



Strands 1-3:

Summary Report

Dialogue by Design

September 2007

Contents

Executive Summary

1. Cross-cutting themes and policy issues
2. The sciencehorizons process
3. Strand 1 - Deliberative Panel
4. Strand 2 - Facilitated Public Events
5. Strand 3 - Small Group Discussions

Additional detail available on www.sciencehorizons.org.uk:

1. sciencehorizons stories
2. Summary of Deliberative Panel discussions
3. Summary of Facilitated Public Event discussions
4. Summary of Small Group Discussions

The **sciencehorizons** consortium would like to thank:

- Sciencewise for supporting the project,
- GE Healthcare for providing additional funding for the Deliberative Panel,
- the Project Oversight Group,
- the Project Board,
- the British Association for the Advancement of Science for organising the 'Working Lunches',
- and most importantly, all of the people who helped to develop materials, organised events and took part in **sciencehorizons** discussions.

Executive Summary: the sciencehorizons project

1. **sciencehorizons** was a national series of public conversations about new technologies, the future and society. A series of events were held between January and July 2007.
2. These included:
 - Strand 1: a **Deliberative Panel** with a diverse group of some 30 members of the public and invited expert speakers
 - Strand 2: **Facilitated Public Events** in science centres and other community spaces
 - Strand 3: Self-managed **Small Group Discussions** run by community bodies such as schools, Women's Institutes and faith groups.
3. All the events considered the same stimulus materials - a set of stories looking at how science and technology being developed now could affect our lives in the future. The stories covered robotics, genetics, energy generation, communications, smart materials, stem cells and sensors.
4. The government's Sciencewise programme commissioned the project, beginning in May 2006, in order to explore the public's views on the wider implications of themes in science and technology that emerged from the strategic horizon scanning work led by the Government Horizon Scanning Centre.
5. The **sciencehorizons** project was run by a consortium, comprising: Dialogue by Design, Graphic Science, BBC Worldwide Interactive Learning, Think-lab and Ian Christie. The project was independently evaluated by Shared Practice. Demos were also part of the consortium during the design and set-up phase.

Executive Summary: sciencehorizons project aims

6. The **sciencehorizons** project was to comprise informed, deliberative dialogue processes bringing together citizens, specialists, policymakers and other stakeholders, and working in partnership with the broader science engagement community.

7. The project's **primary aims** were:

- to discover views about the issues raised by possible future directions for science and technology, from a broad set of participants,
- to inform policy and decision-making on the direction of research and the regulation of science and technology,
- and to help identify priorities for further public engagement on areas of science and technology.

8. Its **secondary aims** were to:

- widen public awareness of the role of science and technology in shaping the future of the UK;
- improve public confidence in the Government's approach to considering wider implications of science and technology;
- increase understanding of the value of public dialogue in shaping policy and decision-making in science and other policy areas;
- improve understanding of how to engage large numbers of people in discussions and dialogue on science and technology-related issues, particularly issues arising from new and emerging areas of science and technology;
- strengthen coherence and collaboration among science engagement practitioners.

Executive summary: sciencehorizons headline findings

9. The discussions about science and technology brought to the surface numerous deep-seated social concerns and policy themes: these include anxieties about **privacy and surveillance, erosion of the human dimension in services and relationship-building, future employment, trustworthiness of authorities, safety, fair access to technology** and the **potential for technologies to be misused**.
10. Participants brought to the discussions two kinds of prior knowledge and opinion. First, some had **specialist informed knowledge** about particular issues and developments. Second, all brought '**testimonial knowledge**' obtained from media, conversations with colleagues, friends and family, and drawing on personal values, that informed how people viewed the **potential implications of new technologies** and the **policy context** into which they would emerge. The concern that technology is being developed by industry and/or government in order to **make profits**, rather than in response to societal needs was a fairly common theme. Some people expressed feeling a **lack of control** over the direction in which science technology is heading.
11. **Trust** in expert authorities in the abstract tended to be low, sometimes surprisingly so. There is pervasive anxiety about **potential abuse** of technologies. It is also widely assumed that policymakers in government and big business are not candid with citizens. For example, a common reaction to low-carbon technology stories was to suppose that carbon quotas would amount to a new 'stealth tax' and/or a means of **surveillance of citizens' consumption**.

Executive summary: sciencehorizons headline findings (continued)

12. There was considerable **ambivalence** about many of the technologies in question. Broadly, technologies are supported that seem to promise more **health, independence (e.g. for the elderly), convenience and quality of life**. There is corresponding suspicion of technologies perceived to bring **risks to safety, scope for loss of privacy and autonomy, social divisiveness** (e.g. because of costs) and **lack of genuine human interaction** (e.g. use of robots for domestic care).
13. Broadly, there is support for developments that have the potential to reduce or mitigate the effects of climate change, such as **renewable energy systems** and (to a far lesser extent) **carbon credits**, but there are significant caveats about nuclear power (cost/safety) and wind energy (cost/visual impact). Support is based not only on environmental benefits but also on grounds of **energy securityindependence** and of **personal autonomy/income (e.g. supplying home energy to grid)**.
14. There were no striking divisions of opinion by social class, gender, ethnicity or age. Broadly, people were likely to be positive, with important qualifications, about developments in science and technology that seemed to promise **gains in choice, quality of life, longevity, convenience, time-saving and environmental impact**. Potential impacts on **social equity, freedom, privacy and human autonomy and skills** were regarded with considerable suspicion or hostility. A minority felt largely anxious about the perceived domination of young people's lives by computer technologies, and the potential for a dehumanised future.

Executive summary: sciencehorizons headline findings (continued)

15. The **Deliberative Panel process** was very well received by the participants: people liked the engagement they had with issues and the expert speakers. There was a widespread view that the deliberative process ought to be used more and that this would be healthy for public life and policy. However, people need reassurance that their views really will be taken seriously and will inform policy discussions.
16. Exposure to **approachable and articulate expert witnesses** in person in the Deliberative Panel process tended to **reduce initial fears, negative preconceptions and anxieties** about new technologies. The main shifts in opinion were:
- from considerable fear of robotics towards a generally favourable view,
 - from doubts on climate science towards accepting the scientific consensus, and
 - from view of carbon credits as inequitable and motivated by tax/control purposes towards a more even division of opinion.

Executive summary: sciencehorizons contact details

17. For more information please contact:

Dr Amy Sanders, Project Manager, Dialogue by Design:

phone +44 (0)20 8683 6602

facilitators@dialoguebydesign.com

www.dialoguebydesign.com

1. Cross-cutting themes and policy issues

Variations between the three strands

- 1.1 The broad pattern of likes, dislikes and tensions between them was similar between the three Strands. There was considerably more knowledgeable input from a technical point of view on some topics from some of the interest groups in Strands 2 and 3, by comparison with the 'lay' people recruited for Strand 1's Deliberative Panel, but in the overall picture this does not seem significant, except in relation to the issue of **climate change**. On this issue most of the Panel members at the outset were either sceptical, outright disbelievers in the reality of human-forced climate change or uncertain. A few had seen the channel 4 TV programme *The Great Global Warming Swindle* and found it convincing: they used this 'testimonial knowledge' to attack the premise of the climate-related stories in *People and Planet*. There was less climate scepticism amongst participants in Strands 2 and 3.
- 1.2 The discussions in Strands 1 and 2 were facilitated whereas those in Strand 3 were self-managed. The role of the facilitators does not seem to have been significant in shaping any variations in patterns of response across strands.
- 1.3 Where there is significant variation is in the final response of Strand 1 members to robotics - more favourable than in the other Strands - and in the shifts *within Strand 1* concerning robotics and climate change/carbon credits. So we need to see what was different about Strand 1. The factors at work in this Strand alone were the **opportunity to hear from, and question, expert speakers** on the second day, and the opportunity that the panel had for more in-depth discussion and **longer reflection** than was possible for Strand 2 and 3 participants.
- 1.4 The speakers on the **robotics and climate/carbon credits themes** were regarded as the most accessible, reassuring and 'on our level', and their presentations were received even more warmly than the other two. The robotics talk was accompanied by a demonstration and slideshow that removed key preconceptions about humanoid and advanced robots held by several Panel members. The climate talk shifted opinions markedly too.

