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Department for Innovation, Universities & Skills

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Deliberative Panel: Report

Dialogue by Design

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

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- the expert speakers,
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Introduction

- This report presents a full summary of and commentary on the results of the two **sciencehorizons** Deliberative Panel events held in Bristol in April and May 2007. These meetings formed Strand 1 of the project.

- A transcript report of the Panel meetings has also been produced and is available on the website **www.sciencehorizons.org.uk**

- Separate summary reports have been produced on Strands 2 and 3. The former involved facilitated public discussions around the regions in a variety of settings, such as science centres and museums. The latter was devised as an outreach programme to people who are not necessarily interested in science and may not be able to get to an externally organised event, but who are interested in having a discussion about the future. The research team provided materials to enable groups to have discussions and provide feedback in a largely self-managing way.

- 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 included aspects of robotics, genetics, energy generation, communications, smart materials, stem cells and sensors.

Introduction (continued)

- The Strand 1 Deliberative Panel involved small group discussions among a sample of citizens from the Bristol area, led by facilitators, on issues arising from the **sciencehorizons** stories. The stories were grouped into general themes:
  - *Home and Community;*
  - *Mind and Body;*
  - *People and Planet,* and
  - *Work and Leisure*.

- See the website, **www.sciencehorizons.org.uk** for the stories in full.

- The report covers the following topics:
  - *The methodology used for the Strand 1 Deliberative Panel meetings;*
  - *The aims of the meetings;*
  - *The range of participating citizens;*
  - *Pre-event comments on science and technology issues;*
  - *The findings of the small group discussions, by theme;*
  - *Issues arising in the second Panel meeting and expert presentations;*
  - *Commentary on the results.*

- Comments quoted are taken from the flip-chart records of the discussions, and include a mix of direct citation and summary made at the time of longer comments from participants.

Methodology for Strand 1

- The Deliberative Panel comprised a group of 31 citizens living in and around Bristol, and selected by a market research company to provide a reasonably diverse group of people.
- The group met twice, at the @bristol science and technology centre in the Bristol docks: first on Saturday 14th April, and again on Saturday 12th May.
- 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.*
- 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.
- 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 their own and others' assumptions, presentation of facts and expectations about the pros and cons of particular developments.
- 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.
- The method was developed by the **sciencehorizons** consortium's lead member, Dialogue by Design, and 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.

Methodology for Strand 1 (continued)

- The two Deliberative Panel meetings began around 9-9.30am and ended around 4pm. Participants were given a payment for their time.
- **Panel 1, April:**
- 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 much people had noticed science and technology issues arising in news broadcasts and other media in the previous week. There was also an 'ice-breaker' discussion on three things people would like advances in technology to enable them to do in the future.
- 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 had an opportunity to cover stories from each of the themes.
- 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 of the findings, led by the facilitators Pippa Hyam, Amy Sanders and Andrew Acland from Dialogue by Design, and Ben Johnson from Graphic Science.
- During the day the sessions were observed by the project evaluator Diane Warburton, Horizon Scanning Centre consultant Aisling Irwin and Dialogue by Design associate Ian Christie.

Methodology for Strand 1 (continued)

- **Panel 2 , May:**
- The second meeting of the Deliberative Panel took place one month after the first session. The aim of the second meeting was to extend and deepen the discussions of the issues arising from the **sciencehorizons** stories. This was facilitated in two ways.
- First, participants discussed in plenary the issues that had stuck in their minds from the initial meeting, after considering these first in twos and threes. They also talked about any discussions they had had with family, friends and colleagues about the first event, and about any further researches of their own they had carried out, for example using the Internet.
- Second, participants had brief presentations from independent experts on aspects of the four themes, and were able to question them in detail.
- The participants also discussed in plenary the changes in their views over the course of the two meetings, and as a result of the presentations and Q&A sessions with the expert speakers. The facilitators also elicited comments on how the speakers had come across, what was reassuring or disturbing about the issues they had covered, and how and why people rated them as credible presenters of information and interpretations. The robotics presentation included a demonstration of micro-robot devices.
- The expert speakers present at the second Panel were:
  - *Cyber-security*: Stephen Crane, Hewlett-Packard Labs
  - *Carbon credits and climate change*: Simon Roberts, Centre for Sustainable Energy
  - *Genetic testing and DNA databases*: Hilary Newiss, legal consultant, member of UK Biobank Ethics and Governance Council and former member of the Human Genetics Commission
  - *Robotics*: Prof. Alan Winfield, University of West of England

The members of the Deliberative Panel

- The Panel consisted of 31 members of the public, selected to create a broadly representative sample.
- Participants came from the Bristol area.
- All attended the first Panel event in Bristol in April 2007. All but four attended the second meeting in May.
- The age range was 20 - 70. The age breakdown was as follows:
  - 16-29 = 5
  - 30-44 = 12
  - 45-59 = 9
  - 60-74 = 5
- 13 males and 18 females too part.
- Occupations and social class: two-thirds of the group fell into the C1/C2/DE categories of analysis. Five participants were retired; one was unemployed.
- Occupations ranged from student to housewife, from civil servant to air hostess.
- Seven of the participants worked, or had worked, in occupations involving specialist scientific and technical knowledge and skills, such as a lecturer in immunology, telephone engineers, mechanical engineer.
- Ethnic composition: 24 were White; 6 Black; 1 Asian.
- Five participants said they had a disability.

