



House of Commons
Science and Technology
Committee

**Scientific advice and
evidence in
emergencies:
Government Response
to the Committee's
Third Report of
Session 2010–12**

**Fourth Special Report of
Session 2010–12**

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The Science and Technology Committee

The Science and Technology Committee is appointed by the House of Commons to examine the expenditure, administration and policy of the Government Office for Science and associated public bodies.

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The Reports of the Committee, the formal minutes relating to that report, oral evidence taken and some or all written evidence are available in printed volume(s).

Additional written evidence may be published on the internet only.

Committee staff

The current staff of the Committee are: Glenn McKee (Clerk); Stephen McGinness (Second Clerk); Farrah Bhatti (Committee Specialist); Xameerah Malik (Committee Specialist); Andy Boyd (Senior Committee Assistant); Julie Storey (Committee Assistant); Pam Morris (Committee Assistant); and Becky Jones (Media Officer).

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Fourth Special Report

1. On 2 March 2011 the Science and Technology Committee published its Third Report of Session 2010–12,¹ *Scientific advice and evidence in emergencies* [HC 498]. On 3 May 2011 the Committee received a memorandum from the Government which contained a response to the Report. The memorandum is published as an appendix to this Report.

2. The Committee noted that the memorandum did not contain responses to its conclusions and recommendations at paragraphs 55, 110, 142, 154, 165, 168, 176, 183, 223, 229 and 230 of its report. When it raised these omissions with the Government it was advised that the responses to these paragraphs were implicit in the Government's responses to other conclusions and recommendations. The Committee expects the Government's replies to its conclusions and recommendations aimed at government to be comprehensive. The Committee will take this matter up with the Government.

Appendix: Government response

1. The Government is committed to effective, proportionate evidence-based emergency management, which draws on advice from a range of sources, including science. It welcomes the Committee's conclusion that "*science is used effectively to aid the response to emergencies*", and believes this is testament to its planning and preparations. Significant steps have been taken to ensure scientific advice informs decision making at all stages of crisis management (see below) and the Government is committed to continuously improving the way in which this advice is coordinated and used in emergencies. We welcome the efforts, time and thought invested by the Committee, and the open way in which it conducted the inquiry.

Scientific evidence and advice in the risk assessment process:

2. Evidence for planning for emergencies in the UK is provided by the National Risk Assessment (NRA) which has been cited by the Organisation for Economic Cooperation and Development as an example of 'best practice...for producing tools to help high level policy makers compare multiple risks'². Although the NRA process is coordinated by Cabinet Office, its production relies upon extensive expertise from within and outside government, including scientific advice. The NRA aims to provide a well-rounded evidence base which can be used to inform decisions about building UK resilience.

3. To ensure scientific evidence is given due consideration during the NRA process, departments across Whitehall are expected to draw upon their Scientific Advisory Groups

1 Since the report was published it has been established that the session is expected to continue until 2012

2 Organisation for Economic Co-operation and Development report '*Innovation in Country Risk Management*': http://www.oecd.org/dataoecd/33/18/42226946.pdf?bcsi_scan_F8D0BFE83951C3DA=XCiRNOHcVvWqmHlbfFIIIEAAA AUQEdd&bcsi_scan_filename=42226946.pdf

and Chief Scientific Advisors when reviewing, updating and identifying new risks, and we continue to encourage Lead Government Departments do this. To ensure quality is maintained, a number of review mechanisms are built into the NRA process. These include:

- a cross-government Risk Assessment Group comprising of key advice providers, which provides a mechanism for peer review;
- an interdepartmental Risk Assessment Steering Group which provides oversight and direction to the NRA process as a whole and an additional internal challenge function; and
- the National Security Council's Threats, Hazards, Resilience and Contingencies sub Committee (NSC(THRC)) and its official level group which sign-off the whole process.

Scientific evidence and advice during planning and preparation:

4. During the planning phase, Lead Government Departments use their own Scientific Advisory Groups to commission new research and draw on a range of experts to ensure their planning is informed by science. In circumstances where the lead has not yet been identified (i.e. because it is unclear where the majority of impacts would fall or because impacts are evenly spread across a number of sectors), Cabinet Office fulfil this role, working closely with the Government Office for Science, and Government and external experts as appropriate.

Scientific evidence and advice during response and recovery:

5. During emergencies requiring cross-government coordination, a Scientific Advisory Group for Emergencies (SAGE) is activated to coordinate scientific advice to inform decision-making. The effectiveness of this group is testament to the Government's planning and preparations as SAGE draws upon existing advisory groups and builds upon and adapts existing advice.

6. SAGE built on and benefited from advice formulated by the Scientific Pandemic Influenza Advisory Committee (SPI), whilst the volcanic ash SAGE used existing departmental Scientific Advisory Groups to coordinate advice, and benefited from significant atmospheric modelling work already undertaken by the Met Office. In both events existing Scientific Advisory Groups were supplemented by appropriate external experts and some bespoke arrangements to ensure the best available advice was provided.

7. As part of continuous improvement, the Government is reviewing and further refining SAGE operations, reflecting lessons learnt from recent emergencies and exercises. "*Amplified Science Guidance*" on SAGE has been developed in consultation with a range of scientific advice providers and tested in Exercise Watermark (a cross-government flooding exercise in March 2011). It is now being revised to reflect the lessons learnt during this exercise and the Committee's recommendations. The Amplified Science Guidance will be published in summer 2011.

Actions taken since the publication of the Committee's report:

8. On 11 March (9 days after the Committee's report was published) one of the largest earthquakes on record occurred off the coast of Northern Japan, triggering a tsunami and the destabilisation of one of the Fukushima nuclear power plants. On the 13 March SAGE was activated to coordinate advice on potential scenarios for events at the power plant and inform UK policy decisions. Despite the short gap between the publication of the Committee's report and the earthquake in Japan, the Government has been able to act on many of the Committee's recommendations. In particular, the membership of SAGE and transcripts of teleconferences have already been published online. SAGE also worked with international experts to ensure everyone was working to the same assumptions and built on scientific advice developed during the planning phases.

9. The Government response to each of the Committee's recommendations and an outline of progress to date against each is outlined below. For ease of reference, these are presented in the order in which they appear in the report.

Lead Government Departments (LGDs)

One of the Cabinet Office's first tasks in an emergency should be to review whether the pre-identified choice is most appropriate. During a long-running crisis where the emergency evolves and the focus of the response may change (for example, from the initial response to recovery phase), COBR should review the lead periodically. (Paragraph 38)

10. The Government agrees that emergency response and recovery arrangements should be both flexible and periodically reviewed. The Cabinet Office maintains the list of Lead Government Departments³ for both response and recovery and reviews this in light of the precise circumstances of any emergency. In many cases, the Lead Government Department for response is different to that for recovery. For instance, during both the 2007 floods and the more recent 2010 Cumbrian floods, the Lead Government Department role transferred from Defra during response to DCLG during the recovery phase. This reflected the shift from flood forecasting and management to recovery. During the volcanic ash disruptions of 2010, the Lead Government Department changed from DfT, where the focus was on managing disruptions to airspace, to the FCO when the focus shifted to repatriating British Nationals stranded abroad.

We recommend that, in responding to this report, the Cabinet Office clarify how it makes the decision to appoint the first LGD if one has not been pre-identified. (Paragraph 39)

11. In circumstances where the Lead Government Department is unclear, the Cabinet Office, in consultation with the Prime Minister's office, identifies a lead. This decision is based on where the majority of the impacts fall, with the department normally responsible for that area being identified as the lead. If impacts are evenly spread across a number of sectors it may be difficult to designate a Lead Government Department. In these circumstances, the Prime Minister may appoint a Minister to lead in a non-departmental capacity, or a department to lead on an issue which might not normally fall to them. In

3 <http://www.cabinetoffice.gov.uk/ukresilience.aspx>

these circumstances the designated lead Minister would chair relevant meetings and lead on parliamentary and media handling with support from other Ministers and departments, as necessary. Support for the lead minister would normally be provided by their department and the Cabinet Office.