1. Cross-cutting themes and policy issues

What participants brought to the Strands

- 1.5 The participants brought to the discussions two kinds of prior knowledge and opinion. First, some had **specialist informed knowledge** about particular issues and developments. Second, all brought '**testimonial knowledge**' obtained from media, conversations with colleagues, friends and family, and drawing on personal values, that informed how people viewed the themes, stories and technologies.
- 1.6 The '**testimonial knowledge**' amounts to an important part of the mental frameworks used to make sense of new ideas and information and to organise preferences and priorities. It also generates a range of 'default' assumptions about motives, likely consequences of innovation and the probable balance of threat and promise from innovations. Participants brought to the discussions both prejudices and assumptions, therefore, about the nature of the technologies in question and about the kind of policy and societal context in which they would be introduced and applied.
- 1.7 Many of these assumptions reflected a low opinion of business motivations and of governments. The concern that technology is being developed by industry and/or government in order to **make profits**, rather than in response to societal needs was a fairly common theme.
- 1.8 Linked to this, **trust** in expert authorities in general tended to be low, sometimes surprisingly so, as in the first Panel day. There is pervasive anxiety about **potential abuse** of technologies and an assumption that many scientists and technologists are biased by their funding sources and dependence on them. It is also widely assumed that policymakers in government and big business are inclined to impose 'solutions' and keep developments quiet to avoid 'upstream' debate with the public about implications; and that they are always looking for ways to control or monitor citizens. For example, a common reaction to low-carbon technology stories was to suppose that carbon quotas would amount to a new 'stealth tax' and/or a means of **surveillance of citizens' actions**.

1. Cross-cutting themes and policy issues

Attitudes to science and technology across the three Strands

- 1.9 Some people reported feeling a **lack of control** over the direction in which science and technology is heading. Their default assumptions tended to be that developments are 'done to the public' and that citizens are largely passive in the face of change.
- 1.10 Broadly, technologies are supported that seem to promise more **prevention of harms (disease, crime), health, independence (e.g. for the elderly), convenience, environmental gain and quality of life**. Broadly there was support for renewables and other means of reducing carbon emissions, dependence on fossil fuels and environmental damage.
- 1.11 There is corresponding suspicion of technologies perceived to bring **risks to safety, scope for loss of privacy and autonomy, over-dependence** on ICTs and robotics, **threats to jobs and skills** (one of the key problems associated with robots), **lack of equity or social divisiveness** (e.g. because of premium costs) and **lack of genuine human interaction** (e.g. use of robots for domestic care). There was general suspicion of what were perceived to be unfair implications for the poor at home or abroad - as with the stories about carbon credits and DNA vaccines.
- 1.12 **More knowledge and information** were demanded in the Deliberative Panel, and echoed elsewhere, about two areas in particular - **genetics** and **low carbon living/alternative energy**. In both cases people often felt overwhelmed by complexity and confusion.
- 1.13 There were areas of science and technology where considerable **ambivalence** was experienced as people discussed the themes and brought their 'testimonial knowledge' to bear. These were: **biotechnologies, cyber-security, robotics** (good at home and hazardous jobs, bad in care work and the military), **nuclear power, carbon credits, automated vehicle systems, and high-tech medicine**.

1. Cross-cutting themes and policy issues

Ambivalence and tensions

- 1.14 The issue of ambivalence did not apply simply to specific technologies or storylines. It arose in relation to many of the **values and aspirations** that people brought to bear in the discussions. It also arose in relation to the comment often made that, while technical advances might be impressive and even welcome, they sometimes seemed to be inappropriately proposed as solutions when the real issues at stake were about social relations and values.
- 1.15 People valued **choice** highly, but in relation to **genetics and low carbon living/alternative energy** reported overload and confusion and a desire for less or no choices at all, or for the choices to be the responsibility of government. (In relation to climate action there was some frustration with what was felt to be lack of urgency, clear messages and investment from government).
- 1.16 People valued **personal safety, health and security** highly, but disliked the degree to which enhancements might be available only at the cost of significant provision of personal information, which they saw as poorly protected by regulation and by corporate systems.
- 1.17 People valued **biotechnology advances** in medicine highly, but were anxious about unwanted side-effects and the implications of malfunctions in ever more complex applications of science and technology.
- 1.18 People valued **convenience and time-saving** highly, but were anxious about the extent to which these could be bought only through greater dependence, with concomitant risks of loss of skills and human interaction.
- 1.19 People valued the '**personal touch**' and 'human dimension' in services, but were extremely hostile to advances in technology - often 'time-saving' ones - that would enable more simulation of 'humanness' - particularly concerning robotics and online dating. Human distinctiveness was closely related to personal face-to-face interaction, and the discussions pointed to deep ambivalence about virtual worlds and mediated experiences.
-

1. Cross-cutting themes and policy issues

Summary of policy issues

1.20 The major areas of policy raised by the Strand discussions include:

- Regulation of personal genetic information
- Protection of personal data on ICT and DNA databases
- Insurance issues relating to increasing genetic understanding and medical profiling
- Public confusion and apprehension about genetics and biotechnologies
- Public confusion about carbon credits and reluctance to accept role in dealing with climate change
- Demand for more clarity and urgency in Government messages and policy (including investment and incentives) about climate change and low-carbon living
- Support for advanced vaccine technology being made affordable and available to people in need in developing countries
- Clear popularity of the deliberative processes and demand for more such exercises as a means of building trust in authorities and improving public involvement, education and debate.

1. Cross-cutting themes and policy issues

- 1.21 The **deliberative process** was generally very well received by participants: people liked the engagement they had with issues and experts. There was a widespread view that the deliberative process ought to be used more and that this would be healthy for public life and policy. However, people need reassurance that their views really will be taken seriously and will inform policy discussions.
- 1.22 Exposure to **approachable and articulate expert witnesses** in person in the Deliberative Panel process tended to **reduce initial fears, negative preconceptions and anxieties** about new technologies. The main shifts in opinion were:
- from considerable fear of robotics towards a generally favourable view,
 - from doubts on climate science towards accepting the scientific consensus, and
 - from view of carbon credits as inequitable and motivated by tax/control purposes towards a more even division of opinion.

2. The sciencehorizons process

- 2.1 The Office of Science and Innovation's Sciencewise programme commissioned a project beginning in May 2006 to explore the public's views on the wider implications of themes in science and technology that emerged from the **strategic horizon scanning** work led by the OSI's Horizon Scanning Centre (now part of the Government Office for Science).
- 2.2 The sciencehorizons project was to comprise **informed, deliberative dialogue processes bringing together citizens, specialists, policymakers and other stakeholders**, and working in partnership with the broader science engagement community.
- 2.3 The project's **primary aims** were to:
Discover views about the issues raised by possible future directions for science and technology, from a broad set of participants, to inform policy and decision-making on the direction of research and the regulation of science and technology and to help identify priorities for further public engagement on areas of science and technology.
- 2.4 Its **secondary aims** were to:
- widen public awareness of the role of science and technology in shaping the future of the UK;
 - improve public confidence in the Government's approach to considering the wider implications of science and technology;
 - increase understanding of the value of public dialogue in shaping policy and decision-making in science and other policy areas;
 - improve understanding of how to engage large numbers of people in discussions and dialogue on science and technology-related issues, particularly issues arising from new and emerging areas of science and technology;
 - strengthen coherence and collaboration among science engagement practitioners.
-

2. The sciencehorizons process

- 2.5 The **sciencehorizons** project was designed and run by a consortium, comprising: Dialogue by Design, Graphic Science, BBC Worldwide Interactive Learning, Thinklab, and Ian Christie. The project was independently evaluated by Shared Practice. Demos was part of the consortium during the design and set-up phase.
- 2.6 The project oversight group, whose main role was to give feedback on plans and materials, was chaired by Martin Earwicker, NMSI, and made up of David Boyd, GE Healthcare, Gail Cardew, Royal Institution, Lindsay Colbourne, Lindsey Colbourne Associates, Ian Diamond, ESRC, Phillip Greenish, Royal Academy of Engineering, Roland Jackson, the BA, Richard Jones, University of Sheffield, Clare Matterson, Wellcome Trust, Katrina Nilsson, Dana Centre, Melanie Quinn, Ecsite UK and Nick Russell, Imperial College.

