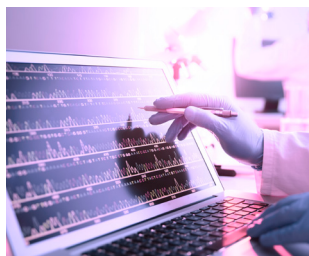
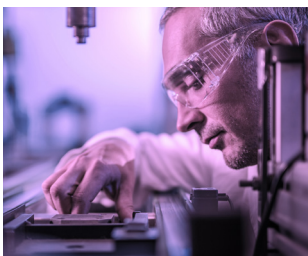




Home Office

# Home Office Science Advisory Council Compendium Report





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# Introduction

# Introduction

The Home Office Science Advisory Council (HOSAC) has been functioning since 2003. In 2013, the appointment of Professor Sir Alan Wilson (former Chief Executive Officer of the Alan Turing Institute) as an independent chair marked a new phase for HOSAC.

The primary purpose of HOSAC is to support the Home Office Chief Scientific Adviser (CSA) in providing independent scientific advice to the Home Office and to champion the role of science within the department. HOSAC does not provide advice directly to Ministers. The current Home Office CSA is Professor John Aston, who is on secondment from University of Cambridge. Professor Aston specialises in applied statistics and previously was a trustee of the Alan Turing Institute. It is Professor Aston's responsibility to offer advice directly to Ministers and senior officials, whilst working alongside the Chief Scientific Advisers of other government departments.

It is HOSAC's particular role to:

- advise on emerging scientific trends and findings that may be relevant to the Home Office, either as opportunities or threats
- act as a forum for the discussion of science and technology within the Home Office
- support and complement the Home Office's specialist scientific advisory committees and facilitate coordination of their work
- advise on any specific scientific issue referred to the Council
- facilitate creative links between the Home Office and the wider scientific community

## Membership

The Chairs of each of the Home Office advisory committees whose business has scientific content are members of HOSAC. Currently, these committees are:

- Advisory Council on the Misuse of Drugs
- Animals in Science Committee

- Biometrics and Forensics Ethics Group
- Migration Advisory Committee.

To reflect the Council's wide-ranging and cross-disciplinary remit, additional members are appointed from the following learned societies:

- Academy of Medical Sciences
- British Academy for Humanities and Social Sciences
- British Psychological Society
- British Society of Criminology
- Royal Academy of Engineering
- Royal Society
- Royal Statistical Society

In addition, membership of the Council is open to the Home Office Chief Security, Science & Innovation Officer. Meetings are attended by the CSA as well as relevant Home Office officials.

HOSAC Members are normally appointed for a term of four years, with the possibility to renew terms to a maximum of ten years. Annually, the HOSAC Chair and CSA review the balance of skill within the Council and determine whether the composition and expertise matches current and future needs.



# Membership



# Membership



## Professor Sir Alan Wilson FBA FRS

Professor Wilson is Director of Special Projects at the Alan Turing Institute and Executive Chair of the Ada Lovelace Institute. He is a mathematician and social scientist, with a background in the physical sciences. He was formerly Vice-Chancellor of the University of Leeds, and is currently a Professor at University College London. Sir Alan is a Fellow of both the Royal Society and the British Academy, and brings a broad and outstanding record of government and academic experience. Professor Wilson served as Chair of HOSAC until March 2019.



## Dr Owen Bowden-Jones

Dr Owen Bowden-Jones is a Consultant in Addiction Psychiatry and Honorary Senior Lecturer at Imperial College London. His national roles include Chair of the Advisory Council on the Misuse of Drugs (ACMD) and clinical adviser to the Alcohol, Drugs and Tobacco division, Public Health England. Dr Bowden-Jones founded the CNWL Club Drug Clinic, an innovative service offering treatment for emerging drug problems such as novel psychoactive substance and prescription medication misuse. In 2018, he led the development and publication of national clinical guidance and associated e-learning for emerging illicit drugs.