12. It is important to note that whilst the Lead Government Department is responsible for providing leadership it is not necessarily responsible for all aspects of delivery. For this reason, the Lead Government Department will in many emergencies need to work closely with other government departments and agencies to ensure a coordinated response and/or recovery. Further details on the process for appointing Lead Government Departments can be found in the: *“Responding to Emergencies, the UK Central Government Response – Concept of operations”*⁴ guidance.

We recommend that a LGD/LGDs for a space weather emergency be identified alongside the publication of the 2011 National Risk Register. (Paragraph 42)

13. The Government agrees that for known risks a Lead Government Department should be identified. Currently, it is difficult to determine which department should provide the lead for space weather. This is because although the range of potential impacts is known, it is unclear which sector will be most affected. Work is currently underway to further define the impacts of space weather and this will inform the next iteration of the NRA and public facing NRR. Once this work is completed a Lead Government Department will be identified and the Government will update the designated Lead Government Department list accordingly. If the impacts of space weather are evenly spread across a number of sectors and departments, a lead Minister would be identified and the Cabinet Office would continue to coordinate space weather work.

Risk assessment

We are surprised and concerned that the Government Chief Scientific Adviser (GCSA) had no direct involvement with the National Risk Assessment (NRA) process until recently. In addition, we are concerned that the GCSA’s oral evidence appears to be at odds with the Government on an issue that is a matter of fact—either GO Science and the GCSA are involved with the NRA process or they are not. We consider that science should be at the heart of the NRA process and ask the Government and the GCSA to clarify this matter. (Paragraph 54)

14. The Government agrees that science is an important element of the NRA process. Science is one of a number of core components that inform the NRA and the consideration of scientific advice is important to ensuring the NRA is a well-rounded assessment process which informs decisions about building UK resilience.

15. In the first instance, risk owners (Government Departments) are responsible for ensuring that appropriate scientific advice is included in the assessment and identification of any new risks. This should include the departmental Chief Scientific Advisors and their

4 <http://www.cabinetoffice.gov.uk/resource-library/central-government%E2%80%99s-concept-operations>

officials, departmental Scientific Advisory Groups, Heads of Analysis and external advice where appropriate.

16. Officials from the Government Office for Science and its predecessors have been engaged in the NRA process, through the interdepartmental Risk Assessment Group and Risk Assessment Steering Groups (see paragraph 3), since the first NRA was produced in 2004. This group provides a mechanism for all departments to challenge and inform current NRA risks and highlight any emerging risks. The presence of the Government Office for Science on these groups provides an opportunity for them to challenge assessments and propose potential new risks. Consequently, the GCSA, as head of Government Office for Science, has a pivotal role in the scrutiny of the scientific evidence that informs the NRA (see below).

We recommend that the GCSA should be formally involved in the NRA process at a high level. The NRA should not be signed off until the GCSA is satisfied that all risks requiring scientific input and judgements have been properly considered. (Paragraph 56)

17. The Government agrees that the GCSA should be formally involved in the NRA process, in addition to the Government Office for Science's presence on the interdepartmental groups which provide a review mechanism (see paragraph 3). As noted above, the Government Office for Science is involved at all stages of the NRA process and this means that the GCSA is fully engaged in the scrutiny of the scientific evidence that informs the NRA through the involvement of his staff in the interdepartmental review groups. Work is underway, via the NRA interdepartmental groups (see paragraph 3) to identify ways to strengthen scientific scrutiny within the NRA process and consider how best to more fully engage the GCSA in the process of approving the assessment of risks requiring scientific input and judgement. Given scientific evidence is one of several types of evidence feeding into the NRA, the Government remains of the view that overall sign-off of the NRA should remain with the National Security Council Threats, Hazards, Resilience and Contingencies sub-committee (NSC(THRC)).

We recommend that the Government Office for Science, while remaining a semiautonomous body, be located within the Cabinet Office. (Paragraph 61)

18. The Government believes that, although there may be benefits of locating the Government office for Science within Cabinet Office, it should remain located within the Department for Business Innovation and Skills (BIS). We believe that the Government Office for Science location in BIS does not inhibit close and effective cooperation between the staff of the GCSA and the Cabinet Office. The co-location of the Government Office for Science and BIS facilitates close working between the Government Chief Scientific Adviser with the Minister for Universities and Science and the Director General for Knowledge and Innovation in BIS. The Government Office for Science works closely and effectively with the Cabinet Office and other departments.

We recommend that the Government clarify why no review of the risk of disruption to aviation caused by a natural disaster, including volcanic eruptions, was undertaken in 2009; and provide the evidence behind the decision. (Paragraph 65)

19. For a number of years, the Department for Transport had identified a risk of disruption to air travel from natural hazards occurring overseas. The possibility of volcanic ash causing such disruption was an example. The risk of a volcanic hazard abroad caused by a combination factors such as type of volcano, content of ash cloud and prevailing wind conditions as was witnessed last year, and resulting in significant and prolonged ash incursions over UK airspace, and was perceived to be unlikely. A more serious risk of disruption to airspace was assessed to arise from other hazards, for instance severe winter weather, and UK resilience capability and resilience planning for disruptions to airspace were driven by these other risks.

20. During production of the 2009 NRA, the Department for Transport (DfT), as the risk owner for the disruption to aviation from natural hazards, examined available historic data and found no evidence of previous instances of prolonged disruption to aviation in the UK arising from volcanic activity abroad that would warrant identifying this as a qualifying risk for the NRA. DfT proposed, and the cross-government Risk Assessment Group agreed, that this risk should be removed from the list of NRA risks to be reviewed that year. Following the events of April / May 2010, the Government recognised the need to review this assessment. The SAGE mechanism was used to draw upon advice from experts across a range of scientific specialities and their advice was used to inform the identification and assessment of the risks associated with volcanic hazards abroad. This included disruptions to aviation, resulting from volcanic ash plumes (added to the 2010 NRA) and wider disruptions resulting from gas-rich volcanic eruptions (to be added to the 2011 NRA).

It appears that there may have been a breakdown of communication between the earth sciences community and Government. We recommend that the GCSA assess whether this was the case and improve the mechanisms by which scientists can engage with the Cabinet Office. (Paragraph 66)

21. The Government disagree with this assessment. Paragraphs 19 to 20 outline the reasons why the volcanic ash hazard was not in the NRA. We do not believe this to be because of a breakdown of communications. However work is underway to consider how scientific scrutiny within the NRA process can be improved and how to strengthen the input of the scientific community to Government risk management. For example, the Government has worked closely with the Earth Science community to develop and assess a number of NRA risks (e.g. severe space weather).

We are pleased that the Government is assessing the risks posed by space weather ahead of the next solar maximum. This is vital given that the Government believes the National Grid could be at risk. The Government should take all possible action to put in place and coordinate resilience measures across different sectors. (Paragraph 69)

22. The Government agrees that the next stage following the assessment of the risks posed by severe space weather is to consider if the type and level of capability to deal with power and telecommunication impacts needs to be revised, and whether any additional resilience measures are needed to respond to this particular risk. However, we seek to reassure the Committee that the UK is prepared for the consequences of a severe space weather event. The Government's approach to preparing for civil emergencies is to plan for the consequences of risks, regardless of the cause. The NRA contains a number of risks which result in a loss of power (e.g. as a result of bad weather) and / or a loss of

telecommunication (e.g. as a result of a localised incident such as fire, flood or gas incident). These other NRA risks have set the type and level of capability needed to deal with loss of power and telecommunications and has informed preparations in these sectors.

23. The Government has identified a risk of emergencies of this kind as a consequence of severe space weather, and is continuing to consult expert opinion on both the likelihood of severe space weather occurring over the next five years, and on the potential impacts.

We are disappointed that the GCSA has little involvement with the Domestic Horizon Scanning Committee in the Cabinet Office. We recommend that GO Science and the GCSA consider ways of assessing the quality of the Domestic Horizon Scanning Committee's work. (Paragraph 71)

24. The Government can confirm that officials from the Government Office for Science have been engaged in the Domestic Horizon Scanning Committee's (DHSC) since 2002. This Committee provides all members of it an opportunity to peer review the DHSC assessments that are undertaken by individual departments, drawing on relevant expertise and data. Although some of these assessments are scientific in nature, many focus on operational issues and readiness. The Government Office for Science will continue to work closely with the Cabinet Office to ensure that Departments fully engage appropriate scientific experts and considering science at an early stage in their assessments where appropriate. This will include encouraging departments to draw on the expertise of their Departmental Chief Scientific Advisors and relevant officials.