2. The sciencehorizons process

The approach

2.7 A range of different techniques were used alongside a methodology for comparing the views expressed by citizens contributing at different levels.

2.8 There were three strands of **sciencehorizons** events:

- **Strand 1: a Deliberative Panel;**
- **Strand 2: Facilitated Public Events; and**
- **Strand 3: Small Group Discussions.**

2.9 These strands each used the same **discussion pack** containing stimulus materials, discussion questions and instructions. In addition, a processing system enabled the research team to structure the data gathered from discussions, analyse and interpret it and present it back to citizens and policy makers alike via the project website, www.sciencehorizons.org.uk.

2.10 **sciencehorizons** used technologies identified in the **Horizon Scanning Centre's eight clusters of emerging science and technology** as starting points for the 16 stories in the discussion pack. The clusters, which arose from the Horizon Scanning Centre's **Sigma and Delta scans**, were:

- Advanced materials and robotics
- Body and mind sciences
- Energy
- Information handling & knowledge management
- Nanotechnologies
- Network interactions
- Security
- Sensors & tracking.

2. The sciencehorizons process

Development of stories

- 2.11 Within these clusters were **61 different new and emerging areas** of science and technology - too many to include all of them in the programme. The Government Horizon Scanning Centre planned to prioritise these technologies. However, before this had happened **sciencehorizons** needed to devise a way of deciding which technologies should be discussed in the programme, in order to develop the materials.
- 2.12 The timing constraints meant that it was not feasible to carry out a wide-ranging survey to rank the technologies in order of priority. Instead, the consortium brought together 30 people, mainly from the fields of science communication and public engagement, and ran a workshop to generate ideas for potential stories arising from the technologies in the clusters.
- 2.13 These ideas were then refined and developed, and the 16 stories were written. Illustrations and online interactive materials were designed, and the instructions, questions and the discussion pack itself were developed in detail.

Project launch

- 2.14 The project was launched at an event for science communicators, and others interested in public engagement, held in September 2006 at the **BA Festival of Science** in Norwich. The main aim was to introduce the project to the people and organisations who might be delivering aspects of the project or be exposed to the results. Attendees were invited to run pilots of the packs. Following the event a short article appeared on BBC Online which generated significant interest.

Pilots

- 2.15 In October 2006, a pack containing the **Mind and Body theme** was piloted with six groups. The packs were then refined, and other themes worked up. The pack was printed in December 2006.

2. The sciencehorizons process

sciencehorizons website

2.16 Alongside the discussion packs a website, www.sciencehorizons.org.uk, was produced.

Visitors to the site could:

- Sign up for more information (September 06 - January 07)
- View and comment on the Blog containing short news updates
- View the calendar of events (strand 2 - facilitated public events)
- Request packs and teachers' notes to be posted to them
- Download .pdf versions of the pack and teachers notes
- Read the guide to running events in Strand 2
- Use the interactive version of the pack, and the links to relevant delta and sigma scan website pages
- Enter the results of a small group discussion or a facilitated public event
- View the results of discussions as they came in (January to July 2007)
- View the collated results (from August 2007).

2.17 There were **13,150 page loads**, and **8,914 unique visits to the website** between 25 January and 25 June 2007 (the closing date for responses).