## Mr Chris Hughes

Mr Chris Hughes is the Chair of the Biometrics Forensic Science Ethics Group. He has served on a number of regulatory and advisory bodies and is a fee-paid tribunal judge hearing cases relating to mental health, Freedom of Information Acts and Environmental Information. Mr Chris Hughes was formerly a solicitor with the GLC and ILEA, and was the Solicitor to the BMA for ten years.



## Professor Judi Ellis

Professor Judi Ellis is the Director of Research at the University of Reading School of Psychology and Clinical Languages. Her primary expertise and interests are in the process underlying both the development and decline of prospective memory in typical and atypical populations across their lifespan. Professor Ellis is a member of the British Psychological Society as well as the Academy of Social Sciences (ASS).



### Professor David Delpy

Former Chair of the Defence Scientific Advisory Council (DSAC) Professor Delpy is Emeritus Professor of Biomedical Optics, UCL. Before that he was Chief Executive of the Engineering and Physical Sciences Research Council (2007), a position he stepped down from in March 2014. He is also Chair of the Strategic Advisory Board of the UK National Quantum Technologies Programme.



### Professor Alan Manning

Professor Manning is Chair of the Migration Advisory Committee (MAC). He is professor of economics at the London School of Economics and is director of the Centre for Economic Performance's research programme on Community. From 2009 to 2012 he was Head of the Economics department at LSE and from 2004 to 2011 he was a member of the NHS Pay Review Body. His expertise is on labour markets including, but not confined to, the impact of migration.



### Professor Jonathan Shepherd CBE FMedSci FLSW

Jonathan Shepherd is the professor of oral and maxillofacial surgery and director of the violence research group at Cardiff University. He co-founded the University's Crime and Security Research Institute and is expert in the causes; physical, psychological and economic impact; and prevention of violence. Professor Shepherd has led many controlled trials of interventions designed to reduce violence. He is the first UK recipient of the Stockholm Criminology Prize. He initiated, and for many years chaired, the prototype Community Safety Partnership - Cardiff's Violence Prevention Board. Professor Shepherd is a Fellow of the Academy of Medical Sciences and the Learned Society of Wales, and is the independent member of the Cabinet Office What Works Council.



### Dr John Landers

Dr John Landers is a Senior Research Fellow at Hertford College, Oxford and a quondam Fellow of All Souls College. He was previously Lecturer in Biological Anthropology at University College London and University Lecturer in Historical Demography at Oxford. His academic speciality is Historical Demography with particular reference to the history of infectious disease mortality. Dr Landers served as Chair of the Animals in Science Committee until March 2019.









### Professor Michael Pidd

Professor Mike Pidd is an Emeritus Professor of Management Science in Lancaster University Management School, where he worked for over 30 years, working in the private sector prior to that. Professor Pidd was Head of the Department of Management Science at Lancaster and was Research Dean in the Management School. His main research interests include: systems modelling in management science, operations management and public sector with a focus on computer simulation and public sector performance measurement.



### Professor Brooke Rogers

Professor Rogers is a Reader in Risk and Terror in the Department of War Studies at Kings College London and became the Chair of HOSAC in April 2019. She is a social psychologist interested in investigating the formation of attitudes and beliefs, and the influence of attitudes and beliefs on behaviour. The majority of her projects use theories of risk perception, risk communication and behaviour to investigate public and practitioner responses to low likelihood, high-impact events such as chemical, biological, radiological and nuclear terrorism.



### Professor Paul Grasby

Professor Grasby is a Research to Practice Fellow in the Centre for Research and Evidence on Security Threats and holds an Honorary Professorship in the School of Government and Society, University of Birmingham. He is a fellow of the Academy of Medical Sciences and his current research interests are the application of social and behavioural science to terrorism and counter terrorism responses. From 2008 to 2016 Professor Grasby led a team of social scientists undertaking counter terrorism research and analysis in the Home Office. Prior to joining the Home Office, he held a Professor of Psychiatry post at Imperial College for many years.



### Professor Shane Johnson

Shane D Johnson is a Professor and Director of the Dawes Centre for Future Crime at the UCL. His research has focused on reducing crime through design, predictive policing, the application of complexity science to issues of crime and security and developing the evidence base of what works to reduce crime. His current interests focus on how developing technology and social change are influencing new forms of crime opportunity.