We recommend that, in replying to this report, the GCSA clarify why SAPER was abolished and to what extent its functions, particularly in planning for emergencies, have been retained and by whom. (Paragraph 73)

25. Although SAPER no longer exists, its functions are retained by:

- the Scientific Advice Group for Emergencies (SAGE) which advises Ministers during emergencies;
- Scientific and Technical Advice Cells (STACs) which advise local emergency responders during emergencies; and
- Scientific Advisory Groups (SAG) and the departmental Chief Scientific Advisor (CSA) network which coordinate scientific advice to inform planning and preparations. For example the Home Office run SAG that focuses on the handling and preparation for Chemical, Biological, Radiological and Nuclear (CBRN) Counter Terrorism events.

26. There was general agreement across Whitehall that, whilst SAPER panel members were selected for their expertise and experience across a broad range of fields, relevant subject matter experts would be required for particular emergencies both for response and preparations. Building upon the concept of SAPER, the SAGE, STAC and SAG concepts were developed. SAGs and the CSA network, allow departments to access subject matter experts for their emergency planning and preparations, whilst the SAGE and STAC concepts are designed to be flexible so that once activated, they allow coordination of

advice from relevant subject matter experts, drawing on existing SAGs and the CSA network to do so.

We recommend that a new independent scientific advisory committee be set up to advise the Cabinet Office on risk assessment. This committee should review the NRA, setting up temporary sub-committees as appropriate. Having an independent scientific advisory committee for risk assessment to review the NRA would improve public and parliamentary confidence in a necessarily unpublished document. The committee should inform the judgement of the GCSA in ensuring that all risks requiring scientific input and judgements have been properly considered in the NRA and support his greater involvement with the Domestic Horizon Scanning Committee. (Paragraph 74)

27. The Government welcomes the Committee's recommendation on improving scientific scrutiny in the NRA process as we are always keen to strengthen the process and existing mechanisms for ensuring scientific evidence and advice is considered and scrutinised.

28. The Government is committed to continuing to encourage risk owners (Government Departments) to draw on the advice of their Scientific Advisory Groups and their Chief Scientific Advisors when reviewing, updating and identifying new risks to be assessed. Given their personal knowledge and strong links with academia and industry, CSAs are able to draw on a large pool of internal and external experts.

29. The Government is also committed to continuing to host cross-government Risk Assessment Groups and Risk Assessment Steering Groups which provide an opportunity for peer review and challenge. These groups include all risk owners and other relevant departments and agencies and the Government Office for Science.

30. The Government Chief Scientific Advisor has established a 'Blackett Review' group which has provided independent scientific scrutiny of the NRA process. Once the Blackett Review report is completed the Government will carefully consider how the independent advice of this group can be used to augment the NRA process.

31. The Government Office for Science and Cabinet Office are working to identify suitable options for strengthening scientific scrutiny in the NRA process. This will include providing opportunities for experts to provide a fresh perspective on the scientific inputs to the process and to comment on potential high impact, low probability risks and/or cross-cutting risks which, by their nature, are difficult to identify.

Reasonable worst case scenario

We are concerned that the word "reasonable" appears to be influenced by the need to find a reasonable level of public expenditure for contingency planning rather than outlining the worst scenario that might realistically happen, based on the best available evidence. (Paragraph 87)

32. Judgements on reasonable public expenditure levels are not used to define the reasonable worst case scenarios included in the NRA. The level of expenditure that the Government and industry spend upon mitigation and contingency planning is a separate judgement which is made by the Government based upon the NRA. The "reasonable worst

case scenario” of a particular risk is based upon historical and scientific data, modelling and trend surveillance and the professional judgments of experts. The justification for the phrase ‘worst case scenario’ being preceded by the word ‘reasonable’ in the NRA is to prevent scenarios being formulated that are considered so unrealistic or unlikely that they are implausible.

33. From Cabinet Office’s previous experience, without a reasonable worst case scenario, departments and agencies would be likely to adopt differing approaches to identifying risks. For instance, some might identify hypothetical but implausible scenarios with sometimes extreme consequences. Others might be excessively optimistic and identify a ‘best case’ scenario that does not present a ‘plausible yet challenging’ manifestation of the risk. The ‘reasonable worst case scenario’ is designed to steer a course between these two extremes.

34. The ‘reasonable worst case scenario’ relies on judgments, informed by scientific expertise. For each NRA risk, the Lead Government Department is responsible for ensuring that appropriate science advice is incorporated into the risk assessment.

We welcome the fact that the GCSA is reviewing the concept of a reasonable worst case scenario. We request that, if possible, the results of this review are sent to us and published before any policy change is adopted. (Paragraph 88)

35. The Government can confirm that it will ensure the Committee receives a copy of the Blackett report once it is completed.

The National Risk Assessment and Register

We conclude that it should be clear what criteria are used in developing risk comparisons, particularly when they cut across Government Departmental responsibilities. We recommend that the Government clarify the common methodology and scale for assessing the likelihood of risks that are used in developing the NRA and NRR. (Paragraph 95)

36. An outline description of the criteria for developing risk assessments and comparisons was published in the National Risk Register of Civil Emergencies in 2010, which is an unclassified presentation of the main groups of risks assessed in the NRA. All risks within the classified NRA are evaluated using comparable likelihood and impact scoring criteria. The overall impact score for each risk is the average of the five separate impact criteria: the number of fatalities, the number of casualties, the economic cost; the level of social disruption and the psychosocial impact upon the public. Social disruption is subdivided into 10 further categories including interruption to essential services such as transport, energy and food supplies, as well as access to healthcare and schooling. All impact categories are scored using clearly defined impact scales which describe orders of magnitude differences in the level of impact.

37. The likelihood of a hazard is scored using a 5 point logarithmic scale, starting at a 1 in 20,000 chance and going up to a 1 in 2 chance of occurring in the next five years. Threat likelihood assessments are conducted by the security services on behalf of Civil Contingencies Secretariat (CCS) and take into account the vulnerability of a target and the capability and intent of potential perpetrators.

38. The public NRR gives a summary of the assessment of risks contained within the NRA, and is based on the same methodology. Details of the scores for specific risks which underpin the NRA assessment are not included in the public facing NRR because of the potential to comprise the safety and security of UK citizens. Instead, individual NRA risks are categorised into 14 main groupings and placed upon the NRR matrix in terms of likelihood and impact relative to other risk groups.

We are concerned that the development of the NRA and NRR appears to be a “topdown process hindering the involvement and influence of local authorities. This situation is unsatisfactory. We recommend that the Cabinet Office review its procedures to ensure that the input of local authorities is given full consideration and appropriate weight. (Paragraph 97)

39. The Government is confident that the NRA process and the public-facing NRR do not hinder the involvement and influence of Local Authorities in risk assessments. The NRA responds to the provision in the Civil Contingencies Act 2004 that the government may issue to Category 1 responders guidance and assessments of the likelihood of a particular emergency occurring, and the assessed impacts if it did. This is for the purpose of informing and assisting local risk assessments which Category 1 responders are required to undertake under the Act. Therefore it is important that local and UK risk assessments are both complimentary and synchronised. For this reason the Government is committed to ensuring that local and UK assessments inform each and to the principle of subsidiarity⁵. Wherever possible identification and assessment of risk, the planning of response and the subsequent recovery are locally led, drawing on the expertise and knowledge of the community. Local Resilience Forums (LRFs) which are made up of emergency responders, including Local Authorities, are encouraged to highlight local risks by publishing a Community Risk Register.

40. The Government is committed to ensuring that local emergency planners are adequately supported to fulfil their duties under the Civil Contingencies Act and this includes supporting them in assessing risks locally. The National Risk Register, annual Local Risk Assessment Guidance and guidance on assessing the impacts of specific risks (e.g. flooding and pandemic influenza) provide emergency planners with a basis from which to perform their risk assessments and guidance on how to translate national risks into local risks that can inform their planning.

