Ipsos MORI
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Public Attitudes to Science Toolkit

Using the results of the PAS 2014 survey to engage and research the public

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When and how to use the toolkit

1 When and how to use the toolkit

This toolkit demonstrates how the Public Attitudes to Science 2014 survey results can be used to start a public conversation about science, and public involvement in science. It gives materials and practical advice to science communicators and those working in science engagement on how to run an event or workshop where these conversations can take place.

The toolkit materials are based on those used at a 'Day of Discovery' workshop held by Ipsos MORI in January 2014 as part of the wider PAS 2014 research study.1 The workshop used the survey results to engage 109 members of the public in a debate about various science topics, and challenged them to come up with new ways of being involved in science.

Purpose of the toolkit

The public has a clear role to play in coming up with ways to make themselves better informed about science and generating new ideas for scientists and policy makers to connect with the public.

However, generating these ideas is a difficult task, especially for those who lack confidence in their own relationship with science. The purpose of this toolkit is to give you some ideas and techniques to start conversations about science with members of the public, and challenge them to come up with new and better ways of public engagement.

Kick-starting conversations

In particular, the toolkit focuses on ways to use the survey findings to kick-start conversations with the public about the following questions:

- What is the best way to communicate with the public about science? How does that differ for different types of people?
- What makes people informed about certain topics, and how can they become interested in topics they are currently uninformed about?
- How can we help people better understand scientists and how they work?
- How can we facilitate greater trust in science and scientists among the less trusting?
- What would drive greater public support for investment in science and technology?

1 Appendix 1 of this document contains a summary of the PAS 2014 study. The full report can be found at www.ipsos-mori.com/pas2014

Who can use it?

This toolkit can be used by anyone who is interested in starting a conversation with the public about the PAS 2014 findings, including:

- Scientists and researchers
- Science communication practitioners
- People who work with traditionally hard-to-reach groups, or those who are often excluded from debates around science e.g. older people, minority ethnic groups, young people not in employment, education or training, people from geographically isolated communities, and social-economically disadvantaged groups.
- Teachers

It will be particularly useful to those new to science engagement or to facilitation, especially as the accompanying slides can be downloaded, amended and used as stimulus material for your events.

Where to use it

The materials in the toolkit can also be used anywhere there is space, willing facilitators and potential participants. Examples might include:

- Museums
- Universities
- Community centres
- Schools

What participants will get out of the events/workshops

Participants at the PAS 2014 Day of Discovery - members of the public invited to take part who reflected a range of ages, ethnic backgrounds and social classes - found that it had really helped them engage or re-engage with science. We asked them what they had gained from the day, they said:

- It had helped them to see science as a whole and reflect on its importance to day to day life;
- It had sparked debate about specific science topics, like neuroscience, or animal research;
- It had made them think about previously unexamined aspects of science, like funding; and
- It had challenged their views about science, scientists and science reporting.

Most participants left the workshop enthusiastic about finding out more about science. The video on the toolkit homepage (www.ipsos-mori.com/pas2014toolkit) illustrated participants' reactions to taking part on the day.

What you (and others) will get out of your event/workshop

The specifics of what you get out of your event will depend on your specific objectives and the participants you invite to take part (see Appendix 2 for tips on organising your event). Whatever your objectives though, you will leave the day with a better understanding of your participants' experiences with and attitudes towards science. You will also, hopefully, end with some new ideas about how to inform and engage people about science, which hopefully you'll be able to put into action, or share with others.

Sharing your results with others is really important – the aim of this toolkit is to facilitate a national conversation about better science engagement. To this end, we're asking you to send us any outputs from your events, which we will then host on our PAS 2014 webpage. Outputs could include:

- Photos/videos of the day (you will need to collect participants informed consent in writing on the day in order to share these – please see PowerPoint pack for an example you can customise)
- Participants' outputs (e.g. a word cloud of their post-it comments, their science journeys posters etc.)
- A write-up of what participants said
- Communication and engagement ideas
- Tips for others running similar events

Outputs should be sent to pas2014tookit@ipsos.com, or tweeted to @ipsosmori using the hashtag #pas2014. It could also be useful to tweet throughout your event using the same hashtag. Ipsos MORI will monitor tweets and bring them together as a Storify once the toolkit has been used a number of times.

On the toolkit homepage[2] there is an overview of some of the findings from the PAS 2014 Day of Discovery. It would be great to hear from you about whether and how your findings differ, or your thoughts on the implications of those findings from science communication and involvement.

The British Science Association have also hosted a blog for the PAS 2014 study[3], and may get in touch with you about writing a blog about your event and what you found.

[2] www.ipsos-mori.com/pas2014toolkit
[3] The blog can be found at http://www.britishscienceassociation.org/blog

How to use the toolkit

The materials included in this toolkit give you tips on how to run an event that will allow members of the public to interact with the survey results and engage in facilitated discussions about their views on science and science engagement.