### Professor David C. Lane FORS

David Lane is Professor of Business Informatics at Henley Business School. He has worked for British Aerospace and Royal Dutch Shell and is a Fellow of the Operational Research Society and recipient of the Jay W Forrester Award and the OR Society's President's Medal. Trained as a mathematician, he specialises in policy analysis using system dynamics and systems thinking, working in areas as diverse as child protection and the management of Norovirus outbreaks.



### Mr Alan Pratt MBA CPhys FInstP

Alan Pratt is the Home Office's Chief Security, Science and Innovation Officer and Head of the Science and Engineering Profession within the Home Office. He previously served as Deputy Director and Chief Scientist at the Police Scientific Development Branch, and Director of the Home Office Scientific Development Branch. Mr Pratt leads for the Home Office on horizon scanning and has led the development of the UK's first cross-government Bio-security Strategy. Mr Pratt is a Fellow of the Institute of Physics and the Centre for Science and Policy at Cambridge University.



## Professor Hugh Griffiths

Professor Hugh Griffiths joined HOSAC in 2018 as the Chair of the Defence Science Expert Committee and holds the THALES/Royal Academy Chair of RF Sensors in the Department of Electronic and Electrical Engineering at UCL. His research interests include radar and sonar systems and signal processing (particularly synthetic aperture radar and bistatic and multistatic radar), and antenna measurement techniques. Within the field of radar research Professor Griffiths is a world expert and received an OBE in the Queens New Year Honours 2019.



## Professor David Main

Professor David Main joined HOSAC in 2019 as the Chair of the Animals in Science Committee and is Professor of Production Animal Health and Welfare at the Royal Agricultural University. Professor Main is a veterinary surgeon with interest in welfare assessment, intervention strategies to improve welfare, and animal welfare education. He notably was involved in the collaborative project AssureWel, that introduced welfare outcome assessment into UK certification schemes and EU WelNet.



## Professor Helen Margetts

Helen Margetts is Professor of Society and the Internet at the University of Oxford, and Director of the Public Policy Programme at the Alan Turing Institute for Data Science and Artificial Intelligence. From 2011 to 2018, she was Director of the Oxford Internet Institute a multi-disciplinary department of the University of Oxford, before which she was Professor of Political Science and Director of the School of Public Policy at UCL. She has researched and written extensively about the relationship between technology, politics, public policy and government including over 100 articles and six books, including a series of policy reports for the National Audit Office on Government on the Web (1999, 2002, 2007, 2009) and the book Digital Era Governance (Dunleavy and Margetts, 2006). Her latest book, co-authored with a multi-disciplinary team, is Political Turbulence: How Social Media Shape Collective Action, which won the Political Studies Association's W. J. Mackenzie prize of the Political Studies Association for best politics book in 2017. In 2018 she was awarded an OBE in the Queen's New Year's Honours List for services to social and political science.

## Ways of Working

The full Council meets two to three times per year to discuss Home Office business, with work ongoing throughout the year. Members keep themselves up-to-date with science in the Home Office through quarterly reports, business plans and other information made available to them. If advice is needed on a specific topic, a working group may be formed, comprised of a subset of HOSAC members and possibly also co-opted experts when specific knowledge and experience is required. These working groups are typically relatively short-term, disbanding once they have provided their advice. They may report either to the CSA or to Home Office business areas.

On occasion, one or a few Council members may provide specific advice or fill an ongoing advisory support role to individual areas of the Home Office. In addition, ad hoc meetings of the Council may be convened in response to emergency situations.

## House of Commons receptions

HOSAC occasionally organises receptions at the House of Commons. Most recently, in December 2017, The Minister of State for Security and Economic Crime (Ben Wallace) hosted an evening reception at the House of Commons on behalf of HOSAC. The Home Office CSA and the Permanent Secretary, Sir Philip Rutnam, also attended.