Panel meeting 1: Pre-event questions How much interest do people have in science and technology issues?

- Before the first of the Panel events, the Panel members were asked what news stories they could think of from the previous week, from TV, radio, press or Internet. What struck them as particularly important? Could they think of items on science and technology during the year so far? They were also asked how far they were generally interested in science and technology matters.
- Overall people had no difficulty in identifying news stories relating to science and technology, although the immediate week's news items that were recalled were often political ones rather than scientific / technological in content.
- News items identified by at least two members of the Panel, either from the week before or from the year so far, included:
  - *Hand-held brain scanner;*
  - *Shrinking landfill space for waste disposal; waste recycling;*
  - *Stem cell research;*
  - *Global warming; Stern Report; polar ice melting;*
  - *New treatments for diabetes, cancer.*
- Just two members said that they did not take much interest normally in science and technology. Half the group said they were 'fairly' interested; the rest said they were very interested as a rule.
- The areas of interest identified by members tended to focus on technology rather than pure science. The themes mentioned tended to be about applications close to everyday life - computers, transport, medicine - or about scientific matters with close connections to it - energy and environment, climate change.

Panel event 1: What would people like new science and technology to enable them to do?

- Before the detailed discussions of the **sciencehorizons** themes got underway, members were asked what three things they would like to be able to do in future as a result of breakthroughs in science and technology.
- This was an 'ice-breaker' session rather than a full part of the discussion sessions, and some of the answers were humorous or fantastical (time travel). One reply was a desire for '*cheaper clothes'*, something that today's low-cost fashion retailers might think has already been supplied beyond most people's wildest dreams. One reply was plaintively modest: '*instructions in plain English for technical things'.*
- There was a cluster of replies about travel - space travel clearly appealed to several, and some liked the idea of 'instant' travel anywhere, with no impact on the environment.
- There was also a focus on labour-saving in the home, with some replies that might have been expected had the Panel been meeting fifty years ago: *'a self-driving car'; 'a robot that does the house-keeping'; 'an appliance so you don't need to iron'*.
- There was also a cluster of replies focusing on health and longevity, a theme that came up frequently in subsequent discussions. For example: preventive diagnosis for health problems; longevity to be accompanied by good health.

Panel event 1- Small Group sessions: themes

- The following sections report the results of the small group discussions in the first of the Deliberative Panel events, in April 2007.

- **Mind and Body theme**:
  - *George and the jogging cap* (tracking technology for people with dementia)
  - *Ruth and the tests* (automatic medical testing devices)
  - *Katie and the doctors* (biotechnology for mental and physical enhancements)
  - *Roy and the new heart* (stem cell technology for growing new heart tissue)

- The groups considered the four themes and their associated stories. The themes are summarised on this page and p.11.

- **Work and Leisure theme:**
  - *Henry at the café* (advanced teleworking with ICT)
  - *Jennifer and the salon* (new methods for beauty treatment, boosting health and wellbeing)
  - *Malcolm at the wheel* (sensors and computers to assist driving)
  - *Katie at the park* (security/surveillance devices, advanced textiles)

Panel event 1- Small group discussions: themes (continued)

- **Home and Community theme:**
  - *Malcolm and the shopping* (IT systems for tracking of food shopping)
  - *Paul and his love life* (online and virtual dating systems)
  - *Emily and the robot* (robotics for household chores)
  - *Henry and the cameras* (advanced scanning systems for security)
- **People and Planet theme:**
  - *Roy and the migrants* (advanced robots for complex tasks)
  - *Cynthia and the gas bill* (climate change and energy systems)
  - *Rajpal and the relatives* (climate change and carbon quotas)
  - *Emily and the vaccines* (genetic vaccines and implications for developing countries)

Panel event 1- Small group sessions: Mind and Body theme

George and the Jogging Cap **story**:

- Members tended to like the potential offered by the technology (tracking device for vulnerable people, e.g. dementia sufferers, children). This related to boosting independence for Alzheimer's sufferers, and at the same time providing security to carers for such people, or to parents anxious about letting children roam.
- However, more reservations were expressed than welcomes. People focused on the scope for failures of the technology (wouldn't a back-up system be needed?) or for problems with practical use (theft, loss, traffic, failure to monitor the system back home).
- Some also saw drawbacks in that the independence being offered was illusory for dementia sufferers - *'he's not using his own mind, the cap controls him'; 'Dehumanising - makes him like a robot'.*
- The responses here immediately highlighted a range of issues that would be raised in consideration of other stories and themes. People tended to be positive about scope for enhancing *personal well-being* and *autonomy*; however, they were swift to spot a) practical problems rooted in *the risks they saw in everyday life (crime, misuse of technology, breakdown)*; and also b) potential reductions in *personal freedom and well-being*.