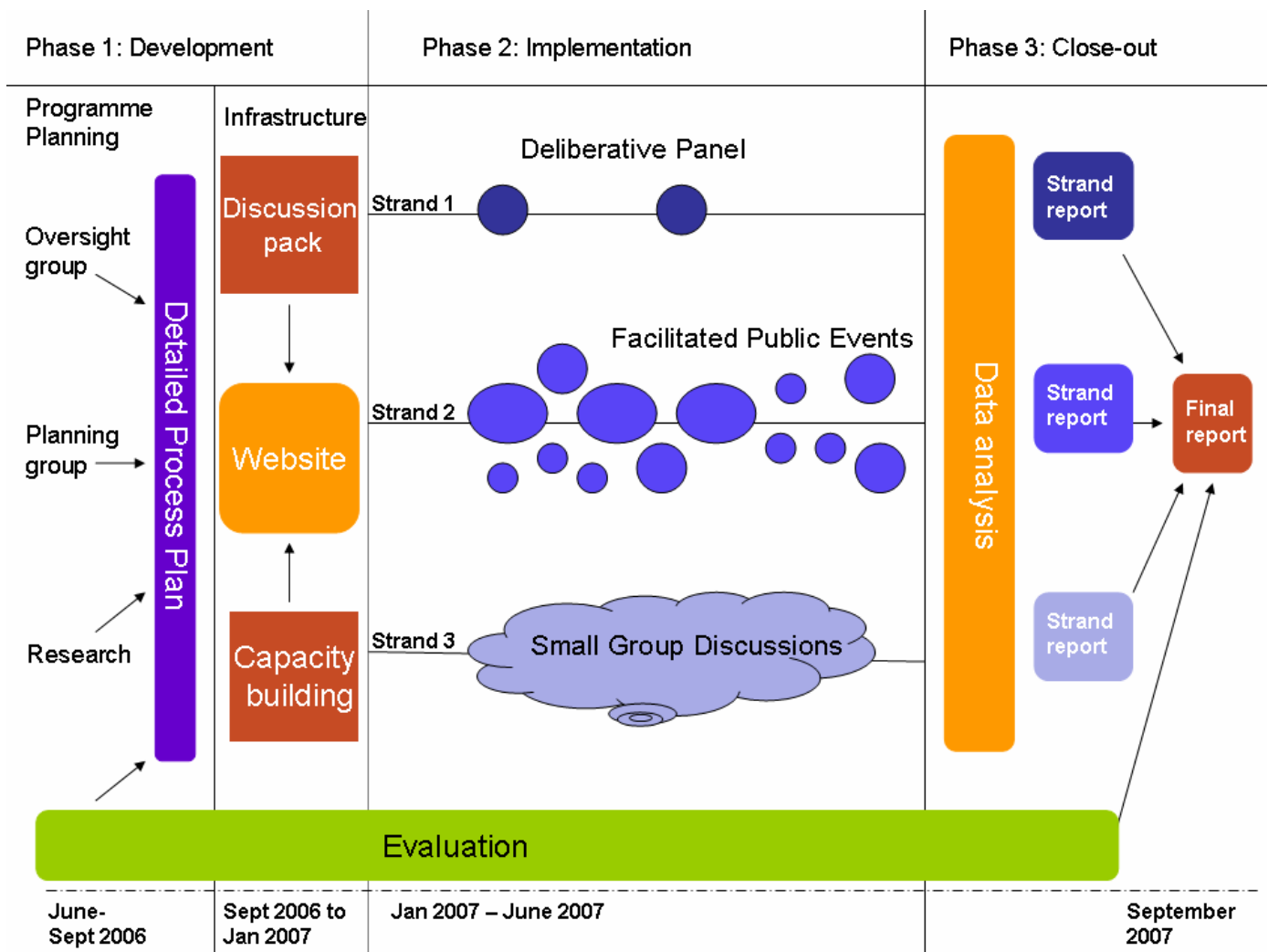
2. The sciencehorizons process

Public launch

- 2.18 The discussion pack was launched to the public on 25 January 2007. The event was held at the Royal College of Art in London, with 10 students from the RCA's Interaction Design course. The students were joined in the discussion by **the then Science Minister, Malcolm Wicks MP**, and the head of the oversight group, **Martin Earwicker of NMSI**.
- 2.19 Articles appeared in The Guardian and BBC Online as well as a number of smaller or more specialist publications and these were used along with other approaches to recruit applicants to take part in the public Strands of the project during the first half of 2007. See appendices 2-4 for the summary Strand reports and details of recruitment to the Deliberative Panel, Facilitated Public Events and Small Group Discussions.
- 2.20 A video and photographs from the launch were posted on the **sciencehorizons** website to illustrate the nature of the discussion. A short article putting the project in context was also published on the site.
- 2.21 In addition, there was a podcast with Professor of Public Understanding of Science, **Kathy Sykes** discussing public engagement with science in general and the **sciencehorizons** project in particular.
- 2.22 The **overall structure of the project** is shown in the diagram on the next page.

2. The sciencehorizons process

Outline of sciencehorizons structure and process



2. The sciencehorizons process

2.23 The following sections describe the main features of each of the **sciencehorizons** Strands:

- Strand 1: Deliberative Panel
- Strand 2: Facilitated Public Events
- Strand 3: Small Group Discussions

2.24 The centrepiece of the **sciencehorizons** study was the Deliberative Panel, as this extended the discussions over two days (compared with the 2-3 hours for the Strand 2 and 3 group meetings). **Accordingly, most attention is paid below to the Strand 1 discussions.**

2.25 Further detail on each of the Strands is provided in appendices 2-4. In addition there are full **Transcript Reports** for each Strand, available from the **sciencehorizons** website. These provide comprehensive collated comments from the discussion groups.

2.26 See also the **sciencehorizons Evaluation Report** for further information about each Strand and the views of participants on the processes.

3. Strand 1: Deliberative Panel

Recruitment to the Panel

- 3.1 Thirty-one participants were recruited to join the panel. In order to ensure a diverse mix of individuals, a company that specialises in recruiting participants for engagement and market research activities was used, and on their advice, participants were each paid £60 per day to participate. The recruitment aimed to cover a range of demographics in the members of the public. People with any formal background in science were excluded from the recruitment process. Separate advertisements went to the University of Bristol and University of the West of England inviting up to 8 scientists to come as participants. Two were able to attend.
- 3.2 The Panel comprised 18 women and 13 men. The age breakdown was as follows:
16-29 = 5, 30-44 = 12, 45-59 = 9, 60-74 = 5, Over 75 = 0.
- 3.3 The participants were all from the Bristol area. Two were from Chipping Sodbury (a nearby village), 13 were from Yate (a nearby town), and 16 were from various parts of Bristol city.
- 3.4 Of the 31 participants, 24 classed themselves as White, 6 as Black, and 1 as Asian. 5 participants said they had a disability.
- 3.5 The socio-economic groupings assigned by the recruiters to the participants were as follows: B-5, C1-10, C2-6, D-8, DE-1, E-1
- 3.6 The deliberative panel met on two Saturdays in 4 weeks apart in April and May, at @bristol science centre.
- 3.7 The full set of 31 participants attended day 1 and 27 attended day 2.
- 3.8 The events were facilitated by Andrew Acland, Pippa Hyam, Amy Sanders and Hannah Vernon of Dialogue by Design and Ben Johnson of Graphic Science.

3. Strand 1: Deliberative Panel

Methodology

3.9 The aims of the meetings were explained to the participants as follows:

To understand the group's attitudes to new science and technology;

To use the findings to inform government policy on science and technology.

3.10 The Deliberative Panel method is used in order to enable participants to explore facts, interpretations and controversies in an informal way during a whole day, allowing for detailed questioning, reflection, discussion and exposure to a wide range of views. Participants can therefore find their understanding and opinions developing considerably over the course of a day and over the two meetings.

3.11 The panel method is based on the idea that complex issues of science and technology can be fruitfully discussed in facilitated groups that enable participants to question the presentation of facts as well as their own and others' assumptions and expectations about the pros and cons of particular developments.

3.12 The specific method used for Strand 1 was developed by the **sciencehorizons** lead consortium member, Dialogue by Design. Similar approaches have been used in many different projects around the UK to explore attitudes, views and understandings of scientific and technological issues, and controversies concerning environmental policy problems.

3.13 Additional funding for the panel was received from GE Healthcare.

3.14 While the discussions were all recorded on flip-charts by facilitators, and some filming was done in the second event, there was no attribution of views to individuals unless they specifically agreed to this.

3.15 The approaches used on each of the Panel meeting days are outlined in turn below.

3. Strand 1: Deliberative Panel

Day 1 structure and approach

- 3.16 Before the first set of discussions began, there were warm-up plenary sessions to introduce the project and the format for the day; to allow people to introduce themselves; and to invite reflection on how far people had noticed science and technology issues arising in news broadcasts and other media in the previous week.
- 3.17 The panel was divided into four equal-sized mixed groups to discuss the **sciencehorizons** stories and issues arising from each theme. These groups held 30-40 minute discussions, led by a facilitator, in a 'carousel' process, so that each group could cover each of the themes.
- 3.18 After lunch, four new sub-groups were assembled to cover one theme each in greater depth, identifying particularly important issues, using plenary discussion to reflect on the materials and on the views expressed earlier. Finally, there was a brief plenary review.
- 3.19 The organisers then took the list of issues, questions and suggestions and invited a number of experts to come to the next meeting and discuss particular topics with the panel.

3. Strand 1: Deliberative Panel

Day 2 structure and approach

3.20 The aims of day 2, which took place one month after the first meeting, were:

To see what effect more reflection and information (from expert witnesses) would have on people's views about science and technology; and

To see whether there were issues that cut across different areas of science and technology for the participants.

3.21 The meeting took place as before at the @Bristol science centre. Nearly all of the previous Panel members were able to attend; no new participants were involved.

3.22 The format was as follows:

- The group was welcomed and reminded of the aims of the project and of the four themes discussed last time; discussion was invited about issues that had stuck in members' minds from the last meeting;
- Expert speakers addressed the group as a whole on the four issues that had been considered especially problematic and interesting at the first meeting: **Steve Crane of Hewlett-Packard** on cyber-security, **Simon Roberts of the Centre for Sustainable Energy** on climate change and carbon credits, **Hilary Newiss of the Human Genetics Commission** on genetic testing and information, and **Alan Winfield of the University of the West of England** on robotics.
- After each presentation and plenary question-and-answer sessions, participants split into small groups to discuss the material provided in depth. In the afternoon, plenary discussion resumed, focusing on how far people's minds had been changed, how and why; on the question of trust in government and other authorities on science and technology; and on what people now found most worrying and most exciting. The event concluded with a debriefing session.

3. Strand 1: Deliberative Panel

3.23 In the following sections we summarise key points arising from the discussions on the two Panel meeting days.

Day 1 - Mind and Body theme

3.24 The key issues were identified as:

- Availability of new techniques
- Cost and scope for cost savings
- Savings in care of disabled and elderly people
- Who decides about use of the techniques described?
- How are priorities set for investment ? *'Experts will tend to go towards their agenda'*, which was seen by some in the group as inevitably not that of the average citizen.