The reception provided the Minister and the Permanent Secretary with the opportunity to meet over 40 important members of the scientific and wider academic community, including members of the Council, leading scientists from the Home Office, other government departments, and important academic stakeholders. The reception enabled the Home Office to have trusted and safe conversations with academics and encouraged their involvement in Home Office work and additional engagement from them.



# Compendium Report

Case Study Examples

# Behavioural science as a policy tool

(Jenny Cann, Dr Brooke Rogers, Professor Paul Grasby, Professor Judi Ellis)

## CASE STUDY

There has been a push across government departments to incorporate behavioural science principles in policy decisions. This involves behavioural scientists looking at a particular problem from an independent perspective and seeking simple behavioural solutions.

Jenny Cann in Home Office Migration and Borders was looking to use behavioural science principles to help tackle problems with an online application system and online exploitation. As there is little in-house expertise on the use of behavioural science principles Jenny approached the HOSAC for advice. The HOSAC formed the Behavioural Science Sub-Group with four HOSAC members – Dr Brooke Rogers, Professor Paul Grasby, Professor David Lane, and Professor Judi Ellis. The four members come from a variety of scientific backgrounds.

This case study focuses the on-line application system because of the time available and the wider ethical considerations that would be needed for a wider study.

The Behavioural Science Sub-Group seeks to provide evidence of certain types of behaviour. It also acts as a challenge function to see how a process could be improved. The Group does not have a particular knowledge of the problem area but provides a valuable independent perspective.

The first task was to brainstorm the types of behaviour of people using the system. This looked at existing behaviour, for example, why some people started but did not complete an application online, instead calling the help centre for advice.

The next stage was to provide evidence of this behaviour. This involved a workshop to establish what is already known and why some users of the system have a problem operating

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it. The workshop brought together people with an operational knowledge and users of the 'problem' under review. Staff at the call centres explained the problem areas that the online users raised with them, highlighting the areas of most difficulty.

Once all the evidence is gathered the final stage is to consider interventions to make the process easier to use and more efficient. These would also cover communication and risk perception. It is vital at this stage to ensure that the people operating the system support any interventions.

This project is in the early stages of development. The next stage will be to implement changes. Following a trial period the effectiveness of these changes can be measured. For example, the problem would be partially solved if the call centre received fewer calls demonstrating that a greater number of applicants were able to use the online system without help.

The input of the HOSAC members provided a fresh, specific and informed perspective. They were exceptionally helpful, particularly in encouraging colleagues to think of endemic challenges from a different perspective. Another benefit was through her work with other organisations, Dr Rogers was able to connect the Home Office with people in other government departments who have faced similar problems and could share their experiences.



# Counting the costs of cyber crime

(Samantha Dowling, Professor David Delpy)

## CASE STUDY

In the summer of 2014 the Home Office Analysis and Insight unit set up a sub-group to look at ways to improve estimates of cyber crimes. This was led by Samantha Dowling. HOSAC members were invited to the initial workshop to set up the group and their input was very helpful in defining areas on which the subgroup should focus. As a result, HOSAC was asked to remain involved in the project and one of its members, Professor David Delpy, was asked to be the independent chair. Although having an interest in this subject Professor Delpy was not an expert in this area.

Over the next two years the Costs of Cyber Crime Working Sub-Group met around five times, communicating by email in between meetings. Early meetings of the Group mapped existing activities and work done in this area, both in the UK and internationally. This was found to be extensive and diverse.

Three areas of research were identified. Professor Delpy helped to set up the grant calls for the research, including the process for scoring and reviewing the applications for this work from potential researchers and making sure that the process was fair. The three research projects were:

- to analyse and collate the existing data;
- to do a broad analysis of the economic, reputational and psychological costs of cyber crime; and
- to try to estimate the benefits of cyber crime to the perpetrators, for example, by accessing the dark web and seeing the price of sets of stolen card details being auctioned there.

It proved impossible to collate the existing data because of the different headings and definitions used. The Group developed a framework for collecting data to help to estimate the cost of



cyber crime using consistent definitions so that in future comparisons could be made between studies. There were also problems in estimating reputational damage. Many companies appear to be reluctant to talk publicly about incidents of cyber crime and the resulting costs to the business as well as to reputation.

