to help inform UKRI strategy and to suggest avenues of investigation to the wider research community. We welcome collaborative working, and contact can be made through the following e-mail address: research@homeoffice.gov.uk.

While this document is structured by topic, there are obvious synergies between them. Many of the challenges are also relevant to other Government Departments. Some of the most difficult problems are intrinsically interdisciplinary, including those in the humanities and social sciences, as well as those in physical, biological and mathematical, computational and engineering sciences. The digital age has caused enormous social change and presents challenges and opportunities in virtually every area. These include the wide-ranging and growing importance of data science and data analytics.

Behavioural science has much to offer to all areas of Home Office work, to improve our knowledge of drivers of certain behaviours, design effective interventions and better understand impacts of our policies. Examples include, but are by no means limited to: encouraging people to behave more securely online, managing demand for services, encouraging compliance with the law (including immigration law), deterrence methods at the border. We are interested in looking at targeting behavioural approaches, for example looking at what works best for people of different ages, backgrounds *etc.*

Public Safety

Crimes such as homicide and theft, and drugs such as heroin and cocaine have always been of public concern, and there has been a recent focus on areas such as child sexual abuse, modern slavery, new psychoactive substances, online fraud, and online indecent images of children.

The changing landscape of crime:

- Changes in the opportunity structure for crime and in the drivers of the tendency to criminal behaviour, whether social, innate or environmental
- The changing modes and operation of criminal behaviour, the size and characteristics of the offender population, and pathways into offending.
- The nature and extent of business crime.
- Building the what works evidence base for a changing crime landscape.
- How social media can facilitate, monitor and discourage crime and recruitment into organised crime groups.
- Opportunities and threats posed by new technologies, such as the dark web, distributed ledger technologies, the internet of things, additive manufacturing and connected cities.
- Research and development relevant to legislative changes, for example the detection of drugs in vehicle drivers and the analysis and understanding of psychoactive substances
- The social and psychological harm of new forms of crime
- Drivers of serious violence

Modern slavery¹:

- Factors contributing to vulnerability to exploitation, interventions for different groups and individuals, and approaches to targeting these interventions.
- Motivations for committing modern slavery offences, and types of organisations, businesses and services that enable offending.
- Improving outcomes for victims and survivors, including children.
- Barriers to prosecution and seizure of illicit profits, and approaches to ensuring victims receive adequate financial compensation through civil and criminal routes.
- Tackling forced labour in supply chains.
- Prevalence, location and nature of different types of modern slavery in the UK

Child sexual exploitation:

- Interventions to reduce different types of child sexual abuse
- Approaches to parsing images automatically
- Common insights across different “hidden crimes”

Money laundering, alternative currencies and distributed ledger technologies:

- Capability against money laundering and other illicit transactions, including relating to alternative currencies
- Detecting activity and exposing the identity of the perpetrator, or deterring illegal transactions, without disrupting legitimate commerce
- Building security into the design of distributed ledger technologies

Autonomous and unmanned systems (note implications for homeland security as well as public safety):

- Effective use by the police, fire and security services
- Preventing criminal, hostile or mischievous use of autonomous and unmanned systems, or attacks of the systems themselves, especially through “security by design”
- Risk posed across sectors by different types of unmanned aerial vehicle (UAV) and other autonomous and unmanned systems, now and in the future.
- Risks and effectiveness of counter-UAV measures in civilian airspace.
- Developing assurances and standards for technology designed to safely and effectively respond to instances of malicious, illegal use of autonomous and unmanned systems across sectors.

Police and fire services:

- Improving understanding of how changes in crime and non-crime demand are affecting how the police respond to incidents.
- How can police resources be better tailored to variations in work load?
- Strengthening the evidence base on how the police can increase investigative outcomes and reduce attrition.
- Strengthening the evidence base on the measurement of police productivity and how marginal changes in types of police spend can improve outcomes.
- Recruitment, progression, well-being and retention in the police and fire workforces.

¹ More detailed research priorities can be found at Annex A of the 2018 UK Annual Report on Modern Slavery: <https://www.gov.uk/government/publications/2018-uk-annual-report-on-modern-slavery>

- Understanding the current and future demands on fire and rescue services and the capability needed to meet those demands.
- Improving understanding of the activities carried out in the fire system and their effectiveness.
- Monitoring and analysing threats and hazards at incident scenes in real time, including the use of multiple and non-traditional sources such as crowd sourcing and social media
- Constructing secure evidential cases against offenders in a changing technological context
- Coping with the large number of devices and sheer volume of data, especially considering human factors
- Making use of the location of responders and their proximity to risks and hazards in real time
- Clothing and equipment for police and first responders with maximum strength, lightness, wearability and protection.