3.25 Members were asked what further information they wanted and what questions they would wish to put to experts about the theme's technologies and issues. The wish list included:

- *Scope for rejection of stem cell-based new tissue*
- *Would the 'jogging cap' system really work? What else can be done for people with dementia?*
- *What did GPs think about automatic self-diagnosis tests?*
- *What about use of the information generated by the test devices?*
- *What if enhancement technologies don't work? Do they give false hope?*

3. Strand 1: Deliberative Panel

Day 1 - Work and Leisure theme

3.26 The key topics were identified as:

- **Technology masking 'the real issues'**: who decides what gets developed? Why does money get spent on CCTV rather than addressing the causes of anti-social behaviour?
- **Affordability and access**: how do we ensure that people are not excluded - for example, through lack of understanding of new technologies?
- **Control**: who decides about use of the technologies and of the information they generate?
- **Substitution of technology for human relationship**: how do we decide whether a new development is of real benefit?
- **Health and genetic technology**: how easy is it to test for conditions such as cancer? How would the knowledge affect people? How is genetic information stored? Could genes for 'criminality' be corrected? Would new techniques speed up diagnosis and treatment?

3.27 It was generally felt that it was up to the public / individuals to take responsibility in relation to *control over personal information*. This issue also raised questions of trust in expertise: people wanted information on data protection, but at the same time there was some agreement with the group member who said that they *'wouldn't trust anyone on this'*.

3.28 In relation to the genetics and health issues, it was felt that Government was ultimately responsible for action, since *'they will hold the purse strings'*. Group members wanted information from experts on ethical dimensions and the costs of new technologies.

3. Strand 1: Deliberative Panel

Day 1 - Home and Community theme

3.29 The key topics were identified as:

- **Smart shopping technology:** concerns about 'manipulation' by the food industry; but in general people were inclined to be positive about the technologies provided that small enterprises could be engaged and that '*it becomes a weapon of consumer choice*';
- **Online dating systems:** broadly it was felt that these were a matter of personal choice provided that certain vulnerable groups could be protected;
- **Domestic robots:** on the one hand there was a very positive response to the idea of a robot as a household cleaner taking over tedious domestic chores; on the other there was concern about any other applications of robots (for example in warfare) and about enhancements of their humanoid capacities, as both would raise major ethical issues (and costs);
- **Home security systems:** the major themes to which group members returned were fears of 'Big Brother' and paranoia being encouraged; misplaced investment in security at the expense of tackling root causes of anxiety; and the insistence that adoption was a matter for personal choice.

3.30 What questions did people want to put to expert witnesses at the next meeting? The issues raised were:

- *How far has robotics come and what could be feasible on what timetables?*
- *Who will regulate data protection and the use of CCTV - and how?*
- *What are the needs for and benefits from advanced security systems from the police's perspective?*
- *What is the likelihood of small retailers and local shops being able to get involved in smart shopping systems?*

3. Strand 1: Deliberative Panel

Day 1 - People and Planet theme

3.31 Key issues identified were:

- **Advanced robotics:** Participants repeated their concerns about safety and affordability of the robot systems. They wanted to know more about the realism of the scenario and the timetables for development. Some were particularly anxious about the scope for quasi-human emotions and intellect being feasible for robots. Some expressed a strong sense of alarm about what they felt was inexorable technical development that happened regardless of what people like them thought: *'a strong sense that we have no choice, all of this is being done to us and we are fed information in bits'*; *'...we don't get asked anymore'*.
- **Alternative energy systems:** There was much uncertainty about what government and businesses were doing about climate change and alternative energy sources, and about home energy efficiency, perceived to be poor and unaddressed by policymakers. People were curious about the viability of micro-power and selling energy back to the Grid.
- **Climate change and tradeable carbon credits:** Much suspicion was voiced about the science of climate change and the potential of carbon credits/quotas. More information was wanted about how carbon credits would work and about how far they would be open to abuse and fraud. Some saw them as 'stealth taxes' or restrictions on freedom and choice.
- **DNA infectious disease vaccines:** Participants wanted to know how effective new DNA vaccines could be and what side effects might exist. Some wanted to hear from a speaker from a developing country or charity about where aid money goes. There was also interest in hearing about scope for incentives for drug companies to make drugs or patents more available.

3. Strand 1: Deliberative Panel

Day 1 - Conclusions

- 3.32 People liked the deliberative process and the fact that they had been asked to take part in a serious discussion: *'This is the most positive way I've heard science discussed in 10 years'*, said one participant. There was agreement that *'this should happen more'* - *'people feel detached from government and this helps enthuse us'*.
- 3.33 The facilitators noted that despite the above comment, during the day a huge amount of **distrust** had emerged, in government, big business and developers of technologies such as robotics and smart security devices. For example, this general remark: *'We've had so many lies in the past, so much rubbish'* - for example, in relation to food scares - *'that we don't know who to believe'*. In the sessions on climate change, it sometimes seemed that no source of information or interpretation was deemed reliable and trustworthy. A pervasive theme was the fear that people were not being given all the facts in various areas of concern, and that there would not be enough safeguards against inevitable abuse of trust, misuse of personal information (*'online fraud terrifies me'*), and imposition of technologies without debate or consent.
- 3.34 The members of the Panel agreed that they had tended to voice a **lack of trust in many authorities and institutions**. It was felt crucial to find 'independent' experts - i.e. not directly funded by government or key business interests - to give presentations to them on the second day of the Panel in May 2007.
- 3.35 There was agreement that the process of discussion had inclined people to feel **more positive overall** about science and technology, despite the many reservations and dislikes that had been noted.

3. Strand 1: Deliberative Panel

Day 2 presentations by expert speakers and discussion

3.36 Steven Crane of Hewlett-Packard gave a presentation on emerging technologies in **computer security, data protection and security/surveillance**. He expressed concerns about proliferation of data collection and CCTV and accepted that there was public anxiety about the release of personal information to gain access to services. However, he argued that much of the 'push' for these technologies came from public demand for convenience and security. The questions and comments from the Panel focused on **control, trust and decision-making** about how and which technology is developed:

- How does HP deal with issues of public trust likely to arise in future?
- Who is responsible for all the information that is copied and stored?
- Would we have to pay you to store and retrieve information?
- What else is the company doing to give us cyber-security?
- What is the relationship between companies making decisions and government/demand from people?
- Issue of control being taken away from individuals. *'I am worried that this will become more common and you will be forced to release more information than you want to in order to receive services'; 'The people in charge of technology have stopped listening. Children are becoming indoctrinated at a young age and using computers and so on too much. This will leave people unable to do anything themselves.'*
- What is the motivation behind generating databases? Who will have access? What is the information? What is the purpose of collecting it?
- CCTV - could have been useful to find the missing girl in Portugal. If you are doing nothing wrong you do not mind being filmed.
- In the film *Minority Report* they scan the people's eyes - is this technology already here?

3. Strand 1: Deliberative Panel

Day 2 presentations by expert speakers and discussion

3.37 Simon Roberts of the Bristol-based Centre for Sustainable Energy gave a presentation on **climate change and tradeable carbon credits**. He explained the basis for the scientific consensus, which he endorsed, that global warming is real and is being forced by human activities. He argued that most (80%) of people on lowest incomes would gain from carbon quota trading, and explained how a system might work.

3.38 The questions and comments from the Panel members focused on the **scientific evidence for man-made global warming** and the potential **personal and social costs of the carbon credits idea**:

- *Where does the '90% of scientists are certain about climate change' come from? Are they 90% certain about global warming, or that humans are responsible for it?*
- *Most scientists would concede the modelling is a guess. There are other scientists saying that it isn't happening.*
- *We are really questioning whether we can trust the scientists.*
- *Don't carbon credits discriminate against the poor? Why aren't there more alternatives available?*
- *Because we are not all on benefits but we have no spare cash - we don't get any help.*

3.39 Comments were made during the Q&A session about the wider political issues. Again, these reflected scepticism to a large extent. For example:

- *I believe in climate change - but I understand why there is public scepticism; 'there has been no credible public debate'*
- *Still cynical ...scientists are making money out of global warming.*
- *There's no point in us doing it when countries like China are not.*

3.40 Some felt that the science was clear and that people in the UK had a moral duty to take action. Some said that this was the first time they had heard the arguments and facts explained so clearly.