As an independent chair, Professor Delpy did not have an ingrained point of view and expertly managed the different opinions of the cyber crime experts around the room. Once the Working Group had delivered the three projects, Ant Cooper (also in Home Office Analysis and Insight) and Samantha wrote the report *Understanding the costs of cyber crime*. All the stakeholders helped to structure the report with Professor Delpy adding his comments; the final report was presented to a meeting of all HOSAC members.

Samantha found working with the Council a good experience, both helpful and useful. The Council added a layer of independence and transparency. All the members of the Working Sub-Group were deeply engaged with the project throughout, attending every meeting. Their level of interest was demonstrated by everyone making a contribution.

While this work was in progress the Office for National Statistics published new experimental measures of cyber crime in the Crime Survey for England and Wales. The Department for Digital, Culture, Media and Sport also published the results of the Cyber Security Breaches Survey. Both data sets can be translated into the recommended framework, which was accepted by the HOSAC and the Home Office.

# Review of the Serious Organised Crime strategy

(Theresa Jennings, Professor David Delpy, Professor Judi Ellis, Professor Paul Grasby and Dr John Landers)

## CASE STUDY

The Home Office's Serious Organised Crime (SOC) strategy is regularly reviewed to reflect the changing world, and in particular, technological advances. Teresa Jennings is a member of the review team and a colleague suggested that she contacted the HOSAC for an independent input.

The proposals for the future strategy were taken forward and developed in three 'futures' workshops. A Council member attended each workshop, with each member having a different field of expertise – Professor David Delpy has a background in chemistry, Professor Judi Ellis in psychology, Professor Paul Grasby in behavioural science and terrorism and Dr John Landers is a futures expert. Their role was to provide an independent perspective and rigorously test the proposals. They also challenged operational practitioners to consider the proposals from a different point of view.

Theresa then presented the information gained from the workshops to a meeting of all HOSAC members; these also provided useful input and suggestions.

There were genuine benefits in involving the Council in the review of the SOC strategy. In particular, the Council members:

- ensured that the operational practitioners did not get stuck in 'group think' but rather considered the proposals from different perspectives;
- helped to strength-test the new SOC strategy proposals in relation to future scenarios;
- gave useful suggestions on dealing with some of the more technological advances; and
- shared knowledge about new technological developments that the strategy team were not aware of, and what could happen if these were to be used in crime.

The Council members also discussed the challenges in dealing with big data issues (the mass of information available on the internet and on social media). Other sectors, such as defence, face similar challenges. There are opportunities for the Home Office to work with these sectors, as well as with non-traditional partners such as organisations working in the charitable sector, to find ways to deal with these issues rather than working on them in isolation.

Once the SOC strategy has been finalised, time permitting, it would be useful to go through the strategic elements with the HOSAC acting as a 'critical friend'.



# Crime and policing

(Andy Feist, Professor Shane Johnson)

## CASE STUDY



HOSAC's great benefit to the Home Office is providing a useful working relationship with academia. It enables an 'open and trusted' dialogue with independent experts who have specific specialist knowledge.

Over the past couple of years Andy Feist, who leads on policing research in the Home Office, has found HOSAC member Professor Shane Johnson to be an excellent analytical sounding board on crime research, particularly around the geographical predictors of crime and crime trends. Professor Johnson is one the UK's leading quantitative criminologists and is an acknowledged expert in the geography of crime and offending.

Professor Johnson's research expertise has direct relevance to a wide range of policy areas in the field of crime and policing and an ongoing dialogue has developed. In response to a series of specific policy or analytical questions, Professor Johnson has provided expert advice drawing on both in-depth subject area knowledge and technical expertise. This in turn has supported discussions around the development of policy.

Andy greatly values being able to tap into Professor Johnson's detailed knowledge of the contemporary research landscape in this field. And he feels he has particularly benefited from Professor Johnson's ability and enthusiasm to apply his expert knowledge to 'real world' policy problems.

