

Case Study

Space Weather Public Dialogue

A public dialogue to inform Government and other public, private and infrastructure organisations' policy on space weather, and the consequences on people and infrastructure

Vital statistics

Commissioning body:

Science and Technology Facilities Council (STFC)

Duration of process:

15 months: November 2013 – February 2015

Total public participants involved:

54 participants at dialogue events, 71 online and 1,010 as part of i-omnibus survey

Total stakeholders involved:

A total of 25 different stakeholders supported the project – 12 were involved in the Oversight Group and a further 13 supported the events; 22 attended the stakeholder summit

Total specialists involved in events:

Between 4 and 10 experts at each event

Cost of project:

Total cost £188,199
Sciencewise funding = £120,000

Severe space weather is one of the highest priority natural hazards in the UK National Risk Register. It has the potential to disrupt many technologies critical to the functioning of modern society. Extreme space weather events are characteristically low probability, but with the potential for a high level of impact.

Understanding of the science of space weather is limited, and there were considerable uncertainties about how severe the impacts of such an event would be. The Science and Technology Facilities Council (STFC) felt that a better understanding of how members of the public understood space weather and perceive related risks and mitigation, as well as how to communicate the nature of these risks, was required.

Influence on policy and policy makers

STFC gave an immediate formal response to the dialogue findings and, with advice and encouragement from members of the Oversight Group, developed four recommendations to facilitate action from Government and members of the space weather community. The recommendations were published in the dialogue project report.

Overall, the project met a defined policy need to fill a clear gap in the evidence base. In addition, the dialogue project findings are expected to feed into further policies and the strategies of several organisations:

- The dialogue was acknowledged in the joint Department for Business, Innovation and Skills (BIS)/Cabinet Office 'Space Weather Preparedness Strategy' document, which was published in July 2015. The Strategy refers to the dialogue as having informed the work on engaging the public on how to plan for the risk of severe space weather and on building resilience to severe space weather.

More generally, the Strategy reflects the four recommendations of the dialogue project

- The dialogue project findings were presented as evidence to the House of Lords Science and Technology Select Committee's inquiry into the resilience of the electricity system and recognised in the Committee's final report, which was published in March 2015
- The dialogue stimulated significant levels of collaboration between stakeholders and cross-agency working, including with Cabinet Office staff and local community resilience officers. The outcomes of the dialogue were anticipated to feed into the policies and strategies of these organisations

Policy maker view

“The Space Weather Public Dialogue has proved to be a very useful exercise in exploring (a) public attitudes to space weather and its mitigation, (b) how to communicate the risk to the wider public and (c) how personal and community resilience can complement official efforts.”

Mike Hapgood, Chair of the Oversight Group. Space Weather: the public and policy, in Room March 2015.



Background

Space weather is a set of phenomena that is now recognised as a significant natural hazard, with the potential to disrupt many of the technologies that are critical to the functioning of modern societies. It arises when space events (mainly on the Sun) generate adverse environmental conditions (e.g. electromagnetic fields, high-energy particles, and changes in upper atmosphere density and composition) for technologies operating in space, in Earth's atmosphere and on the surface of our planet.

The significance of this hazard was recognised through the inclusion of severe space weather as one of many natural hazards listed in the 2012 UK National Risk Register (NRR)¹ (e.g. alongside coastal flooding and extremes of heat and cold). The importance of understanding space weather was also highlighted in the joint science statements made by UK Prime Minister David Cameron and US President Barack Obama in 2011 and 2012. Scenarios for severe space weather events were being identified by drawing on the experience gained during the severe events of March 1989 and October 2003, and from historical events such as those in 1859 and 1921. This is very much work in progress. In the NRR it is recognised that space weather science is a relatively young field and that significant work is required to better understand and prepare for the expected impacts of a severe space weather event.

The challenge of ensuring the public finds accessible and empowering information about their risks is one that faces many government departments and public bodies. The need for this work was seen to be extensive and the outcomes were expected to feed into the policies and strategies of numerous public bodies. Indeed, as well as STFC, the project brought together a number of significant stakeholders including representatives from RAL Space, Natural Environment Research Council (NERC), National Grid and Lloyd's of London – all of whom provided resources to the dialogue project.

- In February 2015, the dialogue project was nominated for an engagement award and was announced as one of the 'Westbourne 100': the top 100 best campaigns of 2014
- The STFC and others involved in the dialogue have undertaken extensive dissemination of the dialogue results, including:
 - Participation in space weather week in Washington. The dialogue report was spoken about at length during the US-UK Space Weather Workshop on power grids and public communications in Washington in February 2015
 - STFC was asked to participate in the European Space Weather Week held in November 2015 in Belgium (for the session on space weather communication and dialogue across Europe)
 - Mike Hapgood, Chair of the project Oversight Group, contributed an article to 'Room, the Space Journal' in March 2015. The article provided a detailed summary of how the dialogue project worked and of the key insights from the public
 - STFC staff participated in a 2015 exercise to explore how authorities may handle all aspects of a severe space weather event and have been invited to participate in a further exercise in 2016.

