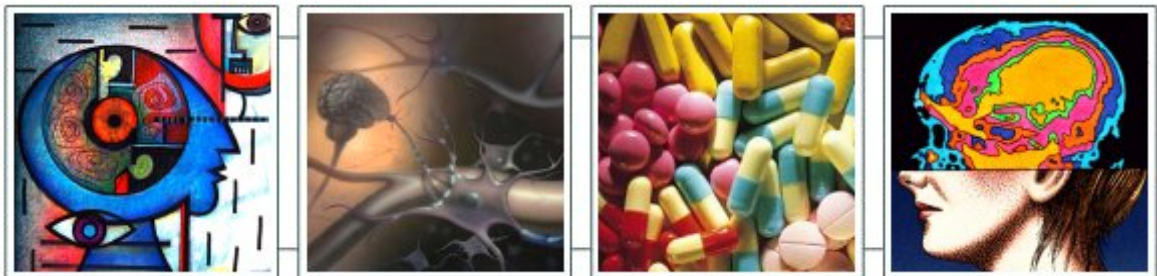


# ***Foresight*** **Brain Science, Addiction and Drugs Project**



**One Year Review**  
July 2005 – November 2006



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# Executive Summary

## Introduction

The Foresight project on Brain Science Addiction and Drugs took a bold approach and decided that the project should consider:

*How can we manage the use of psychoactive substances in the future to the best advantage for the individual, the community and society?*

This broad definition avoided the temptation to focus the work solely on addiction or the use of recreational drugs. The experts involved highlighted that to take a focussed approach risked getting caught in age-old debates about the subtleties of the differences between habit, dependence and addiction. They also saw the advantage of looking across all drugs including recreational, those for mental health and those to enhance performance, which allowed the project to explore the relationship between these three areas and consider broader issues of how we would optimise our brains' performance in the future.

This also brought with it challenges as it made the project very broad and also meant that the findings could not be presented to a single group of stakeholders for action.

## Key conclusions

This report reviews the effectiveness of the approach and the value of the work just over one year on from the launch of the findings of the work. The key findings of this review are:

- The work represented good value for money. An independent review of the programme, which included a review of this project concluded that the project and programme as a whole represented good value for money.
- The project met all of its objectives. It delivered an evidence base including: fifteen state of science reviews; an analysis of the role of modelling to help manage use of psychoactive substances; a perspective of the pharmaceutical companies on future products; and a view of the public on the possible developments. It highlighted the key challenges and opportunities ahead and identified eighteen strategic choices, to which we need to respond.
- This work has provided a new framework for an open debate of the issues around drug use. There has been a strong appetite for the findings of the work internationally and in many different types of forums from expert toxicologists to debates on the relationship between cognition enhancement and education. A number of key figures have commented that the work has been key in taking the debate on use of drugs in society to a new level.

- The work has led to an independent review and a national public engagement exercise to consider how to respond to the strategic choices. Ministers from four departments met to consider the findings of the work and agreed that the UK should take decisions on the strategic choices. In order to take this forward a cross departmental group commissioned the Academy of Medical Sciences (AMS) to provide recommendations following a review and a public engagement exercise. The AMS is due to report towards the end of 2007.
- The project has influenced the research agenda. The Medical Research Council (MRC), the Economic and Social Research Council (ESRC), UK Clinical Research Collaboration (UKCRC) and the Responsibility in Gambling Trust have commissioned research on issues raised by the project. The project has also led to science papers and debate amongst the psychopharmacology community on the possibility of producing a low harm alternative to alcohol.
- The project has helped develop the Foresight model. The commissioning of a public engagement exercise and the conference with the fifteen science communities providing input to this project were innovations. They are now considered as tools to draw on in current Foresight projects.

## **Next steps**

The AMS review is the key activity, which will determine whether the findings deliver maximum value. The challenge is for the Government departments to work closely with the AMS as they take this review forward and Government departments to deliver a joined up response to the recommendations.

# 1 Project Overview

This report reviews the outputs, outcomes and process of Foresight's project on Brain Science Addiction and Drugs (BSAD) from a point just over one year after its launch. It seeks to determine the project's impact so far.