Panel event 1- Small group sessions: Mind and Body theme (continued)

Ruth and the tests **story:**

- This story focused on automatic medical analysis technology, for example sensor systems allowing self-diagnosis at home.
- Group members liked the following aspects of the technology in discussion:
  - *Possibility of non-invasive analysis*
  - *Time-saving (reduction in waiting times, ability to take ready results to doctor)*
  - *Reassurance without going to the doctor*
- But there was an even split between the likes and the dislikes. Members disliked the potential they saw in the technology for a dehumanised approach to medicine - *'losing the personal touch'; 'real doctors can take more into account, use lateral thinking, mood, body language'.* Moreover, one would not be able to ask questions of such a device as one could of a doctor or nurse. Some had no faith in the reliability of the technology - what if it was faulty? There was a risk, some felt, of people becoming *'overly worried'* by using such devices.
- The discussion highlighted a general view that the technology in question was to be welcomed as a tool that added something - time-saving, snapshot data - to the general process of interaction with people in the healthcare system - but was not to be seen as a replacement for that human interaction. This was a persistent strand in the discussions across stories - concern about the scope for technologies to be seen as *substitutes* for a 'human touch' process rather than as a (potentially very helpful) *supplement* to it. Finally, there was concern - expressed in other discussions too - about the availability of such technology: would it be accessible freely to everyone?

Panel event 1- Small group sessions: Mind and Body theme (continued)

Katie and the doctors **story:**

- This scenario concerned the use of 'premium enhancements' - medical technologies to enable people to enhance their physical endowments, correct disabilities, and 'design' features of offspring.
- The discussion produced a set of potential benefits that was outweighed by concerns about misuse and social divisions.
- The group liked the scope such technologies could offer to give people a choice to use them to restore capacities, for example following accidents. Some noted that the technologies could help save money, by bringing people up to 'normal' ability. However, the 'likes' came with several conditions: as with the test devices considered in the first story (Ruth and the tests), many people felt the advances should be available to all, for example via the NHS, lest there be a *'bigger divide between the haves and the have-nots'*.
- The reservations were amplified as people discussed what they disliked. *Choice* came up again: the children in the scenario who are subject to enhancement were felt not to have any choice, and people with disabilities should not be '*forced to be "normal"'.* Who would choose for others, and how old would people be before they could make such a choice? Two other issues arose: first, the perceived lack of 'naturalness' in the proposed 'premium enhancements'; and second, the feeling that the proposed treatments could not be justified as 'necessary' or high-priority, in a world where cancer, dementia and other serious diseases needed to be tackled. Related to the latter point, some felt that use of the enhancements indicated undesirable social factors at work - *'Katie is too pushy'; 'people should look after themselves'* rather than rely on new technology to boost their health and well-being.

Panel event 1- Small group sessions: Mind and Body theme (continued)

Roy and the new heart **story**

- This story concerned growth of new heart tissue using stem cell technologies.
- The group's likes concerning this scenario were similar to those mentioned in relation to diagnostic kits and enhancements. It was noted that *'fewer transplants would be needed'* and that there was potential for fewer costly treatments to be necessary.
- But as before there were considerable reservations about access to the technologies in question: would it not encourage people not to look after themselves properly? And would the choice be available universally?
- The dislikes expressed in discussion echoed those that were mentioned in the debate over the 'Katie and the doctors' scenario. A 'yuk factor' was voiced - the view that 'naturalness' was being undermined. More common was a set of suspicions based on concerns and lack of trust apparent in other *Mind and Body* discussions:
  - **Reliability**: '*would it work? - it's risky'*
  - **Scope for misuse**: *'what if phoney doctors started developing it? Quality control?'*
  - **Misplaced priorities**: '*why can't we solve the organ donation problem first?'*
  - **Accessibility and affordability:** *'what would be the impact on pensions?; it would extend people's lives too much - should there be an age limit?; would it be cost-effective if it was available to everyone?; 'if it's expensive it would only be for the well-off or people with company insurance'.*
- Once again, therefore, concerns were embedded in wider political, social and economic anxieties about scope for abuse, unreliability and social divisiveness.

Panel event 1- Small group sessions: Mind and Body theme (continued)

- The afternoon session on the theme highlighted particular concerns arising from the four stories and new technologies.
- 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.
- 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?*

Panel event 1- Small group discussions: Work and Leisure theme

Henry at the café **story**

- This story concerns the scope of information and communication technologies: Henry can work remotely as an international financial dealer, based in a 24-hours-a-day internet café.
- The group members identified a range of positive elements in the story:
  - The scope for reducing the environmental impacts of working life - commuting and other travel could be much reduced;
  - Scope for '*making working life easier'*;
  - Flexibility and ability to work from home;
  - Potential of the technology to '*overcome barriers between people'.*
- Against these, the following dislikes were mentioned in discussion. These concerns echoed some of the issues raised in *Mind and Body* and the other themes. First, there was anxiety about system useability - what could go wrong, and would people know how to use the systems?
- Second, a 'human touch' issue was raised, as it had been in *Mind and Body* debate: the technology could '*inhibit imagination and activity outdoors'*, and lead to isolation and *'working invading the home'*. It might also displace jobs, contributing to dehumanisation of work life.
- Finally, there were concerns relating to use of information and scope for abuse of surveillance. This is a set of issues that was raised in all of the discussions, and it pointed to a pervasive sense of unease about what 'They' might be able to do with the mass of personal information that would be generated by the new technologies. In this discussion, the anxiety was the *'ability of government to monitor communications'*.