Key messages from the participants

Participants were clear that they expected their views to be taken into account in future plans and actions. They concluded that investment in research and forecasting, the resilience of technology and systems (such as power and communications systems), and increased awareness and understanding were all important.

Communicating the basics

Participants wanted clarity about what space weather is, how it might affect them and what remediation was already in place. There was seen to be a need for simple and consistent answers from government departments, agencies and other relevant organisations to the following questions:

- What is space weather?
- How long could a severe space weather event last, what would the likely impacts be as a result and what can we do about it?
- How vulnerable is the UK?

¹ National Risk Register (NRR) of Civil Emergencies. Available at <https://www.gov.uk/government/collections/national-risk-register-of-civil-emergencies>

Participants suggested that communicating uncertainty is fine as long as there is clarity over roles, responsibilities, current mitigation plans and contingency plans (that is, who would do what?).

Level of information

Participants wanted honest answers with respect to the consequences of a severe space weather event, but said that these should be in context – with an awareness of the ability of the media to inflate stories.

Mechanisms for wider awareness-raising

Participants concluded that wider awareness-raising activities among the general public were a good idea because they were relatively cheap and help to encourage increased personal resilience, but that additional communications had to be based on sound data.

Specifically, participants talked about drip feeding information to the public. They said there should be a consistent low-level feed of information relating to space weather into the public domain to familiarise people with the terminology and concept of space weather, and reduce the chance of panic should a severe event occur.

Community resilience

Participants expressed a range of views about their own ability and/or that of their communities to cope in the event of a severe space-weather or similar event. Some felt modern communities tended to be less resilient than in previous decades or that the UK as a whole is generally not used to extremes. Others felt their (rural) community would be able to cope reasonably well.

Participants recognised the need to increase personal resilience in general. However, they stressed that personal action needs to go hand in hand with action from local and national government and emergency responders in terms of preparation, guidance and mitigation. Increased resilience was seen as a shared responsibility and participants felt this should be communicated.

Participants made the distinction between community and local government, but did not know of the existence of local resilience forums (LRFs). They stressed the role of local and central Government in informing people of events and relevant actions early, to help reduce the level of systemic impact, and the level of worry or panic among individuals and communities.

Systems resilience and the role of industry and governments

Participants recognised that better systems and technological resilience could have wide-ranging benefits for individuals and society, but were concerned that the cost should not, necessarily, be covered by the public purse. There was a strong message that companies and governments have a responsibility to assess space weather risk, and to put in place and communicate contingency plans.

Forecasts, modelling and data

Participants recognised the value of forecasts and modelling as tools to raise general awareness and mechanisms for assisting with the preparation of and the response to periods of adverse space weather. They expressed support for funding further monitoring and modelling systems, adding that sound data provide the essential basis for reliable communication. Participants

also thought that citizen science projects were a good way to engage members of the public.

The dialogue activities

The overall **purpose** of the space weather public dialogue was to inform Government and other public, private and infrastructure organisations' policy on space weather and the consequences on people and infrastructure. Aspects of the project included:

- **Oversight Group.** The project was governed by an Oversight Group, which was involved right from the start of the dialogue project – before delivery contractors were commissioned. It included representatives from National Grid, the Government Office for Science, BIS, the University of Reading, the British Geological Survey, Atrium Space Consortium, Lancaster University, the Met Office, the UK Space Agency, NERC, the Royal Astronomical Society and a freelance science writer. Group members provided input on design and materials, attended workshops as specialists, and fed back their views and reflections. A stakeholder summit in October 2014 took the form of an extended Oversight Group meeting to discuss and respond to the findings of the dialogue.
- **Knowledge review.** A detailed review was carried out of existing information about how people obtain, interrogate and make sense of information about space weather and similar risks (i.e. risks about which scientific knowledge is limited and which could potentially have far-reaching impacts on people's lives). The review provided a robust context, and a starting point for designing the dialogue and developing dialogue materials. The scope of the review was agreed with the Oversight Group and included expert interviews, a document review, and analysis and synthesis of the findings.
- **Public workshops.** Public dialogue workshops were held in three different locations. These were chosen to reflect three perspectives that it was felt were needed to be considered in the event of an extreme space weather event – rural (Wrexham), urban (Edinburgh) and a national perspective (Reading). Approximately 20 people attended in each location. Each group met twice – a full Saturday on each occasion and a shorter Friday evening session prior to the second Saturday event. The local workshops were followed by a third workshop at Jodrell Bank, which involved 18 participants from across all three locations.