## 1.1 The Project

The BSAD project was developed out of ideas discussed at a brain storming event held in July 2002 chaired by Sir David King, Chief Scientific Adviser to the UK Government (and Head of the Office of Science and Innovation) and involving pre-eminent academics identifying significant issues with a scientific impact over the next ten years and more. The project began in July 2003 and launched its findings on 13 July 2005.

BSAD was the fifth project in the new round of Foresight. It looked at drivers that were problem based rather than technological. It involved a wide range of stakeholders and the project was owned by the Department of Health (DH).

## 1.2 Project aim

The project aimed to provide a challenging vision as to how scientific and technological advancement may impact on our understanding of addiction and the use of psychoactive substances<sup>1</sup> over the next twenty years. To achieve this it aimed to answer the following key question:

- *How can we manage the use of psychoactive substances in the future to best advantage for the individual, the community and society?*

In order to answer this question, the project collected and analysed evidence on the following Process Objectives:

- PO1 To produce state-of-science reviews
- PO2 To create vision(s) of the future
- PO3 To create new networks of people from across scientific disciplines and areas of business and policy-making
- PO4 To identify key challenges and engage those who can take them forward

## 1.3 What the project achieved

Assessment against process objectives

- PO1 The publication of fifteen peer-reviewed state-of-science reviews covering topics from the sciences, social sciences, arts and humanities covering current research and possible advances which provide a valuable resource that is available publicly.

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<sup>1</sup> A psychoactive substance is any substance or surrogate intervention that affects brain function through its chemical neurotransmitters. The term includes recreational, psychiatric, cognitive enhancing or mood altering drugs but also future technology such as trans-cranial magnetic stimulation or neural prosthetics

The publication of the findings from a review of the latest developments in modelling techniques to help us to understand the use of psychoactive substances and our approaches to managing their use.

- PO2 The development of four scenarios describing ‘alternative futures’, produced by groups of individuals from a variety of organisational backgrounds. The possible futures are available publicly and are being used by organisations with interests in this domain to explore policy issues.
- PO3 The project created a network of more than one hundred academics and experts from the fields underpinning the brain science, addiction and drugs area. Over the course of the project they worked on exploring the future advances of their areas. These advances may have wide-reaching implications for society over the next 20 years. They are likely to be applied in three key areas to provide a better understanding of:
- Mental health and the development of new treatments for it
  - The effects of legal and illegal so-called ‘recreational’ drugs on different people and how to treat addiction
  - Mental processes, bringing with it the potential for substances that can enhance the performance of our brain in specific ways, such as improving short-term memory and increasing our speed of thought. This new breed of drugs is called cognition enhancers.
- PO4 The project Executive Summary and Overview report (*Drugs Futures 2025?*) identified eighteen key strategic challenges. The Government (led by the DH) has asked the AMS to look at issues relating to society, health, safety and the environment raised in the report. Part of this work will include public dialogue where experts and members of the public can debate the issues which advances in brain science, mental health treatments and addiction may raise.

In addition the project also resulted in:

- An understanding of the public’s view of potential developments was captured through the project’s small-scale public engagement exercise. The overall message from this work was the public’s interest, awareness and willingness to be involved in any debates on psychoactive substances in the future.
- The publication of the findings of a review of the pharmaceutical industry’s perspective on how they might exploit future advances in science.
- The momentum of interest in the project findings leading to a number of organisations holding events to take forward the project’s findings.
- Work that had not been done before, involving networks of people who, while having the same area of interest, tackled it from such different perspectives that there was little meeting of minds on what was the best approach to addiction and the use of drugs to affect the brain. The acknowledgement of addictive behaviours which are now

commanding interest from overseas, with other countries, such as the Netherlands, China, Japan, USA and India.

## 1.4 Key findings

New approaches are being developed for medicines for mental health:

- Preventative treatments are being trialled for Alzheimer's disease and we may be able to develop them for schizophrenia.
- Pharmacogenetics is allowing us to identify people at higher risk of adverse side effects.
- We are learning more about how the brain regenerates itself. This may play a key role in helping us to treat mental health disorders and reduce natural mental decline with age.