Panel event 1- Small group discussions: Work and Leisure theme (continued)

Jennifer and the salon **story**

- This story concerns use of new techniques for beauty and health treatments, enhancing 'youthfulness' and well-being.
- People tended to like the following aspects:
  - **Improvements in health and well-being**: with cosmetic improvements potentially important for these;
  - **Techniques to prolong life**: *provided* that health is maintained or improved at the same time.
- As in other discussions, there were reservations and substantial dislikes about the techniques canvassed in the story:
  - **Reliability**: do we know enough about genes?; people need to be trained properly to use such techniques;
  - **Priorities**: should these techniques be developed when there are more pressing problems to be solved first?
  - **Trust:** need for careful regulation to prevent 'quackery'; concern about '*how genetic information might be used'*; would products come with *'marketing information on the packaging in place of scientific evidence and information*?'

Panel event 1- Small group discussions: Work and Leisure theme (continued)

Malcolm at the wheel **story**

- This story concerns 'driver monitoring' by advanced sensors and on-board computer systems.
- The group members liked the following aspects of the scenario story:
  - **Potential for greater safety**: *'technology forcing people to drive better'; 'security is more important than convenience';*
  - **Economic savings**: '*driverless public transport'* was mentioned.
- The dislikes echoed the comments on other stories:
  - **Reliability of the technology**: '*worried about the technology going wrong - better to be self-reliant'; 'what about viruses and faults?'*
  - **Concern about the loss of the human touch**: for example, lack of people on public transport (and so loss of security for disabled and elderly passengers) and the risk that such technology could stop people 'thinking for themselves and making their own choices'.

Panel event 1- Small group discussions: Work and Leisure theme (continued)

Katie at the park **story**

- This story concerns Katie's ability to wear 'smart clothes' when out jogging, so that she can monitor her performance and use them to send and receive messages. She can also use a 'virtual gym' to go running in.
- This story generated more dislikes than likes. The latter focused on safety and security - if the technology can enhance these then it is welcome. It was also felt to be potentially good technology if it could be kept '*under personal control'*.
- Against this, there were numerous anxieties:
  - **Fear of surveillance** - 'being watched all the time;'
  - **Loss of human touch and extension of remote control**: 'technology that turns us into robots, all working and behaving the same and enabling government to monitor and control us;
  - Concern was expressed that such technology might be 'foisted on us' unexpectedly in some way;
  - Related to the concern over priority-setting with the medical issues in *Mind and Body*, there was anxiety about technology being used unnecessarily to give the appearance of solving problems. This was related, once again, to fears about surveillance by authorities who could misuse personal data - *'technology as a substitute for real solutions - more police, more doctors etc - government hiding behind technology'.*
- These were strong reactions to the scenario, reflecting what turned out to be a pervasive theme during the first Panel event - lack of trust in authorities in general to be benign in motivation and use of technology, and in particular anxiety about misuse of personal information.

Panel event 1- Small group discussions: Work and Leisure theme (continued)

- The afternoon session on the theme highlighted particular concerns arising from the four stories and new technologies. 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. Issues raised tended to spill over into other areas, in particular the *Mind and Body* theme, when it came to questions of genetics and health.
- 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?
- 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'*.
- 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.

Panel event 1- Small group discussions: Home and Community theme

Malcolm and the shopping **story**

- This story concerns use of a kitchen computer system to help manage diet and to work with supermarket ICT systems in selecting purchases.
- There was some enthusiasm for the 'smart kitchen' technology coupled with similar systems in the supermarket. One participant thought it a '*wonderful idea'* and others enthused about the scope for the system to work well for '*health-conscious people'* - aiding control of weight and obesity, calorie counting and obtaining good balanced meals. It was noted that the kind of technology in question could have other uses - tagging and keeping tabs on criminals, for example. It was also felt that the system could make one spend more carefully - '*you become more aware'.*
- The positive comments were matched by a range of reservations and dislikes that emphasised the issues highlighted in discussion of other stories:
  - **Reliability**: what happens if the system malfunctions?
  - **Loss of human touch:** '*pushing out small shops and market traders'* as only big retailers could afford the systems
  - **Accessiblity and affordability**: *'likely to cause a lot of debt - young people are vulnerable'; 'older people will find the transition difficult';*
  - **Scope for abuse of personal data and constant surveillance**: '*do we want to know where everyone is all the time?'*
  - **Loss of human autonomy and self-reliance**: '*would your brain go to sleep?'; 'computer thinking for you - lose control, boring'.*

Panel event 1- Small group discussions: Home and Community theme (continued)

Paul and his love life **story**

- This story concerns the use of online dating systems, including 'virtual' settings for encounters and compatibility assessments to screen potential partners.
- The discussion of positive features centred on the scope for the technology to put Paul more in control of the encounters he chooses - allowing a 'browsing' approach. People also saw benefits for older people and others whose access to social life was restricted.
- Against this, other participants felt that the system '*actually takes away control'*: the more technical the systems behind social encounters, the less control people have, and the more exposed people would be to a) misrepresentation (online dates might not be who they claim to be) and b) loss of social skills. The scope for pretence and mistrust was felt to be significant, as was fear that virtual worlds could '*take over your life'.*
- This was one area where a clear **generational division** was seen in the discussion. Some older participants felt keenly that online networking and socialising was a 'generation issue', with young people relating to one another in impenetrable ways, evoking fears that they would lose real-life socialisation. On the other hand it was acknowledged that young people are *'more technology-minded'* ; and '*if they don't join in they get left behind'.*
- There was a feeling in the group that this story was not so much about technology as about **social relations in general** - '*our social state'* - technology simply highlighted problems in the ways people were forming relationships, or failing to.