3. Strand 1: Deliberative Panel

Day 2 presentations by expert speakers and discussion

- 3.41 Hilary Newiss, a solicitor and member of the UK Human Genetics Commission, gave a presentation on genetic profiling, the potential for 'designer' genetic engineering of offspring and genetic information management. Hilary described the kinds of genetics tests that are available now to the public, such as an over-the-counter test for predisposition to bowel cancer. She noted concerns about the potential for discrimination and the need for regulation of test kits available in shops.
- 3.42 The questions and comments from the Panel members focused on the **reliability of the technologies, decision-making** and the potential **personal and social disadvantages** (among which **discrimination** was a key concern):
- **Discrimination:** *'Health insurance is a right, but won't be open to people with certain diseases?; concern about testing all babies and the government using the information to decide on budgets...could be used to discriminate;*
 - **Accuracy:** *How accurate are the tests? Is there a limit on how accurately they can be used by the public?*
 - **Genetic engineering of children:** *Are you in favour of reproductive choice - designer babies?*
 - **Decision-making:** *how is it decided which conditions can be eliminated, e.g. blue eyes vs. cystic fibrosis, or sex selection? Who is making the decisions?*

3. Strand 1: Deliberative Panel

Day 2 presentations by expert speakers and discussion

3.43 Prof. Alan Winfield, from the Robotics Laboratory at the University of the West of England, gave a presentation on robotics and also a demonstration of a group of micro-robots developed by his team at UWE.

3.44 He noted that robots are unsophisticated still - at the level of 'simple insects' - and that robots would not be designed for the most part to have humanoid features. He acknowledged concerns about the use of robotics by the military, and about the potential replacement of people in caring for the elderly in some circumstances.

3.45 The questions and comments from the Panel members focused on the **nearness of the technologies to application, the kinds of application they might have, decision-making and the implications for human beings:**

- Could these robots be adapted for medical purposes?
- How close are we to robots doing domestic tasks?
- Can you see robots being used for public transport?
- Could you adapt robots as autonomous vehicles?
- Where does man fit into a robotic society?
- Wouldn't the defence industry invest in robots?
- Who funds you?
- What sort of society do you envisage - robots in 10-15 years?
- How long before we have human-like robots?

3. Strand 1: Deliberative Panel

How far did expert presentations change the views of Panel members?

- 3.46 Participants were asked to answer a short questionnaire asking whether their views had changed on any of the technologies that expert speakers had discussed. Note that participants tended often to interpret the question as meaning *Do you feel more positive about the issues?*
- 3.47 The areas in which most change was reported were **climate and robotics**. It was evident that this was to some extent a reflection of the perceived quality and clarity of the presentations and the tone of the presenters, felt to be 'down to earth', 'open' and 'on our level'. In relation to robotics the responses also reflected the demonstration of micro-robots, a far cry from the science-fiction images many participants had earlier conjured up.
- 3.48 Responses by topic are summarised below.

How far did expert presentations change views?

Cyber-security

- 3.49 Just four out of 27 said that their views had changed, and all of these members still had significant reservations about potential for misuse. Overall people either felt that they needed more information to form a full opinion or that they remained anxious about the risks.

Climate change and carbon credits

- 3.50 Around one quarter of the group said that their views had changed, and the direction was towards more acceptance of climate science and less scepticism about the need for action. Many said that they had not changed their view (and note that some arrived firmly convinced about climate change being real and an urgent issue) but felt better informed. Suspicions remained for some about the practicality, fairness and motives behind the proposal for tradeable personal carbon credits.

3. Strand 1: Deliberative Panel

How far did expert presentations change views?

Genetic testing and information

3.51 A few of the Panel said that their views had shifted and several said that they now felt better informed. However, those who came with a negative view of the subject tended to be confirmed in their anxieties about misuse, discrimination and social side-effects; others who felt unsure still wanted more information and time to think about the complexities.

Robotics

3.52 The majority of the Panel said that their views had been changed by the presentation and demonstration, and in the direction of more support for and less anxiety about robotics technology. Reservations remained about misuse and military applications, and enthusiasm was restated for medical and environmental and emergency applications. Several were reassured that the technology was not as advanced as popular culture presented it in films, and were excited by the potential for benign uses. The demonstration of very non-human and small-scale robots unquestionably made a major and reassuring impression on the group as a whole.

3. Strand 1: Deliberative Panel

3.53 The concluding discussion with Panel members focused on a range of questions about their views on the technologies in the stories and their general reactions to the process. The key points are summarised below.

What issues are worrying you most now?

3.54 The dominant response was that issues about **genetics** remained worrying and that more information and discussion was needed here about the ethical and practical issues. *'You've got to get a lot deeper to discuss genetics'*.

3.55 **Cyber-security** was also mentioned. Significantly, these two topics were those where the presentations and Q&A sessions produced the least movement in participants' opinions and where the information had come from people in the commercial world. Given the emphasis placed by many members of the Panel on the need for 'independence' as a pre-requisite for trust there may have been a tendency to be sceptical or suspicious in advance of speakers on these issues.

What is most exciting?

3.56 Robotics and the climate issue (urgent rather than 'exciting') were mentioned.

3.57 Several said that it was the deliberative process itself that they found most exciting and interesting:

- *'Power of people discussing things - not assuming the public is too thick to discuss such issues'*.

3. Strand 1: Deliberative Panel

What would change your minds about the things that most concern you?

3.58 The issues mentioned here were: greater and clearer **accountability and regulation** (*'checks and controls being evolved alongside new technology, and finding out what people think of it and how they will be affected'*); more **control** for individuals over access to information; more **public debate** about, and evaluation of, science and technology developments.

Comments on the Panel process

3.59 There were reservations about the wider context - would Government really listen? - but overall an enthusiastic view of the process. People liked the fact that the Panel had 'come to them' and involved citizens who might not otherwise get engaged in debates.

3.60 For many the process seemed to stimulate a desire for more public deliberation and for more knowledge about science and technology issues. Some felt that such events should be institutionalised - for example, linking them to MPs' work, perhaps twice annually.

3. Strand 1: Deliberative Panel

Conclusions

- 3.61 The Panel process exposed a sample of citizens to intensive and detailed discussion and information about complex technological and ethical issues. The process revealed an **appetite for deliberation** and Panel members took part with energy and enthusiasm.
- 3.62 There was an overall sense of **excitement** too when it came to science and technology as a whole, with awareness of the potential benefits to society from many of the ideas discussed in the stories and presentations. Reservations and fears tended to be about specific technologies and policies, and some of these faded when more information was given. However, for some members there was a general concern about the perceived pace and scale of change and the sense that technology was something 'done to us' and that could not be adequately debated in advance of its application to society and economy.
- 3.63 Minds were changed in positive directions when it came to **robotics** technology, previously seen by some as alarming, but this was clearly influenced by a compelling demonstration of micro-robotics and a clear and informative presenter.
- 3.64 Minds were changed also, though to a lesser extent, about the validity of **climate change science** and the urgency of policy responses. However, members of the Panel remained largely sceptical about the carbon credits idea and some continued to express considerable doubts about Government's intentions and seriousness concerning climate policy.
- 3.65 Considerable anxiety and mistrust remained about **genetic technologies and cyber-security**, with worries clustering around the issues of data protection, scope for misuse and crime, and anxieties about the intentions and motivations of governments and businesses developing the technologies. Genetic advances in healthcare were generally welcomed but doubts remained about scope for discrimination.