There have been significant advances in our understanding of addiction and our understanding of the treatments available for it:

- The amount of information on the harms of 'recreational' drugs is increasing. We may be able to use this growing body of evidence to help us to make better decisions about our 'recreational' use of them. For example, it is clear that children and adolescents are much more vulnerable than adults to harm and addiction.
- Drugs are being developed which help people to forget experiences. In the future it might be possible to 'unlearn' an addiction.
- Vaccines are being trialled that might allow us to stop the action of specific 'recreational' psychoactive substances on the brain.
- Genomics is helping us to identify why certain groups of people are at greater risk of harm from 'recreational' drugs than others. This could allow treatments to be targeted more precisely.
- A drug has been found that can block the memory-impairing actions of alcohol in humans.

New types of so-called 'recreational' psychoactive substances are being developed:

- Scientists have been able to separate the effect of one psychoactive substance from its addictive properties. This could pave the way to non-addictive 'recreational' drugs, but as with any new substances the risks will need to be assessed also.
- A psychoactive substance has been developed that reduces the side effects of 'recreational' drugs. Such compounds might allow users to shape their drug experience.
- Scientists believe that they could produce a 'recreational' substance with similar effects to alcohol but less harm.

New psychoactive substances are being developed which improve the performance of the healthy brain:

- Modafinil was developed as a treatment for narcolepsy, but it has been found that it allows healthy individuals to stay awake for up to three days. It is not yet known if there are long-term side effects.



- Recent work on the effects of ampakines, a type of molecule that enhances the working of some brain receptors, suggest that drugs could be developed to improve the memory of the user under conditions of fatigue.

The findings highlighted a number of strategic choices, e.g. accepting greater risks from the use of new medicines for mental health, in order to encourage innovation in their development versus maintaining high expectations under the clearance process for new medicines for mental health which would reduce the risks of harm from their use, but in the long term risk the withdrawal of the pharmaceutical companies from this market. In total eighteen strategic choices were identified. Any discussions of the issues raised by the choices will need to engage the public, so that society can consider what the future could hold.

## **1.5 Follow-up Actions**

As a result of the findings arising from the project a number of organisations agreed to take forward a range of actions, the most important of which was for Government to ask the AMS to look at issues relating to society, health, safety and the environment raised in the report. They are scheduled to report their findings by the end of 2007

The main activity for other organisations was the dissemination of the findings to their members and colleagues, to explore the implications for their organisations and review research implications and challenges.

## **1.6 Dissemination of findings**

Many of these activities have taken place through the continuing work and enthusiasm of the project experts, who are able to continue to apply their expertise, now enhanced by the experience of working on the Foresight project.

During the project, members of the project team and management group attended seven relevant festivals, conferences and institutional events to publicise the work of the project. They also presented to seventeen external bodies.

Foresight launched “Drugs Futures 2025?” on 13 July 2005 with a series of presentations from the scientists involved in the project to stakeholders, the press and other interested organisations. Sir David King led the briefing and subsequent discussion. It generated considerable interest in the media, with comprehensive articles in the national press and BBC News on-line.

In order to increase awareness of the project’s findings a number of organisations made considerable efforts to disseminate the including the Association of the British Pharmaceutical Industry (ABPI), the Department of Trade and Industry (DTI) and the Royal Society of Arts (RSA).

A book, “Drugs and the Future”, has now been published in the US and UK by Elsevier, contains the project executive summary, science reviews and horizon scan.

Further dissemination of the findings of the project continued after launch, as described below and in the table at annex A.



## 2 Project Outcomes

This section is based largely on feedback from stakeholders, together with a small level of continuing and responsive activity within OSI.

### 2.1 Informing cross-government strategy

Four Government Departments (DH, Home Office, DTI (the OSI) and Department for Communities and Local Government) have asked the AMS to make recommendations for action. Departments are waiting for the results of this work, before taking decisions on further actions. A programme of public engagement is forming a key part of the AMS work.