Panel event 1- Small group discussions: Home and Community theme (continued)

Emily and the robot **story**

- In this story a new humanoid robot is bought for the household, to carry out a range of domestic chores.
- There were numerous aspects of the story that participants liked:
  - **Labour- and time-saving**: the robot could free time for better things to do than household chores, for example spending time with the family
  - **Security**
  - **Potential for helping people with disabilities or illness**
  - **Control** - the robot follows instructions, no mess, no need to pay for its services
- The dislikes were similar to those voiced about the other scenarios. They emphasised problems of control and human autonomy / well-being:
  - **Loss of control:** *what if machines were thinking for themselves and able to 'take over'?; 'robots taking over role of parents'; 'taking away jobs - or just skill-sets'; 'would the robot have rights? - if yes, then it's very dangerous'*
  - **Loss of human autonomy and self-reliance**: 'not learning anything, robot doing it all'; 'makes you lazy - no satisfaction'
- There was also concern about the implications for socialisation - part of which involves 'passing down skills through families'. The home robot was seen by some as a means of de-skilling people.

Panel event 1- Small group discussions: Home and Community theme (continued)

Henry and the cameras **story**

- In this story Henry installs advanced smart security systems, including cameras and biometric sensors, in his house, all connected to the national crime protection system and police surveillance networks.
- Discussion of the benefits focused on a strong sense for some participants that more surveillance brought real gains, for example in reductions in crime. People generally liked the use of sophisticated security systems for *public* places, such as airports, clearly a response to heightened concerns about terrorism and crime. The technology was also seen by some as giving people more *choice and control* in their lives.
- The major dislikes that were voiced concerned these linked issues:
  - **Loss of privacy**: '*especially in your own home'*; dislikes of idea of sensors seeing through clothing or '*scanning for emotions - it could go too far';*
  - **Risk of abuse and exploitation**: '*cameras in the home, linked to police - could easily be abused / exploited'*. Linked to this were the persistent concerns raised in the group about the risks from information production and gathering on a massive scale.
- Other concerns raised were about the *reliability* of the systems, and the possibility that the technology would have a *self-defeating* effect: '*the more security measures you put in the less secure you feel - creates paranoia, isolated, irrational fears*'. Moreover, people in general could become de-sensitised to the sound of alarms, again defeating the purpose of the security systems and creating benefits only for the 'private security firms'.
- Further discussion focused on the 'Big Brother' risks implicit in the scenario and on the problems some saw in spending money on security instead of *'attempting to tackle the causes of crime'*.

Panel event 1- Small group discussions: Home and Community theme (continued)

- The afternoon session on this theme highlighted particular concerns arising from the four stories and scenarios for new technologies. Panel 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.
- 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 the safeguarding of data and the use of surveillance/identification technologies - 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?*

Panel event 1- Small group discussions: Home and Community theme (continued)

- 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 virtual 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.

Panel event 1- Small group discussions: People and Planet theme

Roy and the Migrants **story**

- In this story Roy is looking forward to a new generation of advanced robots who can take the place of migrant workers, whose poor English exasperates him.
- Members of the Panel tended to like the idea of advanced robots - under human control - which could be applied to *'dangerous and dirty jobs - such as mine detecting'*, or used in precision work, such as surgery. For some applications robots were felt to be a good thing.
- There were more dislikes mentioned than likes, however, raising many of the issues that had been mentioned in discussion of other themes:
  - **Loss of human touch**: '*this is really an extension of never talking to a real person on the phone'; 'this feels like the loss of a caring society';*
  - Related to this, there were concerns about using robots in **unsuitable contexts**: *'can't imagine it would be good to use robots in a care environment. You wouldn't want machines doing this kind of work…It runs the risk of increasing isolation and depression'.*
  - **Potential for misuse:** '*robots could be used for crime*;
  - **De-skilling of people and loss of control**: *'it's just another way to lose jobs'; 'we become a lazy species'; 'I don't want my kids not working, not supporting each other and not using their minds'.*

Panel event 1- Small group discussions: People and Planet theme (continued)

Cynthia and the gas bill **story**

- This story is about climate change and risks from fossil fuel use. Cynthia is bewildered about what alternative energy systems she should be choosing.
- There was a strong positive response to discussion of alternative energy technologies such as solar power, wind, micro-power systems and tidal power. People expressed frustration with '*conflicting information'* and agreed that there are *'too many choices'*; systems should be affordable; and there was a feeling that independent and trustworthy service providers were needed. But these conditions aside, there was agreement from most that new energy sources were needed to make homes better insulated and to make sure '*our kids have a future'.*
- Strikingly, the most powerful motivations for adopting new systems were not rooted in an ethical stance towards the environment, but rather reflected desire for **personal and national self-sufficiency** and **energy security**. People also liked the idea of being able to generate electricity and sell surplus power back to the Grid.
- Dislikes were mentioned too: there were objections to perceived lack of funding and incentives from Government and energy companies, and the complexity of the subject was a source of complaint.
- There was a minority who dissented from the view that climate change was happening, was serious and was triggered by human action. Controversy about the politics of climate change was also sparked in discussion of the next story, as explained below.