3. Strand 1: Deliberative Panel

Conclusions (continued)

3.66 Overarching issues crossing the themes and stories that were debated included:

- **trust in expertise** - who can be trusted?;
- concerns about the **security, privacy and integrity of personal information** (IT- or genetically-based);
- concerns about **safeguards against abuse** of technologies by authorities or by criminals;
- and fears about **loss of the 'human touch'** in everyday interactions, for example in relation to health, and in work.

3.67 The process revealed a striking **trust deficit**, only partially closed by the presentations on the second day. Great store was placed in perceived **independence** of organisations, and the default attitude to Government and business tended to be one of suspicion or outright mistrust. Yet both Government (and business to a lesser extent) also tended to be seen as the agencies with most responsibility for taking action to avoid harmful outcomes, given the difficulties for the public in understanding all the issues or making much difference through personal action.

4. Strand 2: Facilitated Public Events

- 4.1 The Strand 2 events involved facilitated public discussions around the UK in a variety of settings, such as community centres and museums, on issues arising from the **sciencehorizons** scenario stories. These cover general themes: Home and Community, Mind and Body, People and Planet, and Work and Leisure. The events were usually open to the public. The organisations that took part were invited to run group discussions using the **sciencehorizons** pack and were offered advice and help in setting the meetings up at four 'working lunch' events that were held in conjunction with the BA, and on a one-to-one basis where requested.
- 4.2 Organisations had access to a fund provided by Office of Science and Innovation to help them pay for the running costs of the events. Organisations receiving funding were asked to:
- Run discussions using the **sciencehorizons** briefing packs;
 - Report on the results of the discussion;
 - Involve one or more scientists in the discussions, whether as a guest speaker, facilitator or participant;
 - Send in an evaluation form.
- 4.3 Applications were received from **24 organisations** and of these **17** were funded.
- 4.4 Strand 2 consisted of **36 events**, with a total of **842 participants** discussing the issues in groups and providing feedback. The average group had 9 people. We received response forms reporting on events from **97 groups of participants**.
- 4.5 The groups met in a variety of settings across the UK. For example:
- Museums
 - Cafés Scientifiques
 - Science festivals
 - Local science and technology clubs or interest groups
 - Women's Institutes.

4. Strand 2: Facilitated Public Events

Methodology

- 4.6 The format for the meetings was similar, although settings, speakers, facilitators all varied around the country. The background knowledge that people brought to the discussions also varied considerably. Some events were aimed at school and college students and some of the comments reflect specialist scientific or technical expertise. But for many people most of the issues were unfamiliar areas where they perhaps had some general knowledge but little or no detailed understanding or pre-existing interest.
- 4.7 Each group considered the **sciencehorizons** stories from the pack, grouped by theme. See www.sciencehorizons.org.uk for details of the stories.
- 4.8 For each story, the discussions were based on these questions:
- What do you like about the technology in the story and why?*
 - What do you dislike about the technology in the story and why?*
 - Of the things that you either like or dislike, which is the most important?*
- 4.9 After each theme's stories had been covered, the facilitator would pose this question, allowing for further reflection either on the issues raised so far or on the quality of the pack:
- What else would you like to say about the stories in this theme or about the pack in general?*

4. Strand 2: Facilitated Public Events

Responses to technologies and issues in the themes

- 4.10 In the **Mind and Body** theme discussions, the main areas regarded as positive related to the extension of choice, greater longevity, preventive action on illness and risk of disease, scope for greater personal independence and more convenience/time-saving. There was often excitement about the prospects for improved health and choice - for example in relation to self-diagnosis kits and use of stem cells to create replacement organs, and perhaps above all concerning the potential of 'standard enhancements' using biotechnologies.
- 4.11 The negative aspects were felt across the groups to be risks of abuse and misuse, the scope for loss of control, privacy or civil liberties and choice (*who controls genetic information?*) and risks of overdependence and social division caused by exclusive access to technology based on ability to pay premium costs. There was a 'yuk' factor at work in some discussions of 'premium enhancements' to bodies using biotechnology, with a view that such developments would encourage undesirable traits and would be 'unnatural'.
- 4.12 In the **Home and Community** theme discussions, these negative issues were again prominent across the groups. There was also an emphasis on the risks of losing the 'human touch' through mediation of experiences and relationships via new communications technologies and above all through use of robots. As in the Strand 1 and 3 discussions, moves to endow robots with humanoid appearance and qualities were viewed with alarm and real distaste.
- 4.13 The positive features echoed those in the Mind and Body theme. Groups liked the scope for preventive action - in this case relating to crime prevention in particular - and for time-saving and convenience (robotics for basic chores at home). There was a general emphasis on benefits for safety and security in relation to home CCTV and sensors - but note that there was a countervailing vehement dislike of these prospects based on fear of 'Big Brother' trends in surveillance and control.

4. Strand 2: Facilitated Public Events

Responses to technologies and issues in the themes

- 4.14 In the **Work and Leisure** theme discussions, the benefits identified related principally to gains in quality of life, convenience and time-saving and safety/security, as with the two previous themes. Groups liked the scope for more road safety via automated vehicle systems, and while some greatly disliked the privacy/surveillance aspects of the technology others welcomed the restriction of drivers' autonomy if it meant safer travel. Groups liked the flexibility, convenience and reduced environmental impact promised by the remote working technologies.
- 4.15 The drawbacks that were highlighted related once again to risks of misuse and abuse, threats to privacy and civil liberties, overdependence on machines, and risks of exclusivity and social division. Concerns were especially strongly expressed in relation to the perceived drawbacks of the automated vehicle systems and of the flexible 'smart clothing' worn in the 'Katie in the park' story. Both technologies were seen by many as a risk to safety and privacy or autonomy.
- 4.16 In the **People and Planet** theme discussions, a similar pattern of negative points emerged. There was considerable dislike for the risks of abuse and misuse of advanced robots, the risks of abuse and impracticality seen in the idea of carbon credits, problems of fairness, affordability and exclusivity in relation to carbon credits and DNA vaccines, and there were concerns about the cost and impacts of nuclear and renewable energy systems.
- 4.17 Against these perceptions of carbon credits, some group discussions focused on the potential for cutting emissions and actually effecting more equitable distribution of wealth by enabling poorer people to sell allowances. There was general support for renewables and an even warmer welcome for the DNA vaccines described in the final theme story, with the proviso that action would be needed to make them available to those in most need (and in many discussions it was clear that neither public nor private sector was trusted to take these steps).

4. Strand 2: Facilitated Public Events

Cross-cutting issues: positive features

4.18 Aspects of the technologies and developments that were seen as the **most important positive features** in at least two of the themes were:

- *Scope for gains in quality of life*
- *Scope to increase choice*
- *Early detection/preventive care*
- *Increased independence*
- *Time-saving and convenience*
- *Better safety/security*
- *Benefits for specific types of person*

4.19 The positive features identified across **three or all** of the themes were these:

- *Time-saving and convenience*
- *Better safety/security*

4.20 So numerous aspects of the technologies and developments in question made particular appeal to people's desire for **enhancing key features of quality of life**: increasing choice, saving their time (and the time of hard-pressed service providers, for example doctors) and **improving their protection against widely feared risks** - via early diagnosis, prevention of diseases, and prevention of crime.

4.21 There is a mix here of gains that largely benefit the individual (more independence) and those with wider advantages for others and for the community as a whole (safety, security). People often made the connection between these categories - for example, early diagnosis kits could save time both for individuals and take some of the load from GP services etc, thus producing a wider collective good. This was also true of the Strand 1 and 3 discussions.