A total of 13 specialists with experience in space weather science, communications, resilience, forecasting, industry and policy were present at the workshops to observe or to engage in discussion and provide further information. In addition, most Oversight Group members attended at least one dialogue workshop to provide input, answer questions and engage in discussion with the public participants.

The workshop structure involved a mix of presentations, working tasks, games, conversations and distillation of key messages. The workshops enabled members of the public and specialists to work together to develop conclusions as the process moved towards the third workshop and the stakeholder summit.

- **Online engagement.** To coincide with the first workshop, a space weather public dialogue website was launched in June 2014. 'This was designed to provide a forum for participants so they could engage with the project between events, to be a focal point for materials and to be a place where media enquiries could be directed

The website also provided an opportunity for anyone to input views. A total of 71 people responded to an online survey. These people were completely self-selecting and thus likely to have an existing level of interest or knowledge about space weather

- **Representative survey.** This was undertaken using the Ipsos MORI i-omnibus, with a sample of 1,010 adults who matched the known profile of the UK population in terms of age, gender and work status. The aim was to gauge baseline levels of understanding and perceptions of space weather, and related aspects of communication and resilience
- **Stakeholder summit.** Outputs from the three dialogue elements – the public workshops, self-selecting online engagement and representative survey – were fully analysed and fed into an interim dialogue report that was presented at a stakeholder summit in October 2014. This summit involved 29 participants (19 specialists including Oversight Group members, five public participants from the dialogue workshops, four members of the project team and an evaluator). The summit included a presentation of top-line findings, and its overall aim was to share initial findings and build upon the emerging outcomes. This event drew together learning from all strands of engagement and encouraged stakeholders to discuss how specific recommendations and messages would be taken forward, and who would do it.

What worked especially well

- The governance of the project by members of the Oversight Group was very strong. They played a key role in the development of the project and its subsequent dissemination. The project evaluators considered the governance process represented best practice for a dialogue project. The Oversight Group was formed very early in the process (before any contractors were appointed) and gave the project a firm steer throughout. The composition of the Group was well designed and included a useful plurality of perspectives (e.g. the partnership with Lloyds was effective and allowed the outputs to be disseminated to a different audience). The Group also had a very effective chair (Mike Hapgood) who was very well networked and respected in the field
- The knowledge review at the start of the project played an important role in summarising existing information, and informing the scope and design of the dialogue. The fact that the project timings allowed for the inclusion of this element within the overall work programme was beneficial
- The structure of the workshops with the public, with reconvened events, was important. Participants were starting from a low knowledge base, so needed the time and space to process new information before giving an informed view
- Some very high-quality resources were developed for the public workshops in terms of presentations, handouts and videos. In particular, the use of video was frequently cited by participants as being engaging and conveying a wider range of perspectives from experts not in the room. Indeed, the fact that there were many experts in the room and the video contained the perspectives of other experts was a highly effective combination

- The level of interaction with scientists and experts in the room was one of the most effective aspects of the dialogue. In particular, the experts were deliberately interspersed on the tables and engaged in discussion (as opposed to being silent and passive observers), which helped guard against any 'them' and 'us' dynamic
- The final stakeholder summit performed a very useful function in engaging a wider stakeholder audience and building momentum behind the project.

“The thing I liked about it was the ability to talk to participants, and take an issue and thrash it out in more detail. It made you feel that they had at least thought through the issue in detail, rather than carrying through any misconceptions without a way of testing their views.”

Stakeholder

What worked less well

- The use of the Friday night sessions was less successful than hoped. However, the premise of having a less formal/socially focused event is interesting and worthy of further testing in future dialogue projects
- Sampling and recruitment of public participants was weak in some instances, particularly around the recruitment of pairs of individuals (e.g. friends and family), which did impact on the group dynamic. On occasions, some facilitators could have done more to engage quieter members at the tables
- The funding priorities exercise at the public workshops suffered to a degree from being undertaken in a whole-table environment, which led the group view to be highly influenced by louder voices on the table or the views of experts.

Contact details

Commissioning body

Science and Technology Facilities Council (STFC)

Sciencewise contacts

Alison Crowther (Dialogue and Engagement Specialist)

Email: Alison.Crowther@sciencewise-erc.org.uk

Alexandra Humphris-Bach (Projects Manager)

Email: Alexandra.Humphris-Bach@sciencewise-erc.org.uk

Delivery contractor

Jane Dalton, 3KQ

Email: jane@3kq.co.uk

Collingwood Environmental Planning

Evaluator

Phil Downing, Icaro

Email: phil@icaro.uk.com

Reports

Full project and evaluation reports are available from Sciencewise on www.sciencewise-erc.org.uk/cms/space-weather-dialogue