# Centre for Applied Science and Technology/ Defence Science and Technology Laboratory merger

(Dr Brooke Rogers, Professor Shane Johnson, Professor Paul Grasby, Chris Hughes, Professor Alan Manning)

## CASE STUDY

HOSAC has a watching brief to provide ongoing advice on the potential risks and benefits of the merger between the Centre for Applied Science and Technology (CAST) and the Defence Science and Technology Laboratory (Dstl). As with any restructuring there are challenges; each facility has its own culture and the challenge is how these can be brought together and complement each other.

A group of HOSAC members – Dr Rogers, Professor Johnson, Professor Manning and Chris Hughes – visited CAST to gain awareness of its work and the challenges of the merger. As not all HOSAC were able to go on the visit, CAST has also made several presentations at Council meetings.

Both the visit, along with the presentations, have given a thorough overview of CAST's work, both historical and present-day. Most of the work involves a physical science, such as DNA testing and aviation security. However,

non-physical scientists can also enhance CAST's work, for example, by looking at potential issues which may affect members of the public in areas where new science is being introduced, such as roadside testing for drugs.

The merger has a long transition period, with the risk of absorbing too much of the staff's effort and time over an extended period. A successful merger is the aim of both CAST and Dstl, and CAST is aware of the dangers of having 'tunnel vision' in order to achieve that success. For this reason, HOSAC's task, as external academics, is to challenge and provide an independent perspective. A potential approach is to engage in a series of 'challenge groups' where CAST opens discussions with the Council and presents plans to see if they can be improved. The Council then questions whether the implications of a particular action have been thoroughly thought through.



# Review of the ethical framework

(Professor Shane Johnson, Professor Judi Ellis and Chris Hughes)

## CASE STUDY



All research projects involving humans should have an ethical framework to protect the participants. This framework assesses the risks and benefits of human involvement in research. Home Office business areas that do a lot of research involving humans have a process for ensuring that this research is ethical.

However, some Home Office business areas, like the Centre for Applied Science and Technology (CAST), do little research involving humans and therefore do not have a process for this. Following a number of requests to the HOSAC to look at research proposals to make sure that they were ethically appropriate, it was decided to update the ethical framework to standardise and streamline these processes.

Professors Shane Johnson and Judi Ellis, together with legal expert Chris Hughes, were asked to review the current processes. All universities have ethics frameworks so they were well placed to do this. They drafted an updated framework that simplified the existing processes. This included a short checklist to

ascertain whether the research needed an ethical review. Research that did not need this could then be carried out without delay.

The updated framework also simplified the process for research that did need to be ethically reviewed. A flow chart showed how to use the framework. The framework also included a list of questions that need to be asked before the researchers put the proposals to the HOSAC, thus minimising any delays in ensuring that the research was ethically appropriate.

# Office for Security and Counter-Terrorism review

(Professor Sir Alan Wilson, Professor David Delpy)

## CASE STUDY

The Chair of the HOSAC, Professor Sir Alan Wilson, and Professor David Delpy undertook a strategic-level review for the Office for Security and Counter-Terrorism (OSCT). Focusing on counter-terrorism, their task was to review the quality of science and technology used by OSCT, how it was used and the outputs.

They held discussions with all senior stakeholders, including the Centre for Applied Science and Technology (CAST) and the Defence Science and Technology Laboratory (DSTL) in the UK, and the US Department for Homeland Security. These looked at the overarching strategy of the use of science and technology, and how individual projects fitted in this strategy.

As a result, they made a series of recommendations to the Home Office Science and Technology Board to update the process of using science and technology within the overall strategy. These included proposals to develop and sharpen the OSCT's formal terms of reference and lines of response.



# Improving scientific links

(Professor David Delpy)

## CASE STUDY



From time to time HOSAC members visit Home Office science groups and centres to gain information about the work carried out. These visits are useful as there is not a lot of external visibility regarding Home Office work and it can be hard for the academic community to know what is happening and what is needed.

These visits strengthen the links between the scientists and the academics. They also encourage the Home Office directors to consider the external aspects of what is happening in the wider academic community in relation to their work.

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