If it is the case that access to the NRR alone is insufficient to allow local authorities to assess the potential impacts of risks to local areas, and access to the classified NRA is necessary, then we question the operational value of the NRR. We recommend that the Government conduct a consultation with Category 1 emergency responders, including local authorities, to evaluate how useful the information on the NRR is for risk assessment and emergency planning. (Paragraph 98)

5 Subsidiarity, defined in the Central Government's Concept of Operations, refers to the process whereby decisions should be taken at the lowest appropriate level with coordination at the highest necessary level. Local responders should be the building block of response for an emergency of any scale. <http://www.cabinetoffice.gov.uk/resource-library/central-government%E2%80%99s-concept-operations>

41. The National Risk Register (NRR) which was first published in 2008, is intended to provide guidance on the risks of civil emergencies, primarily for businesses and other organisations not in the public sector, and for individuals, families and communities. A secondary purpose is to assist local responders in producing Community Risk Registers which provide assessments that reflect local circumstances.

42. The NRR is reviewed on a regular basis to reflect changes in the National Risk Assessment and continual feedback on the document is encouraged via the Cabinet Office Webpage.⁶ In early 2010, CCS undertook a series of consultation workshops with a cross section of NRR users. This included business representatives, a range of specialists (e.g. media representatives, business continuity experts), community representatives and cross-departmental experts. Category 1 and 2 responders (which include Local Authorities) were consulted via the Government resilience online network. The general response from these consultations was very encouraging with a wide-range of NRR users stating that they considered the NRR to be a well-written, informative and valuable document.

43. The Government is committed to seeking feedback on its guidance, from target audiences and it will continue to consult Category 1 and 2 responders, following each publication of the NRR. The feedback received will be used to develop the guidance that the Government publishes.

We recommend that the Government review whether those with appropriate security clearance outside of Central Government have difficulties accessing the NRA, and put in measures to resolve the problem. (Paragraph 99)

44. The Government is committed to releasing as much information on the risks of civil emergencies as it can, consistent with the requirements of national security, and with the need in some cases to preserve confidentiality. To facilitate access to those that require the NRA, the assessment was shared with all UK police forces for the first time in 2010. As well as informing police work, this move was intended to increase direct access to the NRA for Local Resilience Forums (LRFs), the majority of which are chaired by the police. LRFs are made up of Category 1 and 2 responders and may include other relevant parties such as charity organizations.

45. In particular, we recognise that much of the hazard information in the NRA is not sensitive and have therefore released the reasonable worst case scenarios for natural hazards through the publication of a guide to improving the resilience of infrastructure and essential services, currently out for consultation until 6 May 2011. The planning assumptions for Pandemic Influenza have also been released in the Government's Influenza Pandemic Preparedness Strategy which was launched for consultation on the 22 March 2011.

Behavioural Sciences

We are disappointed at the lack of focus on social and behavioural sciences in Government to date. We expect the newly established Cabinet Office Behavioural Insight team to provide input to risk assessment for emergencies. (Paragraph 108)

6 <http://interactive.cabinetoffice.gov.uk/nrr/feedback.asp>

46. The Government agrees that scientific advice should draw on evidence, analysis and assessments from a wide-range of appropriate scientific specialities, including both the social and natural sciences. In response to the Committee's report, the CCS has discussed with the Cabinet Office Behavioural Insights team how it can usefully inform the risk assessment process and further promote the importance of social and behavioural considerations in risk assessment, planning and response, to risk owners.

47. In addition, as part of its work to develop further guidance on SAGE, the Government has identified a set of principles for defining SAGE membership. These include statements that SAGE should:

- include representatives from a wide-range of appropriate scientific and technical specialities, to ensure well-rounded advice is produced; and
- include the most appropriate, rather than the most accessible experts (i.e. those experts that are best placed to provide high quality, trusted, well-respected strategic advice rather than those that are the easiest to contact).

48. Following the publication of this new Amplified Science Guidance on SAGE, the Government will promote the importance of scientific evidence in emergencies and this will include considering evidence and advice from both the natural and social sciences. Existing good practice includes the Behaviour and Communication sub-group of the Scientific Pandemic Influenza Advisory Committee (SPI) which has been used by the Department of Health to inform its preparations since 2008 and was used through-out the 2009 H1N1 pandemic to inform decisions and provide briefings on a range of topics, including aspect of vaccination and principles of effective communication.

49. The Government will continue to encourage departments to publish the evidence and advice which underpins their policy decisions. For instance, the Department of Health developed a series of 12 scientific evidence base papers to underpin the UK Influenza Pandemic Preparedness Strategy, which was published for consultation in March 2011. Five of these papers covered social and behavioural science issues including:

- factors associated with the uptake of vaccination;
- demographic and attitudinal determinants of protective behaviours during a pandemic;
- principles of effective communication;
- healthcare workers willingness to work; and
- respiratory and hand hygiene.

These have been published on the DH website.⁷

We would like to know whether and when a Government Chief Social Scientist will be appointed to replace Professor Wiles. (Paragraph 109)

7 http://www.dh.gov.uk/en/Publicationsandstatistics/DH_125318

50. Following the departure of Professor Wiles in March 2010, Jenny Dibden (based at the Department for Work and Pensions) and Richard Bartholomew (based at the Department for Education) took over as joint Heads of Service for the Government Social Research Service.

Communication

If, following the GCSA's Blakett Review, the concept of a reasonable worst case scenario is retained, we recommend that the Government must make continual efforts to establish the concept of "most probable scenarios" with the public. While the Government should be open about the worst case scenarios being used by emergency responders, it should use the experience of the 2009 pandemic to emphasise the range and likelihood of various possibilities. While we do not expect this to remove all the problems associated with communicating risk and uncertainty, we consider that it may provide the public with a better sense of the likely risks.(Paragraph 123)

51. The Government agrees that more can be done to improve the way in which risk is communicated and believes that targeted approaches are needed for different audiences. We are committed to ensuring that evidence is drawn from a wide-range of scientific specialities, including behavioural sciences (see paragraph 46).

52. The Government will carefully consider the recommendations of the Blakett Review once it is completed. The 'reasonable worst case scenario' concept is essential for both Government and local planning and preparations. Identifying the consequences of a range of scenarios allows the Government and local planners alike to identify capability requirements and the comparison of risks allows those that require specific preparations to be identified. Describing challenging yet realistic scenarios ensures that decisions about capability and resilience planning are robust yet proportionate.

53. The Government recognised in its response to the 2009 influenza pandemic and the 2010 volcanic ash episode that the 'reasonable worst case scenario' may not always be the best way to communicate risk to the general public as it can raise unnecessary alarm. During response, communication of the best, most probable and worst case can be a helpful way of communicating uncertainty and the range of possible scenarios. Work is already underway in many Government departments to understand how risk can be better communicated to both planners and the public. The Government is committed to ensuring that this work continues and it will ensure that the Committee recommendations are fully considered as part of this work.

We recommend that there should be a single portal of information for every emergency, along the lines of flu.gov in the USA. This should be of use to members of the public as well as emergency responders and should be the primary source of all information, linking to other websites as necessary. We consider that maintaining this portal should be the responsibility of the Lead Government Department, and should be located within its departmental website. (Paragraph 128)

54. The Government agrees that information should be easily accessible in one place, on departmental websites as this helps improve transparency. Work is currently underway to promote the need to publish the scientific evidence and advice which underpins key

decisions. The Lead Government Department Guidance which is currently being revised and the new Amplified Science Guidance on SAGE will both emphasise the need for openness and transparency. Both documents will be published in summer 2011.

55. Recent emergencies have demonstrated the importance of effectively communicating with the public and the value of using scientists to communicate scientific messages, where appropriate. For instance, during the H1N1 (2009) pandemic the Chief Medical Office gave regular media briefings on the pandemic. Dame Deidre Hine in her independent review of the Government's response to the pandemic reported that she had heard that the use of a "single authoritative voice" throughout the 2009 swine flu pandemic had worked well and built on learning from previous emergencies. She also reported that she felt that access to a wider range of experts may have helped further boost credibility. Building on this the Department of Health is currently working with professional bodies and the Devolved Administrations to explore how it can best communicate the latest clinical advice via a single portal. This will include consideration of what can be released and to whom (in line with the FOI Act); ensuring communications are targeted at both GPs and the general public and consideration of the ownership of data, and who should publish it.