### 2.2 Informing understanding of the future challenges

Evidence from the project has been used as a key source in a number of expert forums. For example:

- The Beckley Foundation organised a three-day seminar at the House of Lords.
- Demos organised a seminar on “The cognition enhanced classroom”
- The Nuffield Council held a one-day workshop on the ethical issues surrounding advances in neuroscience, and has decided to establish a Working Party to examine the subject more deeply.
- The Commissioners of the RSA have been drawing on the reports their discussions on the future of drugs policy. The report and the science reviews will be cited in the Commission’s report, to be published in March 2007.
- The Foundation for Science and Technology Dinner and Discussion on Drugs, Alcohol and Health.

### 2.3 Highlighting research priorities

The ESRC review of project outputs resulted in several activities:

- Announcement of joint Highlight notice with the MRC on Society, Social Behaviour and the Neurosciences.
- Commissioning of six projects on Problem Gambling with the Responsibility in Gambling Trust.
- The UKCRC Strategic Planning Group in Public Health identified tobacco and addiction as priority areas, and have commissioned research reviews.
- ESRC are funding a Capacity Cluster, which will enhance capacity among researchers wishing to investigate the biological and social determinants of human behaviour.

MRC launched two Cross Research Council Highlight Notices, and is developing its partnership with the UKCRC Mental Health Research Network especially in areas like experimental medicine.

There is some interest from the research community in low-harm alcohol<sup>2</sup>, which may result in a commercial spin-out.

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<sup>2</sup> Alcohol alternatives - a goal for psychopharmacology: D.J.Nutt, *Journal of Psychopharmacology*, 20(3) (2006) 318-320.

## **3. Learning from the Project Process**

### **3.1 Public Engagement**

The small public engagement exercise worked well, but timing is crucial. Carrying it out within the project meant that results could not be fully incorporated into final reports. The right time for a large-scale exercise is probably post-project, when it is possible to use the projects outputs as material for the engagement, and to add further evidence about public perceptions and attitudes to the policy development process.

### **3.2 Royal Society State of Science Presentations**

The presentations of the state-of-science reviews at the Royal Society on 19 October 2005 were very successful and interesting. Although the state-of-science reviews were at different stages of maturity the organisation of the event helped both the contributors in organising their thoughts and material and gave Foresight a preview of the important issues. It also provided the environment for crosscutting issues to be identified and discussed. Outputs were crucial to engagement dialogues.

### **3.3 Pharmaceutical Companies**

The work on the perspective of the pharmaceutical industry gave a clear indication of their views, which was used in more detailed discussions, such as a business breakfast.

### **3.4 Positive Reactions**

Quote from Professor Trevor Robbins, project expert: "I have found the Foresight process stimulating and worthwhile, and have been very happy to use my experience to advise more broadly about the Foresight process. Thank you for allowing me to be part of this exciting and unique process that, perhaps for the first time, has provided a forum within which individual scientists feel they are able to communicate effectively with Government agencies."

## 4. Ongoing work, and Monitoring Project Impacts

An AMS working group, chaired by Professor Sir Gabriel Horn, has been convened to consider, in consultation with experts and the public, the societal, health, safety and environmental issues raised by the advances described in the project reports. Issues being explored concern:

- implications of findings on the vulnerability of young people
- developing early warning systems
- risk and regulation:
  - issues for the borderline between drugs and food
  - issues for 'lifestyle' drugs, including cognition enhancers
- medicines for mental health and treatment of addiction.

The Academy's study is being informed by both a 'call for submissions' and a national programme of public engagement that will explore the hopes and concerns of a broad cross-section of the public on current and future issues relating to brain science, addiction and drugs. This study will culminate with a final report, to be published by the end of 2007, which will include recommendations for public policy and future research needs.'