Panel event 1- Small group discussions: People and Planet theme (continued)

Rajpal and the relatives **story**

- This story concerns the use of carbon credits to help shift the economy and society to much lower emissions of carbon dioxide in order to reduce climate change. Rajpal is confronted by the problem of affording trips to India to see relatives, as his carbon quota is exhausted.
- The debates sparked by this story were lively and at times passionate. Some members of the panel took the view that climate change was exaggerated or non-existent, and a few were heavily influenced by the Channel 4 TV programme *The Great Global Warming Swindle*. A few others were convinced by the science they had heard about, and the majority were unsure about the nature and impacts of global warming. Several general issues emerged from the group discussions of this story:
  - **Mistrust of the dominant narrative about global warming**: the theory was seen by some as a lie, a way for government to '*control us'*, or an excuse to tax people in new ways;
  - **Rejection of responsibility**: most felt that governments and businesses had to take most or all of the responsibility to act; several people expressed a wish to see more grants and more investment in alternative technologies to reduce environmental impacts;
  - **Mixed messages**: many agreed that if the problem were as bad as it was said to be, then governments should be showing much more urgency and take radical steps, for example restricting aviation or making flights more expensive. '*They are telling us we should travel less but are allowing more and more flights and airports are being built*.' A local issue was raised by several Panel members: *'why haven't they built the Severn Barrage yet?'*
  - **Implications of credits**: carbon credits were seen generally as undesirable, because they could be misused, might not make any difference, would amount to a 'stealth tax' and would represent a restriction of consumer choice.

Panel event 1- Small group discussions: People and Planet theme (continued)

Emily and the vaccines **story**

- Emily wants to visit a friend in Zambia, in a town at high risk from infectious diseases. Emily's parents can pay for her to have 100% protection via new genetic vaccines - but Emily is troubled by the gap between her safety and the risks the Zambians are facing.
- The idea of new genetic vaccines was generally welcomed, but the discussion went beyond likes and dislikes to cover the problems associated with global poverty, the responsibilities of drug companies and the state of some developing country governments.
- There was some support for the view that drug companies should pay more taxes and that the proceeds should be invested in making drugs available to more people in developing countries. There was some concern that increasing the gap between rich and poor worlds would be a '*long-term threat to security*' - '*excluding people will increase conflict*'.
- Others focused on the problems of making sure that innovations and investment actually reached people in need. Much reference was made to corruption and instability in developing countries and the lack of infrastructure to enable good use of new technologies.

Panel event 1- Small group discussions: People and Planet theme (continued)

- In the afternoon discussions on the key issues arising from the People and Planet stories the following topics were raised.
- **Roy and the migrants**:
  - 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'*.
- **Cynthia and the gas bill**:
  - 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.
- **Rajpal and the relatives**:
  - Much suspicion was voiced about the science of climate change and the potential of new taxes or carbon quotas. More information was wanted about how carbon allowances would work and about how far they would be open to abuse and fraud.
- **Emily and the 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.

Panel event 1: conclusion

- There was a concluding plenary session. The participants welcomed the opportunity to discuss the stories and the technological projections, and to learn from one another's perspectives on the issues.
- Participants 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'*.
- 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.
- 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.
- All that said, there was also 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.

Panel event 2: 12th May 2007, Bristol

- The aims of the second Deliberative Panel meeting, which took place one month after the first one, were:
  - To see what effect more reflection and information (from experts) 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.
- The meeting took place as before at the @bristol science and technology centre. Nearly all of the previous Panel members were able to attend; no new participants were involved.
- 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 Panel 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: cyber-security, climate change and carbon credits, genetic testing and information (e.g. held on DNA databases), and robotics.
  - After each presentation and plenary question-and-answer session, participants split into small groups to discuss the material provided in depth.
  - In the afternoon, plenary discussion resumed, focusing on how far 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 and completion of evaluation forms (see separate Evaluation Report on **sciencehorizons**).

Panel event 2 (continued): what issues stuck in people's minds from the first meeting?