Forensic science:

- Research and development in all forensic science areas: the rapidly expanding digital forensics; “conventional” areas such as fingerprints and DNA; and many other niche areas. Using general scientific advances and insights in the forensics domain.
- Improving speed and accuracy of existing forensic approaches (for example, rapid DNA profile extraction and analysing seized digital media)
- Digital forensics especially in light of rapid technological change
- Recovering fingerprints from various materials; automatically processing fingerprints; getting additional information (not just the image itself) from fingerprints
- Understanding the contribution of forensic techniques to the Criminal Justice System, within investigations and in court, including issues such as attrition of cases in the system
- Wider role of forensics in crime prevention as well as detection, for example in safeguarding

Extremism:

- Relationship between extremism and integration, dynamics of friendship/familial and community relationships, and links between hate crime, other societal crimes and extremism
- Links between extremism and terrorism
- Role of mainstream and social media in promoting / countering extremist communication, and in recruitment.
- Role of identity and religious faith in promoting and countering extremism
- Characteristics and drivers of prominent extremists and those with wider extremist sentiment; levels and regional variations.

Migration and Borders

Science and analysis play a crucial role in providing the best evidence base to inform policy, and showing the best way forward within a given policy framework. The Home Office’s operational work covers travel and the border, working with the vast majority who comply with the rules and with those that may not: controlling and managing the border; administering passports, visas and asylum applications; applying and enforcing immigration rules. Some areas of scientific interest include:

Supporting operations:

- Allocating resources optimally, including using data science effectively (for example to improve targeting)
- Influencing customer choices, for example encouraging people to use online and automatic systems, or to apply for documents in good time
- Technology or techniques to identify prohibited and restricted articles (for example, people, money, drugs, tobacco, counterfeit goods and species that require a permit under the Convention on International Trade in Endangered Species of Wild Fauna and Flora [CITES])

Identity:

- Using biometrics, digital and behavioural aspects to assure identity and to understand and mitigate the possible deception of systems
- Assuring the integrity of documents (possibly electronic), for example involving distributed ledger technology and advances in materials

Drivers and impacts of migration:

- Impacts of different types of new arrivals on local communities, the economy and public services (monetised and non-monetised costs and benefits)
- Drivers, destinations and other details of emigration from the UK, for those who have been here a short time and for natives or long-term residents

The legal labour market:

- How legal migrant workers are recruited into which markets and their characteristics
- How the supply of foreign workers interacts with indigenous labour supplies, local skills gaps and retraining programmes
- How recruitment of cheap (migrant and native) labour balances against investment in new technology
- Conditions and wages of low-skilled migrant workers compared with native employees

Refugees:

- Supporting those who are admitted, both for their own and for wider benefit
- Equipping refugees for life in the UK and for returning home if/when they can

Homeland Security²

The terrorist and serious and organised crime (SOC) landscape:

- Improved knowledge of the harms and impacts of SOC activity, including the economic impact
- Use of technology by organised criminals, and changes to the threat due to future technologies
- Nature and prevalence of links between SOC and drug trafficking / modern slavery
- Understanding when and where criminal or terrorist behavior is likely to occur, how to deter it, and associated ethical questions
- Exploitation of robust data sources
- Understanding how criminal business models operate and succeed

² More detailed research priorities for serious and organised crime can be found at <https://www.gov.uk/government/publications/serious-and-organised-crime-home-office-research-priorities-april-2018-to-march-2021>

- Understanding how SOC markets work, and how they interact and impact each other

Preventing terrorism and SOC:

- Understanding which individuals are at risk of becoming offenders (and/or victims), for what reasons and at what stages of their lives
- The elements of preventative programmes that are most effective, with whom, when and why
- The role and influence of the internet and social media in the radicalisation process and ways to intervene
- Approaches that deter people from getting involved in cyber crime, moving deeper into cyber crime and/or reoffending
- Combating illicit markets
- Approaches to lifetime offender management and deterrence of continuing criminal behaviour, such as Serious Crime Prevention Orders
- Intervention programmes for offenders who view online indecent images of children

Protection of infrastructure, transport, crowded and open places:

- Security in high throughput and heavily populated environments
- Real world threat detection and mitigation capability, ensuring minimal impact on privacy rights. This includes the exploitation of more of the electromagnetic spectrum; compressive sensing; connectivity; use of video analytics; the internet of things; wider use of smart technologies including tracking and remote systems; advanced materials; informatics.

Threats in the stream of commerce (including people, vehicles, freight, parcels; to detect threats to safety, security, economy, health):

- Detecting threat materials of all kinds without disrupting business, through automation and improved operator effectiveness. For example: combining novel technology with big data analytics; systems approaches; behavioural insights
- Opportunities and capabilities to intervene and mitigate risks

Chemical, biological, radiological, nuclear and explosives (CBRNE) and firearms:

- Use of canines and alternatives for detection
- Low-cost tools for detecting threat items in bags
- Novel methods of predicting/detecting explosive manufacture
- Fast/high throughput trace detection and body scanners
- Simulants for safe detection equipment testing and canine training Identification of CBRNE materials
- Identification of CBRNE materials
- Understanding, deterring and mitigating the possible impact of any particular CBRNE event
- First responder capabilities and approaches to decontamination and recovery

Animal Experiments

The Home Office is responsible for regulating animal experimentation and the underlying policy.

- The strengths and weaknesses of animal models
- Developing non-animal technologies
- Pursuing every aspect of research in the 3Rs (Replacement, Reduction, Refinement)