## Annex A: Action Plan

Activity	Proposed Completion Date	Result
<b>Academy of Medical Sciences</b>		
Will consider the implications of the findings of the Foresight report for clinicians, and their interface with the Pharmaceutical Industry.	Autumn 2005	Now agreed that the report to Government will be prepared for the end of 2007.
<b>Advisory Council on the Misuse of Drugs</b>		
Will take a close interest in the project findings and, where applicable, consider the project findings as part of their ongoing work.	July 2006	The ACMD remains committed to considering the findings of the report, but their work over the last twelve months has related to classification issues relating to specific substances. There is continuing enthusiasm and support for the Foresight reports.
Will advise the Home Office on issues that are of interest to the Home Office.	July 2006	As yet, the ACMD has not made any recommendations to Government that have specifically arisen from the Foresight work, but their work has been undertaken with an awareness of the themes and ideas that emerged.
<b>Association of the British Pharmaceutical Industry</b>		
Will consider the review and report back any comments from its members.	Summer 2006	

Activity	Proposed Completion Date	Result
<b>Beckley Foundation</b>		
Will explore the implications of the findings of the report for the development of a long term, sustainable policy on the management of recreational drugs	July 2006	<p>The Beckley Foundation organised a three-day seminar at the House of Lords. The first day saw two plenary meetings: one, of the International Society for the Study of Drug Policy, chaired by Professor Peter Reuter. The other, chaired by Mike Trace, of the International Drug Policy Consortium. The second day, chaired by Colin Blakemore, assessed the impact of international drug control systems on scientific and medical research. The general consensus was that, as a consequence of the war on drugs, it is virtually impossible to investigate a whole range of substances, such as the psychedelics, which could be useful in the study of neuroscience and psychotherapy and, among other possibilities, help terminally ill patients face death. The following day, taking advantage of the large number of international experts who had gathered for the main seminar, the Beckley Foundation, in collaboration with Foresight, held a seminar to review the findings of the Foresight report. It was a stimulating day and, among other things, it brought into focus the need to understand why people use drugs, and the need to take into account the experiences people find beneficial, as well as the harms. It also focused on the blurring of the boundaries between cognitive- and life-enhancers and substances, which under the present circumstances, are illegal.</p>

<b>Activity</b>	<b>Proposed Completion Date</b>	<b>Result</b>
<b>Demos</b>		
Learning and cognitive enhancers	Spring 2006	<p>A seminar on “The cognition enhanced classroom” took place on 29 March 2006. It generated a lively and constructive discussion, with participants from the worlds of neuroscience, psychology, the media, education policy and practice. Speakers included Baroness Greenfield, Barbara Sahakian and Stephen Heppell.</p> <p>The project, and the seminar’s conclusions, were reflected in a speech by Baroness Greenfield in the House of Lords in April 2006.</p> <p>Demos has continued to draw to these issues through articles and presentations related to the Foresight report, and is part managing a consortium for the next phase of the OSI Sciencewise programme.</p>
<b>Department of Culture, Media and Sport</b>		
Agree to review the implications of the project’s findings.	July 2006	Action pending consideration of AMS report.
<b>Department of Trade and Industry</b>		
Agree to review the implications of the project’s findings.	October 2005	Action pending consideration of AMS report.
Take forward discussion with the BioIndustry Association.	October 2005	Completed – DTI officials discussed the issue of the report with a number of parties, in particular the BIA. They brought the report to their attention and arranged for them to be invited to the launch event.



Activity	Proposed Completion Date	Result
<b>Economic and Social Sciences Research Council</b>		
Agree to review the implications of the project's findings.	October 2005	Review resulted in several activities: <ul style="list-style-type: none"> <li>• Announcement of joint Highlight notice with MRC on Society, Social Behaviour and the Neurosciences.</li> <li>• Commissioning of six projects on Problem Gambling with the Responsibility in Gambling Trust.</li> <li>• The UKCRC Strategic Planning Group in Public Health identified tobacco and addiction as priority areas, and have commissioned research reviews.</li> <li>• ESRC are funding a Capacity Cluster which will enhance capacity among researchers wishing to investigate the biological and social determinants of human behaviour.</li> </ul>
Chair a meeting of the Research Councils to consider the research implications of the modelling review	October 2005	This will be taking place on 9 January 2007.
<b>Foresight</b>		
Will communicate the project's findings to: <ul style="list-style-type: none"> <li>• National Institute for Drug Abuse, USA</li> <li>• World Health Organisation</li> <li>• World Forum 2006</li> <li>• EU bodies</li> </ul>	September 2005  July 2006  July 2006  July 2006	Foresight Director participated in three sessions at the Davos World Economic Forum 2006, drawing on the project's findings.  Foresight Deputy Director made 13 presentations on the findings of the project in the post-launch period. These included the US National Institutes of Drug Abuse and Mental Health (in a unique joint session), the Foundation for Science and Technology, and the Prime Minister's Strategy Unit.  Project expert, Professor Trevor Robbins, attended scientific meetings, one with the Dutch research Councils to a meeting organised by the scientific officer of the Amsterdam Embassy, on treatment of ADHD.