- Participants were asked to discuss this question in twos and threes and to note issues down on post-it notes, which were collected and grouped by the facilitators.
- The full list is in the transcript report. The groups were as follows:
  - *Trust in experts*
  - *Robot technology*
  - *Health technologies, especially in relation to genetic / stem cell innovations such as growing heart tissue*
  - *Computer systems and data protection*
  - *Sensors and smart vehicles*
  - *Climate change and carbon credits*
- The three clusters of topics with most impact from the first meeting were clearly these: robotics, health technologies and climate change / carbon credits. These had all been associated with some of the more emotive, passionate and politically charged discussions.
- Participants were asked if they had discussed any of the issues, or the **sciencehorizons** process generally, with anyone else since the first meeting. Most had done so, either with family and friends, down the pub or in the workplace. Relatives, friends and colleagues were reported to have been very interested in both the issues and the deliberative process. Some had given the stories to grandchildren or children to take to school and discuss with friends. One noted that her grand-daughter was '*much less doubtful and cynical'* about new technologies than she was.
- A few reported that they had started noticing newspaper science and technology stories more, for example about robotics and tagging for the elderly, or about climate change.
- Overall it seemed that there was a very positive response to the process so far and that appetites had been whetted for more information and discussion.

Panel event 2 (continued):sessions with expert speakers

- The expert speakers present at the second Panel were:
  - *Cyber-security*: Stephen Crane, Hewlett-Packard Labs
  - *Carbon credits and climate change*: Simon Roberts, Centre for Sustainable Energy
  - *Genetic testing and DNA databases*: Hilary Newiss, legal consultant, member of UK Biobank Ethics and Governance Council
  - *Robotics*: Prof. Alan Winfield, University of the West of England
- The topics for the expert presentations were selected on the basis of the group and plenary discussions at the first meeting, drawing on the issues most frequently raised by the Panel members.
- The expert speakers were selected on the basis of recommendation as clear and very well-informed presenters, and three of them came from locally-based organisations.
- In response to request made in the first Panel meeting, the presentation by Alan Winfield included a demonstration of micro-robotic devices.
- The Q&A sessions that followed each presentation are reproduced in full in the transcript report.
- After the presentation and discussion with each speaker, the Panel members were split into facilitated small groups to discuss their reactions. They were asked to focus on these questions:
  - *How do you feel now about the technologies/issues?*
  - *What are your concerns?*
  - *What do you see as positive?*
  - *On balance, would you support government investment in this technology or not?*

Panel event 2 (continued): session with Steve Crane on cyber-security

- Steve Crane of Hewlett-Packard gave a presentation on emerging technologies in computer security, data protection and security / surveillance technologies. 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 members focused on issues of **control, trust and decision-making** about how and which technology is developed:
  - How does H-P 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?

Panel event 2 (continued):small group discussions of the cyber-security presentation

How do you feel now about the technologies/issues?

- Overall the members expressed continuing concerns about the security and potential misuse of personal information. A few felt more reassured by the presentation and the emphasis on the scope for more control to be passed to citizens. Some said they were very alarmed, even frightened, by the prospects of advanced security systems.

What concerns?

- People were anxious about the potential loss of control and autonomy; the scope for dependence on technology; the scope for 'runaway' technology of uncertain reliability; potential for cyber-crime; and the financial motivations of those developing systems.

What positives?

- People welcomed aspects of new ICT: security, convenience, improvements in public services, scope to trace missing persons. There was a welcome for the line taken by the presenter, acknowledging the complexities and ethical issues.

On balance, would you support government investment in this technology or not?

- Overall there was a feeling that government should be backing the technology, but with very strong and clear provisos - people wanted clear lines of accountability, transparency about who pays for information and security, and rights to control of personal information.

Panel event 2 (continued): session with Simon Roberts on climate change and carbon credits

- 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.
- 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 90% certain 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.*
  - *The costs are unaffordable.*
- 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.*
- 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.

Panel event 2 (continued):small group discussions of the climate change / personal carbon credits presentation

How do you feel now about the technologies/issues?

- Some remained unconvinced about the science of climate change and the human factor, but most were persuaded - some again remarked on the clarity and accessibility of the talk. There were comments about the intractability of the issue, given the links to the consumer economy - '*we are encouraged to consume to help develop the economy - how does this work?*' - and about apparent lack of urgency from Government.

What concerns?

- Despite the shift in group opinion about climate science there was a considerable amount of scepticism about the carbon credits proposal, based on scope for abuse, mistrust of government's motives, impact on low-income households, restriction of personal freedom, and fears that other countries would not follow suit. There was anxiety about the expense of alternative energy systems and lack of grants to make them affordable to the average household.

What positives?

- People welcomed the session and the tone of the presentation. They felt that the speaker was clear, open, independent and trustworthy. Some liked the idea of micro-generation. There was some support for the way in which carbon credits could focus minds on waste of energy, and there was support for the idea that '*we want to do what's best but we need to know how*'.

On balance, would you support government investment in this technology or not?

- The feeling was that it was up to Government (primarily) and business to take a lead if the problems were as serious as was supposed. People supported investment in alternative energy and public transport, financial support for households to take up micro-power, and also wanted clear information and advice about climate action by Government and households.

Panel event 2 (continued): session with Hilary Newiss on genetic testing / information

- Hilary Newiss, legal consultant, member of UK Biobank Ethics and Governance Council and former member of the UK Human Genetics Commission, and specialist on legal aspects of genetic information, 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 already available 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.
- 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**: '*heath 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?*

Panel event 2 (continued):small group discussions of the genetic testing/information presentation

How do you feel now about the technologies/issues?