Seasonal influenza

The Government should carefully consider the public's assumptions about swine flu (or any new flu strain) when communicating the risks of that strain in the context of seasonal, rather than pandemic, outbreak. (Paragraph 132)

56. The Government agrees that consideration of the public's assumptions about Swine flu (or any new strain) is important. The Welsh Assembly Government is currently conducting a piece of research to assess the impact of swine flu on attitudes to the seasonal vaccination programme. This work is due to conclude shortly and the Department of Health will build the findings of this work into their planning for 2011/12.

We recommend that the JCVI conduct a comprehensive review of the benefits and risks of extending influenza vaccination programmes to all children under five, drawing on the experiences of countries, such as the USA, that already have policies of vaccinating under fives. (Paragraph 133)

57. At the request of JCVI, the Health Protection Agency is conducting a comprehensive study to assess the impact of the seasonal influenza programme and possible extensions to it, including the routine vaccination of all children between six months and under five years of age. The study will draw on international knowledge as appropriate but as the epidemiology of influenza differs between geographic regions, it is important to consider the impact of any potential changes to the vaccination programme in the UK context. JCVI plans to consider the completed study in October 2011.

SAGE: membership

We ask the Department of Health to clarify how the gap caused by the lack of a statistician on the swine flu SAGE was addressed. (Paragraph 150)

58. The balance of expertise on the swine flu SAGE covered a wide range of scientific disciplines. Although the swine flu SAGE lacked a member whose primary area of expertise was statistics, many of the SAGE members, in particular those with a background in mathematical modelling had extensive expertise in statistics and statistical analysis.

59. In line with the Code of Practice for Scientific Advisory Committees, the Department of Health periodically reviews the balance of expertise on the Scientific Pandemic Influenza Advisory Committee (SPI) and will continue to do so. It is also working with the Government Chief Scientific Adviser to ensure that there is an appropriate balance of expertise on SAGE for any future influenza pandemic outbreaks.

In line with the Code of Practice for Scientific Advisory Committees, which states that SACs should operate from a presumption of openness, we recommend that SAGE members and their declarations of interest are published once initial membership has been established. (Paragraph 152)

60. The Government strongly agrees that SAGE should operate from a presumption of openness and agrees that SAGE membership and their declarations of interest should be published, with the permission of SAGE members. It is also committed to ensuring that SAGE members are not preventing from saying so. The Government respects the privacy of the external experts involved in SAGE, all of whom participate on their own good-will. It is therefore committed to appropriate timing of the publication of SAGE membership lists. Some members may prefer to keep their SAGE status quiet during the emergency to, for instance, avoid heavy media attention.

61. SAGE membership lists and their declarations of interest are now published online for all recent SAGE's (i.e. the Swine Flu, Volcanic Ash and Japan nuclear SAGE's).

We recommend that GO Science, working with Departments, develops and maintains a directory of scientific experts who can be called upon in emergencies. The directory should include information on expertise area, current security clearance and previous experience advising Government. We anticipate that focus should be placed on the risks identified in the NRA, although not exclusively. We conclude that having a SAC for risk assessment in the Cabinet Office, as we recommended above, could also assist GO Science in identifying members for this directory. (Paragraph 155)

62. The Government strongly agrees with this recommendation. For known risks potential SAGE members should be identified and believes that Lead Government Departments should include procedures for the activation of SAGE and identification of potential members in their preparations for emergencies.

63. The new Amplified Science guidance on SAGE will, when published, recommend that Lead Government Departments consult their Chief Scientific Advisors (CSAs), Heads of Analysis and if appropriate their Chief Medical Officers (CMOs) and/or Chief Veterinary Officers (CVOs) to identify and maintain lists of potential SAGE members. CSAs will consult their own networks (such as from academic, National Academies and societies and international networks) and the Government Chief Scientific Advisor (GCSA). Any list of potential SAGE members should include an appropriate range of scientific and technical specialities and the best available rather than most accessible experts. These lists should be flexible and resilient, avoiding reliance on specific individuals in case they are unavailable

in the event of an emergency (e.g. because they are affected by the emergency, sick or otherwise engaged).

International sharing of scientific data and expertise will often be pivotal to the resolution of an emergency. We recommend that the GCSA clarify how he ensures that SAGEs draw on international expertise and what formal role SAGE members may play in this. (Paragraph 157)

64. The Government agrees that there is a need to establish and maintain international links to draw on international expertise where required in emergency situations. Many of these networks already exist through bilateral or multilateral cooperation between countries or through international governing/scientific bodies. Lead Government Departments and/or SAGE will be able to draw upon these resources, where confidentiality considerations allow. If existing links with international data sources or expertise are not immediately apparent, the lead CSA (or GCSA) will seek advice from the CSAs network, relevant departments and SAGE members for assistance in identifying and contacting appropriate international partners. SAGE members are selected for their expertise, (in many cases world leading) and it is expected that they will be able to offer sound advice on which international experts to approach.

65. For example, on the recommendation of the British Geological Survey and the Met Office, international geological and meteorological experts were invited to join the volcanic ash SAGE. Paragraphs 117 to 118 provide details on international data sharing during the 2009 influenza pandemic. In addition, the Japan nuclear SAGE has engaged with a broad range of international experts, including those that have knowledge of the specific reactor systems at Fukushima. This SAGE has also received regular materials from the International Atomic Energy Authority (IAEA) and regular updates on the status of the Fukushima Nuclear Plant from the British Embassy in Tokyo. Since the start of the emergency in Japan, the GCSA has been engaged with his counterparts in the US and Europe and key agencies have worked closely with their international counterparts.

We recommend that GO Science and the Cabinet Office develop an appropriate remuneration policy for future SAGE members by September 2011. We recommend that they also consider whether compensating SAGE members' employers would be appropriate. (Paragraph 160)

66. The Government agrees that it is important to develop an appropriate remuneration policy for future SAGE members. We are committed to ensuring that appropriate personal expenses are paid to non-government SAGE members as a matter of course and that other costs are reviewed on a case by case basis using a business case approach. Where there is a clear Lead Government Department, it is their responsibility to ensure SAGE is adequately funded. Work is underway to develop bespoke arrangements for circumstances where the Lead Government Department is unclear or the responsibility for SAGE is split. These arrangements and principles will be published in the new Amplified Science Guidance on SAGE, in summer 2011.

SAGE: transparency and openness

We recommend that if GO Science provides the secretariat, details of members and minutes of meetings should be published on the GO Science website. If information on a SAGE is best sourced through the LGD, we consider that GO Science's website should link to the relevant Departmental webpage. It should be clear from GO Science's website where information on the SAGE is published, and how the secretariat can be contacted. (Paragraph 166)

67. The Government agrees with the Committee that SAGE advice and information should be published in a place where it can easily be found. In circumstances where the Government Office for Science and Cabinet Office jointly provide the SAGE secretariat, details of members, minutes and papers will be posted on the Government Office for Science website. Where there is a Lead Government Department, SAGE information will be published on their website, with links to this provided on the Government Office for Science website. To maximise transparency, the Government also believes that links to SAGE scientific advice should be provided on the Cabinet Office website, given they own UK crisis management and their website might be considered an obvious place to look by many.

We recommend that all SAGE meeting minutes and other documents which would be made public following a FoI request are published immediately, in full or redacted form as appropriate. (Paragraph 167)

68. The Government strongly agrees that SAGE should operate on a principle of openness and transparency and that those SAGE papers which would have been made public following a FoI request are published. For most emergencies, it is likely that a number of FoI exemptions will apply to SAGE scientific advice (e.g. national security, pre-empting policy decisions and personal information). For this reason some SAGE advice will need to be redacted and/or not released until the decisions which it informs have been taken.

69. The Government is also committed to ensuring that SAGE members are not prevented from publically stating that they are a member of SAGE or from talking about their own opinions and work. They will however be asked to protect sensitive information (as defined by the FOI Act) in doing so.

70. The membership of all three recent SAGE activations (i.e. the Japan nuclear, volcanic ash and Swine Flu SAGE's) is now published online. The minutes and key papers from the Swine Flu and Volcanic Ash SAGE's and key transcripts from the Japan nuclear SAGE⁸ are also now published. Minutes and key scientific advice papers from the Japan nuclear SAGE will be published once the decisions that the advice informs, have been made.