Activity	Proposed Completion Date	Result
<b>Medical Research Council</b>		
<p>Agree to discuss the scientific challenges and research recommendations of the project at their Neurosciences and Mental Health Board (NHMB)</p>	<p>November 2005</p>	<p>Professor David Nutt (University of Bristol) attended the MRC's NMHB to discuss the Foresight exercise and its outcomes. Professor Nutt has since joined the Board and so will be able to remind the Board of the Report's conclusions and recommendations in the course of its normal business.</p> <p>Launch of Cross Research Council Highlight Notices with i) BBSRC - translational psychiatry, and ii) ESRC - social neuroscience</p> <p>Extensive MRC funding in Cambridge for Professor Robbins' Behavioural and Clinical Neuroscience Institute</p> <p>Major addiction awards in 2005 included grants to Professor Barry Everitt in Cambridge (mechanisms of addiction) and Dr Dai Stephens in Sussex (binge drinking)</p> <p>Continued co-ordination of Cross Research Council Brain Science programme</p> <p>A call for research proposals in Biomarkers elicited applications relevant to the Report. The Biomarkers call was guided by a workshop that had a specific mental health session.</p> <p>MRC is developing its partnership with the UKCRC Mental Health Research Network especially in areas like experimental medicine.</p> <p>There are continued activities in neuroethics</p>
<b>Nuffield Council on Bioethics</b>		
<p>The Nuffield Council on Bioethics have been asked by their committee to consider investigating the ethical issues raised by the report.</p>		<p>The Council held a one-day workshop in May 2006, on the ethical issues surrounding advances in neuroscience. The Council has now decided to establish a Working party to examine the subject more deeply. It is likely that issues concerning neurological disorders associated with ageing will be part of the study. The Foresight report has been influential in giving neuroscience a higher priority in the Council's activities.</p>
<b>Parliamentary Office of Science and Technology</b>		

<b>Activity</b>	<b>Proposed Completion Date</b>	<b>Result</b>
Would use the report's reviews and findings as a source of information for their work.	Summer 2006	Used the reports to inform POSTnote proposals, for consideration by POST's Board. A POSTnote on Alzheimer's disease and dementia will be published in autumn 2006. The Foresight reports will be used as an information source for this, and in plans for future work.
<b>Royal Society of Arts</b>		
Circulate the report as key source material to the membership of their Commission on Illegal Drugs, Communities and Public Policy.	July 2005	Completed: the Commissioners have been drawing on the reporting their discussions on the future of drugs policy. The report and the science reviews will be cited in the Commission's report, to be published in March 2007
Organise an event presenting the findings of the BSAD report to members of the RSA Commission and other interested parties.	Autumn 2005	This event took place in November 2005. The meeting produced a lively and well-informed debate. It was helpful in focusing the Commission's attention on future trends as well as current dilemmas in drug policy.

Activity	Proposed Completion Date	Result
<b>Transform Drug Policy Foundation</b>		
<p>Agree to use the project findings as an evidence base to explore whether a criminal or legally regulated approach to recreational drugs markets would be most effective and least harmful over the next twenty years.</p>	<p>October 2005</p>	<p>Transform have used the project findings as agreed. They gave written and oral evidence to the Science and Technology Select Committee enquiry into evidence-based policy-making, and the drug classification was one of the case studies that the committee used. Transform is leading an alliance of UK NGOs to lobby for a health-led, evidence based approach to UK drug policy in the run up to the 2008 drug strategy review, and planning a series of seminars to discuss the evidence for the effectiveness of prohibition in reducing drug-related harm.</p>