4. Strand 2: Facilitated Public Events

Cross-cutting issues: negative features

4.22 The most important negative aspects featuring in discussion of least two of the themes were:

- *Worries about costs*
- *Fear of abuse/misuse*
- *Overdependence*
- *Risks to privacy/civil liberties*
- *Loss of social interaction/human touch*
- *Anxieties about loss of control/loss of choice*
- *Risks of failure/impracticality*
- *Fears about exclusiveness/social division*
- *Fears about 'unnatural' developments*
- *Technology as unnecessary/technical 'solution' to social problem*

4.23 The negative features identified across **three or all** of the themes were:

- *Fear of abuse/misuse*
- *Overdependence*
- *Risks to privacy/civil liberties*
- *Loss of social interaction/human touch*
- *Anxieties about loss of control/loss of choice*
- *Risks of failure/impracticality*
- *Fears about exclusiveness/social division*

4.24 The pervasive concerns focus on **unwanted side-effects** of some of the benefits identified: with more security can come risks to privacy; with more technologies for prevention of risk and harm come risks of failure, side-effects and over-dependence; and so on. The participants showed acute awareness of such interactions and **tended to be express dislikes and consciousness of risk.**

5. Strand 3: Small Group Discussions

Design of Strand 3

- 5.1 The Strand 3 events involved small group discussions across the UK in a variety of settings, such as schools, community groups and clubs, on issues arising from the **sciencehorizons** stories. Each discussion focused on one of the four themes: *Home and Community*, *Mind and Body*, *People and Planet*, and *Work and Leisure*.
- 5.2 The individuals and organisations taking part were invited to run largely **self-managed small group discussions** using the **sciencehorizons** pack and were offered advice about running the meetings. The questions to be covered were the same as those discussed in Strand 2 (see page 35 above).
- 5.3 The **sciencehorizons** team wrote to 7,808 individuals or organisations including community groups, environment groups, health groups, adult learning groups, discussion/debating societies, libraries and faith groups inviting them to request packs and run their own small discussions using the **sciencehorizons** pack.
- 5.4 Information about the scheme was also posted on discussion lists/boards, blogs etc.
- 5.5 In order to encourage schools to participate, a set of notes for teachers was produced and a letter was sent to each state secondary school in the UK.

Scale of the initiative and response:

- 5.6 747 pack requests were received, and over 4,000 packs were sent out. 1,320 copies of the teachers' notes were sent out.
- 5.7 392 responses were received, 253 groups returned paper forms and 139 contributed their results directly online.
- 5.8 Approximately **2,400 people** participated in this strand. The average group size was 6.

5. Strand 3: Small Group Discussions

Responses to technologies and issues in the themes

- 5.9 In the **Mind and Body** theme discussions, the main areas regarded as positive were very similar to those in Strand 2. They related to the extension of choice, greater longevity, preventive action on illness and risk of disease, scope for greater personal independence and more convenience/time-saving.
- 5.10 The negative aspects were felt across the groups to be risks of abuse and misuse, unwanted side-effects and system failures, lack of 'human touch' and risks of overdependence and social division caused by exclusive access to technology based on ability to pay premium costs. As in Strand 2 there was opposition to 'premium enhancements' to bodies using biotechnology, sharing the view that such developments would encourage undesirable traits and would be 'unnatural'. The Strand 3 groups did not place as much emphasis on issues of control of information as did those in Strand 2.
- 5.11 In the **Home and Community** theme discussions, these negative issues were again prominent across the groups as they were in Strand 2. There was also an emphasis on the risks of losing the 'human touch' through mediation of experiences and relationships via ICTs and above all through use of robots. As in the Strand 1 and 2 discussions, people greatly disliked the prospect of humanoid robot designs and attempts to give the robots 'human' qualities (and as in the other Strands there was little belief that this would be possible in any case). Privacy issues were less prominent than they were in Strand 2 group discussions.
- 5.12 The positive features echoed those in the Mind and Body theme. Once again groups liked the scope for preventive action and for convenience. There was a general emphasis on benefits for safety and security in relation to home CCTV and sensors - but as in Strand 2 there was a strong tendency to dislike these prospects based on fear of 'Big Brother' trends. There was more emphasis than in Strand 2 on gains to quality of life from, for example, the beauty treatment technologies in the first theme story.

5. Strand 3: Small Group Discussions

Responses to technologies and issues in the themes

- 5.13 In the **Work and Leisure** theme discussions, the benefits identified related principally to gains in quality of life, choice and safety/security. There was little divergence from the Strand 2 pattern. Groups liked the scope for more road safety via automated vehicle systems. They also liked the flexibility/convenience and reduced environmental impact promised by the remote working technologies.
- 5.14 The drawbacks that were highlighted related as in Strand 2 to risks of misuse and abuse, threats to privacy and civil liberties, overdependence on machines, and risks of exclusivity and social division. As with Strand 2 groups, concerns were especially focused on the perceived drawbacks of the automated vehicle systems and of the flexible 'smart clothing' worn in the 'Katie in the park' story. Both technologies were seen, as before, as a risk to safety and privacy/autonomy.
- 5.15 In the **People and Planet** theme discussions, a similar pattern of negative points emerged. There was considerable dislike for the risks of abuse and misuse of advanced robots, the impracticality and unfairness seen in the idea of carbon credits, problems of fairness, affordability and exclusivity in relation to DNA vaccines, and there were concerns about the cost and impacts of nuclear and renewable energy systems. There was less emphasis on the privacy/civil liberty issues than in Strand 2.
- 5.16 There was general support for renewable sources of energy and action to cut carbon emissions and safeguard against climate disruption, and there was a high level of support for the DNA vaccines described in the final theme story, though as in Strand 2 with the proviso that action would be needed to make them available to those in most need (and in many discussions it was clear that neither public nor private sector was trusted to take these steps).

5. Strand 3: Small Group Discussions

Cross-cutting issues: positive features

5.17 Aspects of the technologies and developments that were seen as the **most important positive features** in **at least two** of the themes were:

- *Scope for gains in health and quality of life*
- *Scope to increase choice and flexibility*
- *Early detection/preventive care*
- *Time-saving and convenience*
- *Better safety/security*
- *Benefits for specific types of person*

5.18 The positive features identified across **three or all** of the themes were these:

- *Time-saving and convenience*
- *Better safety/security*
- *Gains in health/quality of life*
- *Flexibility/choice*
- *Safety and security*

5.19 As with the Strand 2 groups, then, several aspects of the technologies and developments in question made particular appeal to people's desire for **enhancing key features of quality of life**: increasing choice, saving their time (and the time of service providers, for example doctors) and improving their **protection against risks** - via early diagnosis, prevention of diseases, and prevention of crime.

5.20 There is a mix here of gains that largely benefit the individual (more choice and flexibility) and those with wider advantages for others and for the community as a whole (safety, security). People often made the connection between these categories - for example, DNA vaccines could be good for tourists but offered most to people in poorer countries. As noted earlier, this was also true of the other Strand discussions.

5. Strand 3: Small Group Discussions

Cross-cutting issues: negative features

5.21 Aspects of the technologies and developments that were seen as the **most important negative features** in at least two of the themes were:

- *Fear of abuse/misuse*
- *Overdependence*
- *Risks to privacy/civil liberties*
- *Loss of social interaction/human touch*
- *Anxieties about loss of control/loss of choice*
- *Risks of failure/impracticality*
- *Fears about expense/exclusiveness/social division*

5.22 Note that these are similar to those recorded for the Strand 2 groups.

5.23 The negative features identified across **three or all** of the themes were:

- Loss of social interaction/human touch*
- Anxieties about loss of control / loss of choice*
- Risks of failure / impracticality*
- Fears about exclusiveness/social division*

5.24 As with the results from the Strand 2 group discussions, the pervasive concerns focus on **unwanted side-effects of some of the benefits** identified: with more security can come risks to privacy; with more technologies for prevention of risk and harm come risks of failure, side-effects and over-dependence; with convenient robots for housework come alarming robots who might dehumanise care work and take away jobs and skills. The participants in both strands showed acute awareness of such interactions and tended to be biased towards dislikes and consciousness of risk.