We recommend that SAGE and its secretariat have a responsibility to identify and support SAGE members willing to communicate scientific issues to the public during an emergency. We further recommend that the GCSA and GO Science, in consultation with Cabinet Office and external centres of expertise such as the Science Media Centre, develop suitable protocols, procedures and guidance for SAGE members. (Paragraph 172)

71. The Government strongly agrees that the way in which SAGE advice is communicated is crucial. In response to lessons learned from swine flu and volcanic ash responses, the GCSA took a much more prominent role in briefing the media on SAGE scientific advice on events at the Fukushima power plant in Japan. Through the UK embassy in Tokyo, the GCSA held several teleconferences with UK nationals in Japan providing them with an opportunity to discuss their concerns about the nuclear incident. In doing this, the GCSA was supported by a number of SAGE members. The transcripts from these teleconferences are available online at the embassy website.

72. In addition, the new Amplified Science Guidance on SAGE which the Government is developing, will emphasise the need for effectively communicating scientific advice and emphasise that LGD should consider this as part of their emergency preparations. This guidance will be published in summer 2011.

SAGE: independence

While we do not doubt Sir Gordon Duff's independence from Government in his role as SAGE co-chair, it is still not clear to us how independence of the swine flu SAGE as a whole was maintained, particularly as it included Government officials. It is difficult to evaluate the independence of scientific advice when the operation of SAGE is confidential. (Paragraph 175)

73. The Government is committed to ensuring that SAGE is effectively organised and focused on providing well-balanced advice that is independent. The new Amplified Science Guidance on SAGE that Government is developing places the responsibility for ensuring independence on the SAGE chair or co-chairs. It will also clarify that SAGE should operate in accordance with the Code of Practice for Scientific Advisory Committees providing advice to Government and the Principles for Providing Scientific Advice to Government.

74. The principles for providing scientific advice to the Government applied during Swine Flu and SAGE members were fully aware of these. The role of Government officials on the Swine Flu SAGE was, in addition to contributing their own relevant scientific expertise, to improve the liaison between SAGE, the Department of Health and the Civil Contingencies Committee and the rest of COBR. This liaison function is essential to ensuring that SAGE can:

- provide scientific pros and cons to policy options under consideration;
- suggest alternative options, as appropriate; and
- provide timely advice.

75. The minutes from the 22 swine flu SAGE meetings were published on 14 October 2010⁹. These detailed documents should enable the independence of the scientific advice to be evaluated.

⁹ Swine flu SAGE minutes available on the DH website at: http://www.dh.gov.uk/lab/SPI/DH_120535; key advice from this SAGE can be found at: http://www.dh.gov.uk/lab/SPI/DH_118862

SAGE and other sources of scientific advice

While there will be scientific advice to Government from sources other than SACs, we see benefits in coordinating advice from SPI and JCVI for future pandemics. Given that the SPI advisory committee was effectively drawn upon to form the basis of SAGE membership, we consider that a future pandemic influenza SAGE should include members of the JCVI (in addition to the JCVI Chair) either as core members of SAGE or a sub-committee. This could speed up the process by which ministers receive advice on vaccination strategies while retaining the crucial challenge function. (Paragraph 179)

76. The structural arrangements for the provision of scientific advice during a future pandemic are currently under review by the Department of Health. They will carefully consider this recommendation as part of this review. The Department of Health will develop a Concept of Operations which will outline the arrangement for a future pandemic influenza SAGE, and build on the Amplified Science Guidance on SAGE that will be published in summer 2011. The review will also take into account the establishment of Public Health England and its advisory bodies.

Because of the CAA's groundwork and the relatively late formation of SAGE during the volcanic ash emergency, it appears that SAGE contributed little to scientific understanding of the key issue: the ash tolerances of engines and aircraft. We question how much additional knowledge SAGE added to enable airspace to be reopened. (Paragraph 182)

77. The Government disagrees with the conclusion on SAGE's contribution to the scientific understanding of the emergency. The volcanic ash SAGE made significant contributions to the understanding of the risks associated with volcanic hazards and how this coupled to the prevalent meteorology. It provided a mechanism for peer review of the modelling that underpinned the operational decisions regarding flight operations within the ash plume, and the changes that were made to the Volcanic Ash Advisory Centre (VACC) output during the emergency. As explained in paragraph 103 these operational decisions on tolerable limits of ash and the closure of airspace were the responsibility of the CAA in the UK. The CAA were represented on SAGE and provided regular progress reports on its work.

78. While SAGE is not formally established until requested to do so by COBR, the GCSA, key CSAs and experts from within and external to Government were providing advice to Cabinet Office and other key Departments as soon as Central Government were alerted to the issue.

79. SAGE made significant contributions to reviewing the Met office NAME model and refining the understanding of what was happening at the source of the eruption, one of the key uncertainties at the outset (see paragraphs 108 to 110). Advice from SAGE enabled the fluctuations in activity at the volcano and on the layering of ash in the atmosphere to be understood and factored into real-time modelling and operational decision-making.

80. SAGE also provided a useful mechanism for ensuring the robustness of modelling and forecasts. Empirical data from a range of ground and remote sensing measurements (e.g. ground and airborne ash samples and measurements from LIDARs which use lasers to

detect and measure airborne particles) were all used to validate the model. More details on the suitability of the model used can be found at paragraph 108 to 112. This work was vital to provide the confidence in ash concentrations and behaviour to inform both CAA and National Air Traffic Services Decisions. Empirical data from a range of ground measurements in Iceland and the UK, remote sensing (e.g. using lasers) and air-borne samples were all used to validate the model.

81. On 13th May, at the request of the CAA, the GCSA chaired a half-day meeting in central London to brief senior executives from the aviation industry and regulatory bodies (including representatives from international regulatory bodies). The meeting was organised to communicate the key scientific issues behind the emergency—particularly that the combination of the nature of the volcano and its proximity to the UK added complexity to the knowledge of the source terms used by the NAME model and the subsequent modelling of ash concentration and dispersion. Several SAGE members with expertise in volcanology and meteorological modelling (including the Chief Scientist from the Met Office) spoke to the industry representatives, and answered specific questions relating to the incident and the science behind it. Other members of SAGE were present to describe their work to provide the validation that ash was present in the atmosphere and to provide validation of the source terms used.

The SAGE mechanism has been used twice, and is therefore relatively new. We expect the Government to have evaluated the impacts that both SAGEs have had and whether SAGE's ways of working need improvement. We recommend that, in responding to this report, the Government provide us with its evaluation on the effectiveness of both SAGEs. (Paragraph 184)

82. SAGE has now of course been activated for a third time in relation to the Japan nuclear situation. As standard practice following all actual emergencies and exercises, lessons and good practice are identified. This includes identifying lessons for providing, coordinating and using scientific advice and evaluating the effectiveness of SAGE (if active).

83. For the 2009 influenza pandemic, an independent review of the UK response was carried out by Dame Deirdre Hine. For volcanic ash, an internal evaluation of SAGE was coordinated by Cabinet Office and the Government Office for Science. This review involved asking SAGE members for feedback and evaluating their responses. A report outlining the lessons and good practice identified will be published on the Government Office for Science website. Both reviews praised the efforts of the scientists on SAGE and of the secretariat. However, as would be expected both reviews highlighted a number of areas for improvement, including some of those indicated by the Committee. These lessons are being reflected in the current work to develop enhanced guidance for SAGE and we will continue to ensure we refine the SAGE processes.

84. The Government does not plan to undertake a further evaluation of the effectiveness of the swine flu or volcanic ash SAGE activations. It will evaluate the effectiveness of the Japan nuclear SAGE once its work is complete.

SAGE: secretariat

The Government should explain who provided the secretariat for the volcanic ash SAGE. (Paragraph 187)

85. The secretariat for the volcanic ash SAGE was jointly provided by the Government Office for Science and the Cabinet Office.

Where the LGD is unclear or yet to be identified, we consider that GO Science should by default provide the secretariat to support a SAGE. (Paragraph 188)

86. The Government agrees that where the Lead Government Department is unclear, the Government Office for Science should, together with Cabinet Office, provide secretariat support to SAGE. To ensure SAGE is focused on key policy questions, the SAGE secretariat should, in these circumstances be jointly led by the Cabinet Office and the Government Office for Science, supported by other government departments as appropriate.