- Some felt that the technologies in question had potential for improving life, and for expanding personal choice. Some felt more positive, in particular about use of technology in detecting serious conditions. More felt uneasy: about 'unnaturalness' and risks of discrimination, and there was a sense that this was an exceptionally complex and uncertain area where researchers were acting without thinking through the consequences or the ultimate purpose of the developments.

What concerns?

- Several felt that in some instances it was better to remain ignorant - this was linked to concerns about scope for misuse of data and discrimination, and for unintended effects (e.g. hypochondria, or '*if you tested negative you might not look after yourself').* What if something was revealed that *'you could do nothing about?'* Some felt that such systems could allow service providers such as insurers to be ever more selective in picking customers. A few felt that the developments could help push healthcare towards an exclusive approach, which they associated with the USA. Several wanted to be sure that the technologies would not erode the personal touch - dealing with a local doctor.

What positives?

- Against those who saw the benefits from remaining ignorant of genetic destiny, some were keen on knowing results from screening - '*it might make you act'*. Some felt that the techniques could improve health care, aid preventive action and take strains from the NHS.

On balance, would you support government investment in this technology or not?

- Panel members noted the great complexity of the field. The feeling was that Government needed to be engaged in this area to make decisions about the wider public good and to have a regulatory role. Concerns were expressed once more about the need for protection of potentially damaging personal genetic information.

Panel event 2 (continued): session with Prof. Alan Winfield on robotics

- Prof. Winfield, from Robotics Laboratory at the local 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. 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.
- 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?*

Panel event 2 (continued):small group discussions of the robotics presentation

How do you feel now about the technologies/issues?

- There was a generally fascinated response to the demonstration and a clear shift by the great majority of the Panel towards more positive views of robots once the Panel had seen the micro-devices from UWE. Some expressed relief at the non-human appearance of the robots and at the relative lack of sophistication. Many were impressed by the speaker, trusted what they had heard, and felt that they'd learned a lot.

What concerns?

- Anxieties focused on the scope for abuse of the technology, for example by terrorists or (more often mentioned) by the military; on the scope for loss of the human touch in everyday life and for loss of jobs and skills as robots became more sophisticated; and on the potential for robots as surveillance devices.

What positives?

- As noted above, there was a significant shift from initial concern and even fear about robotics towards a more positive and reassured position for many in the group. They were now more likely to be seen as tools under our control than advanced systems with potential to 'take over'. People tended to be enthused most about medical applications and use of robots in hazardous environments.

On balance, would you support government investment in this technology or not?

- Overall there was support for Government involvement, for example to support development of applications in healthcare and environmental action. There was less interest in domestic applications. An important proviso was the range of applications - ''*depends on the use that they are being developed for'.* Some Panel members remained sceptical and anxious and could not see robotics as a priority given other needs for investment and action.

Panel event 2 (continued):how far did views change?

- Participants were asked to answer a short questionnaire asking whether their views had changed on any of the technologies that expert speakers had discussed. The answers reflect reactions to the presentations (and presenters) that day in particular , but are probably informed to varying degrees also by the experience of the two days of the Panel as a whole. Full responses are shown in the Transcript Report attached. Note that participants tended often to interpret the question as meaning *Do you feel more positive about the issues*?
- 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 conjured up.
- Responses by topic are summarised below.

Cyber-security

- Just four out of 27 said that their views had changed, and all of these members still had significant reservations about the technology and 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

- 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. There was widespread approval of the content and tone of the presentation. 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.

Panel event 2 (continued):how far did views change?

Genetic testing and information

- 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

- 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 big impression on the group as a whole.

Panel event 2 (continued):closing plenary discussion

- In the final plenary discussion the group members were asked a set of questions about what they had heard and debated:
  - *What issues are worrying you most now?*
  - *What is most exciting?*
  - *What would change your minds about the things that most concern you?*
  - *What do you think of the Deliberative Panel process?*
  - *What makes you trust someone?*
  - *Who would you trust to tell you about science and technology?*
- Responses are summarised below. Full details are in the Transcript Report. More analysis is provided in the **sciencehorizons** Evaluation Report.
- Summary of responses:

What issues are worrying you most now?

- 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*'.
- **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.

Panel event 2 (continued):closing plenary discussion

What is most exciting?

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

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

- 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

- 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. 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.

Panel event 2 (continued):closing plenary discussion

What makes you trust someone?

- The responses pointed to a 'gut feeling' that a speaker was trustworthy, open and honest. It was notable that particular trust was expressed in Simon Roberts, who was a local (with a local accent) and was felt to have spoken 'on our level'. Speakers were also given credit for expressing doubts, acknowledging uncertainties and ethical dilemmas and departing from what might have been felt to be an official 'line'.

Who would you trust to tell you about science and technology?

- Participants were asked to discuss this point in twos and threes and put answers on post-it notes, which were then grouped.
- The dominant response was that people placed trust in individual experts and organisations that could be felt or seen to be *independent*. These might include 'watchdog' bodies, non-profit bodies, academic experts not funded by business or Government. 'Independence' was associated with the non-profit sector, and with lack of financial reliance on Government and business interests, and with lack of financial motivations.

Concluding comments

- 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.
- 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.
- 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.
- 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.
- 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.

Concluding comments

- **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.

- 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.