87. The Government considers that the effectiveness of SAGE secretariat is crucial for ensuring Ministers receive the best available, well-rounded advice in a timely fashion. The SAGE secretariat has a responsibility for seeking assurances on the quality of the advice provided and for ensuring it is focused on key policy questions. In circumstances where there is a Lead Government Department, this department is best placed to lead on ensuring SAGE is effective. In circumstances where the Lead Government Department is unclear, the Government Office for Science is best placed to seek assurances on the quality of the advice, whilst Cabinet Office, is best placed to ensure advice is focused on key policy questions. During the response phase to emergencies, resources across Government are inevitably stretched. For this reason, the Government is keen to encourage other Government Departments to consider their role in SAGES for circumstances where they are not the Lead Government Department.

88. The new Amplified Science Guidance on SAGE will clarify the purpose of the SAGE secretariat and who is responsible for it, emphasising the points highlighted above. This guidance will be published in summer 2011.

SAGE: conclusions

We recommend that the GCSA either clarify what guidelines/codes of conduct apply to SAGE or, if no existing ones apply, produce guidelines governing how SAGES should operate. The guidelines should address independence, transparency, confidentiality and the conduct of members, the Chair and the supporting secretariat. We recommend that the guidelines be published. (Paragraph 189)

89. The Government Office for Science's owned "*Code of Practice for Scientific Advisory Committees*" and the "*Principles of Scientific Advice to Government*" apply to all scientific advisory committees that advise government. As SAGE is designed to advise ministers in COBR during emergencies, it should in principle comply with the *Code of Practice for Scientific Advisory Committees* and in line with the Principles.

90. The Government is currently developing new guidance on SAGE. This will include a link to both the Code of Practice for Scientific Advisory Committees and the “*Principles of Scientific Advice to Government*”. The new guidance on SAGE will be published in summer 2011. In addition the Government is committed to reviewing and revising the SAGE Terms of Reference and Confidentiality Agreements to ensure that they clearly reflect the Government’s commitment to transparency and ensuring that decisions are evidence-based. The Confidentiality Agreement will need to clarify what is meant by sensitive information, as defined in the FoI Act, and explain why this needs to be protected.

Changes to the Health Protection Agency and Joint Committee on Vaccination and Immunisation

We recommend that the Government sets out how the independent advisory functions of the HPA and JCVI will be maintained. If any function of the HPA or JCVI is cut, we consider that a justification should be published. (Paragraph 193)

91. The Government recognises the importance of ensuring that the scientists and other public health professionals who currently work for the HPA and who will in future work in Public Health England as part of the Department of Health, demonstrably offer impartial scientific advice. Public Health England, whilst a part of the Department, will have a distinct identity within the Department of Health and an operational focus. Members of Public Health England will continue to be bound by professional codes and, as with other civil servants, by the Civil Service Code, which requires civil servants to act with integrity, honesty, objectivity and impartiality. All Scientific Advisory Committees (SACs) will be expected to abide by the Code of Practice for SACs. Work on designing the new national arrangements for public health will continue over the coming months.

92. During 2011/12, JCVI will be reconstituted as an independent committee of experts to the Department of Health. The reconstituted committee will have a similar remit to that of the current committee, retain its independence and continue to consist of independent experts.

93. The Government is committed to ensuring that the scientific research it funds is transparent and independent. The Department of Health and the National Institute for Health Research are partners in the initiative to create UK PubMedCentral (UKPMC) which was launched in January 2007. This initiative provides a permanent and free-to-access digital archive of the full text of peer reviewed research publications (and datasets) arising from research funded by the Department of Health, the National Institute for Health Research and other members of the UKPMC Funders Group. In addition, the Department of Health are committed to creating a Chief Medical Officers Public Health Advisory Board which will bring together Public Health England with its lead partners. This Board will provide a means of ensuring that Public Health England not only provides the high quality services we expect, but that it also abides by the highest possible standards for scientific advice.

Use of Research Council resources

We are concerned that the delayed reimbursement to NERC for use of the Dornier 228 aircraft has damaged trust between the Government and the research community, with

the danger that there may be reluctance to make such resources available in future. We recommend that the Met Office, whom NERC supported, and the Department for Transport, the LGD, take responsibility for ensuring that NERC is reimbursed in full immediately. (Paragraph 196)

94. During the volcanic ash disruptions of April/May 2010 NERC made an important contribution by allowing its Dornier 228 aircraft to conduct some atmospheric test flights in UK airspace. The claim for the use of the aircraft was submitted on 18 February 2011. Following discussions with the Civil Aviation Authority, the Department for Transport wrote to NERC on 28 March requesting further information. The Department for Transport also indicated that, subject to the receipt of satisfactory evidence to substantiate the claim for the use of the Dornier 228 during the volcanic ash disruption, it is willing to reimburse NERC for the use of this aircraft. DfT will discuss with NERC the wider issues around NERC-supported programmes related to the use of the Dornier.

Security and scientific advice

We consider that the Government must actively ensure that requirements for security clearance do not deter academics from providing scientific advice to Government. (Paragraph 202)

95. The Government is committed to ensuring that security clearances do not prevent the coordination of scientific advice that could inform decisions. There is however a need to protect sensitive information and there is some information that experts without security clearances will be unable to access. Experts with appropriate security clearances (i.e. many Government advice providers) can be used to manage sensitive information flows. Working with the owners of sensitive information they can determine how best to share sensitive information.

Office of Cyber Security and Information Assurance

In its response to this report, we recommend that the Government clarify the powers and funding of the Office for Cyber Security and Information Assurance. (Paragraph 210)

96. The Office of Cyber Security and Information Assurance (OCSIA) was established in September 2010 within the National Security Secretariat in the Cabinet Office. The team supports the Security Minister, Baroness Neville-Jones and the National Security Council in determining priorities in relation to securing the UK's interests in cyberspace.

97. The OCSIA is responsible for producing a new Cyber Security Strategy for the UK to be published in Spring 2011. This will put the £650 million National Cyber Security Programme announced as part of the Strategic Defence and Security Review on a formal footing and set out the broader UK response. The strategic approach relies on growing our knowledge and understanding of cyberspace, including insight into human behaviour, as well as building our capacity and capability to act in cyberspace.

98. The National Cyber Security Programme (NCSP) which is overseen by the OCSIA will move towards a step change in UK cyber capabilities in the next four years. The NCSP will

be delivered by relevant departments such as Home Office, MoD, GCHQ, CESG, CPNI and BIS, working with the private sector and international partners and will help the UK get the most out of cyber space by:

- enabling a cyber environment that underpins economic growth and prosperity, including tackling cyber crime;
- improving the security and resilience of the UK's infrastructure that relies on cyber space; and
- using cyberspace to protect our way of life and promote our values internationally.

99. Funding for specific elements of the NCSP for 2011/12 and beyond will be allocated by the OCSIA following the submission of comprehensive business cases and formal approval by HM Treasury. The minimum resources required to place OCSIA on a sustainable basis will be included in the programme; they will comprise a very small part of the overall funding (<2%). Regular progress reports and reviews will ensure that the NCSP is being delivered as approved in business cases and that it continues to reflect cyber security priorities.

Space Situational Awareness

We recommend that the Government review the need for the UK to increase its participation in, and contributions to, ESA's Space Situational Awareness programme, following the outcome of the 2011 National Risk Assessment. (Paragraph 216)

100. The UK Space Agency recognises the opportunities that broader engagement with ESA's Space Situational Awareness programme would bring, both in terms of exploiting UK expertise and in terms of gaining access to regional capability offered by European partners. The UK contribution to the Space Situational Awareness programme is currently the minimum level at which Member States can be involved. There is no direct UK participation in the optional elements which include space weather. There will be an opportunity to redress this situation at the ESA Ministerial Council in late 2012 when Member States will subscribe to the next three-year phase of the Space Situational Awareness programme.

101. An increased level of subscription for the UK in the Space Situational Awareness programme would need to be balanced against other calls for funding within the UK Space Agency's programme and existing commitments. Alternative mechanisms which would enable the UK science community to contribute to emerging Space Situational Awareness and space weather international programmes include:

- supporting other ESA programmes such as the General Support Technology Programme (GSTP); and
- supporting a possible national programme which could be coordinated through the International Space Innovation Centre at Harwell and in particular its Security and Resilience Unit.

102. Prioritisation for funding of such activities will be influenced by factors including the 2011 NRA assessment and the developing National Space Security Strategy.

Regulations on flying through volcanic ash

We are concerned that, when asked why the UK was unprepared for volcanic ash disruption, the former Secretary of State for Transport chose both to distance himself from, and to pass responsibility to, the CAA, a body for which he had ministerial oversight. This is unsatisfactory. (Paragraph 222)

103. The Civil Aviation Authority (CAA) is the UK's independent aviation safety regulator. The initial decision to impose airspace restrictions was based on the International Civil Aviation Organisation's European Region Volcanic Ash Contingency Plan¹⁰ which used established guidance based on experience (i.e. that aircraft should avoid encounters with volcanic ash). As it became obvious that this was an unprecedented situation where it was not possible to fly around the volcanic ash plume, it was entirely appropriate that the CAA took the lead in international work with airlines, regulators, and aircraft and engine manufacturers supported by scientists and other aviation experts to develop a new approach to reducing airspace disruption. The Department for Transport supported these concerted efforts which led to the iterative establishment of wider areas in which it was safe to fly. This work was based on tolerable limits agreed by the aircraft and engine manufacturers developed from new research and analysis on evidence gained from the Eyjafjallajökull and previous ash encounters.

104. We welcome the Committee's recognition that "it found little disagreement with" the view of Manchester Airports Group that: "the crisis was solved by the CAA demonstrating clear leadership and using scientific evidence to derive a workable solution to the problem of closed airspace."

105. The 2008 independent Strategic Review of the CAA¹¹ and the 2010 ICAO audit of the UK's safety oversight system¹² both confirmed the CAA's status as a world-class safety regulator. The Government is confident that the CAA continues to demonstrate world-leading abilities, as evidenced in the immediate response to and subsequent developmental work on the volcanic ash crisis.

Government will need to resolve the following three policy and process issues (paragraph 224):

- i. the CAA's contribution to EASA's decision-making processes

106. The Government supports the independence of the CAA as the specialist aviation regulator in the UK. The Secretary of State for Transport, who is accountable to Parliament for the overall performance of the CAA, has set out his current priorities for the CAA¹³. These priorities include "maintaining and developing the CAA's good reputation and

10 *Volcanic Ash Contingency Plan ICAO EUR Region (DOC 19)*, Issued by the ICAO EUR/NAT Office, Paris
http://www.paris.icao.int/documents_open/files.php?subcategory_id=63

11 *Report of the Strategic Review of the CAA*, Sir Joseph Pilling (2008)
<http://webarchive.nationalarchives.gov.uk/+http://www.dft.gov.uk/pglaviation/domestic/pillingreview.pdf>

12 *Final Report of the Safety Oversight Audit of the Civil Aviation System of the United Kingdom*, ICAO (2010)
http://www.icao.int/FSIX/AuditReps/CSAfinal/UK_Final_%20Audit_Report.pdf

13 Letter from the Secretary of State for Transport to the Chair of the CAA on current priorities, February 2011,
http://www.caa.co.uk/docs/286/Feb2011Objectives_signedfinal.pdf

influence, both in Europe and internationally, on those matters in which it has regulatory and technical expertise” and specifically that CAA “support[s] and develop[s] the effective management of EASA” where it is recognised that “there is still much important technical work to be done following the volcanic ash incident last year to ensure we are better prepared for any future incidents of this nature”.

107. The Government can reassure the Committee that the CAA has been and continues to work in partnership with EASA, actively supporting and engaging the Agency on a broad range of activities related to volcanic ash and the Agency’s responsibilities for airworthiness, including continuing engagement with manufacturers on developing understanding of engine tolerances to ash.

ii. the suitability of the Met Office’s computer predictions

108. The Met Office atmospheric dispersion model NAME, is a versatile model developed for use in a diverse range of incidents to predict the dispersion, transformation and deposition of a wide range of airborne materials. It is underpinned by world leading meteorology, and it is continuously being developed and validated against other models as well as being used for a wide range of situations, including providing real-time modelling for the dispersal of radioactive materials, in Japan.

109. For instance, in October 2010 an international meeting of experts found the Met Office NAME model performed as well as, if not better than, the other leading transport and dispersion models from around the world, at predicting the dispersion of the volcanic ash plume from the Eyjafjallajökull volcano.

110. The accuracy of NAME model predictions depends upon the accuracy of the source data inputted into it. During volcanic eruptions it is difficult to tell precisely what is happening at the source of the eruption, this is because scientists cannot get close and instead estimates have to be made, using a range of remote measurements (including analysis of ash deposits nearby, airborne samples and measurements taken using lasers). During the volcanic ash disruptions of 2010, the Met Office and SAGE recognised that uncertainties about what was happening at the volcano, as the key uncertainties in the NAME model.

111. Since the eruption of Eyjafjallajökull, the Met Office has helped to secure a loan between Italy and Iceland with Italy loaning Iceland a mobile, state of the art Doppler radar. A permanent version of this radar, funded through ICAO is due for deployment in Iceland in late 2011. This Doppler radar will provide a continuous and more accurate assessment of eruption source characteristics and can be deployed to monitor any Icelandic volcano.

112. In addition these improvements the Met Office is already working to further enhance the NAME model outputs to ensure they are suitable to meet revised operating procedures; enable more involvement of the airlines in decision making; and ensure the UK remains prepared for future volcanic eruptions.

113. A number of science papers specifically reviewing the Met Office model performance during the Eyjafjallajökull eruption are expected to be released for open review later this

year. An independent review of the NAME model has been commissioned by the CAA which is expected to report in early summer.

iii. the involvement of airline operators in decision-making

114. The Government welcomes the Committee's recognition that airspace restrictions were a necessary response to the immediate volcanic ash threat to aviation safety and were imposed as a direct consequence of international guidance current at the time of the crisis. Substantial progress has been made in the UK, Europe and internationally across a number of areas since the events of last April to minimise future disruption in the event of further incidents.

115. Significantly for airline operators, ICAO's International Volcanic Ash Task Force has published preliminary revised guidance¹⁴ which enables aircraft operators to operate in areas which may be contaminated by volcanic ash, provided an appropriate safety risk supplied to the supervising aviation authority is acceptable. Such safety risk assessments must take account of airframe and engine manufacturers' recommendations—it remains the responsibility of manufacturers to determine what level of ash their equipment can safely tolerate.

116. In addition, the European Aviation Crisis Co-ordination Cell (EACCC) which was established by EU Transport Ministers in May 2010, will play a vital role in coordinating and supporting a harmonised and consistent response in the event of any future Europe-wide disruption to aviation. The EACCC members include the European Commission, European Aviation Safety Agency, Eurocontrol and nominations from airspace users, air navigation service providers and airports, supplemented by representatives from ICAO, national regulators, the military, aircraft manufacturers, MET offices and Volcanic Ash Advisory Centres.

International data sharing during the swine flu pandemic

We conclude that there needs to be a better mechanism of data-sharing, particularly sharing of raw epidemiological data. We recommend that the UK, as a member state of the WHO, propose the formation of an international working group under the WHO to discuss how to share effectively epidemiological data between countries in the run-up to a new pandemic. (Paragraph 228)

117. The Government agrees that international data-sharing is important. The UK has strong bilateral relationships with the World Health Organization, the European Centre for Disease Prevention and Control (ECDC), Australia, Canada and the USA. During the 2009 influenza pandemic, these links facilitated rapid sharing of new epidemiological and clinical data. However, the Government recognises that more can be done to improve and that lessons can be learnt from the response to the 2009 influenza pandemic.

118. Following the 2009 pandemic, the WHO convened an epidemiological working group to look at, amongst other things, the development of an influenza surveillance manual and influenza reporting requirements to the WHO. The Department of Health and Health

14 Guidance material on management of flight operations with known or forecast volcanic cloud contamination http://www.paris.icao.int/documents_open/files.php?subcategory_id=63Guidance regarding flight operations in the vicinity of volcanic ash,

Protection Agency are currently working with the WHO to discuss the development of a protocol for sharing raw epidemiological information during any pandemics.