We have divided the PAS 2014 findings up into six themes, and created materials or activities based on each:

- Science information and communication (Chapter 2)
- Scientists' work (Chapter 3)
- Trust in science (Chapter 4)
- Science and the economy (Chapter 5)
- Science journeys (Chapter 6)
- Science attitudes (Chapter 7)

Each chapter of this toolkit focusses on one of these key themes, and contains:

- Advice and ideas on how to use the materials (which are included in a separate PowerPoint pack, to allow customisation).
- An overview of what Ipsos MORI facilitators found using these materials at the PAS Day of Discovery

The 'Day of Discovery' that Ipsos MORI ran in January 2014 covered all of these themes, but this required 14 facilitators to ensure that all of those who participated got a chance to have their say. However, depending on time, resources and number of people available to facilitate, we suggest that you choose between one and three of these themes to concentrate on.

Designing your event/workshop

The best way to choose your themes is to first come up with some overall objectives for your event/workshop. For example, if you work in a university bioengineering department, you might want to start a debate about:

- How to make people better informed about bioengineering; and
- How to communicate the economic benefits of the bioengineering sector.

Then you might want to use the materials in Chapter 2 and Chapter 5 to structure your event/workshop. You might also think that it would be good to invite participants to quiz people who work in your lab about their work, so you could follow the advice in Chapter 3 as well.

On the other hand, you might be a teacher, and want to use a science lesson to start your students thinking about science and the economy. You might only have a short time with the students, and as such just choose a

few of the materials from Chapter 5, and ask students to look at the materials, then discuss three key questions in small groups, and report back to the larger group.

The materials you choose should work for you: we have disseminated them in PowerPoint form so that you can customise them. Feel free to use other sorts of stimulus materials if you want. If you get a chance, do let us know how your customised or additional materials worked.

Overview of the materials in each chapter

Chapter	PAS 2014 survey findings on this topic can be used to start a debate about the questions including:
Science information and communication	• What more do people want to know about science generally, and the science topics in the survey specifically? • What are the best ways to inform people about science, and these specific topics? • What are the best ways to inform different types of people about science, and these specific topics?
Scientists work	• What characteristics do people think scientists should have? • What do people think of the level of engagement scientists have with the public and what form should this take? • How much do people want to know about the scientific process?
Trust in science	• How could trust in (different types of) scientists be improved? • What would it take to improve trust in the media reporting of science?
Science and the economy	• How can the economic effects of science be better publicised and explained to the general public? • What kind of messages would help people to understand and support investment in science and technology? • How can young people be encouraged to take an interest in working in science?
Science journeys	• How do people see science throughout their lives? • What are the times and where are the places that people are most open to learning about science, and most likely to come into contact with it?
Science attitudes	• How to engage people with each of the different broad attitudes in science

Science information and communication

2 Science information and communication

PAS 2014 survey findings on this topic can be used to start a debate about the questions including:

- What more do people want to know about science generally, and the science topics in the survey specifically?[4]
- What are the best ways to inform people about science, and these specific topics?
- What are the best ways to inform different types of people about science, and these specific topics?

Key findings from the PAS 2014 survey on this topic:

- People overwhelmingly think that science is important and take an interest in it.
- On the whole, people still tend to get most of their science news from traditional media such as television and print newspapers. However, online sources are becoming more widely used and are more regular information sources among young adults. Going online is also typical for people actively seeking out information.
- People on balance do not feel informed about science generally, although the extent to which people feel informed is much more varied when it comes to specific topics in science.
- Very few people think they see and hear too much science information, and half think they see and hear too little, suggesting an appetite for more information. At the same time, most people feel capable of understanding this information.
- The speed of development and specialisation of science are ongoing challenges for science communicators, with people on balance feeling that these make science and technology harder to follow.

[4] These were: genetically modified plants (GM crops), the use of animals in research, nuclear power, stem cell research, synthetic biology, climate change, economics and the way the economy works, clinical trials, vaccination of people against diseases, renewable energy, nanotechnology.

Materials and how to use them

Stimulus materials (see accompanying PowerPoint pack)

These posters are based on Q7 from the PAS 2014 survey, which measures how informed people feel about various science topics: genetically modified plants (GM crops), the use of animals in research, nuclear power, stem cell research, synthetic biology, climate change, economics and the way the economy works, clinical trials, vaccination of people against diseases, renewable energy, and nanotechnology.

You can also use these posters as a template to create your own topic-specific posters. For example, you might want to create one based on 'robotics', in order to start a conversation about what people want to know about it and how they think they should be informed.

Each poster should be hung up on the wall, ideally with facilitators stationed nearby. Participants can record their reactions to the findings on post-its and stick them on or around the posters. It is helpful to note which specific topic posters people are most drawn to and ask them why! You might also want to invite participants, once they have looked at the posters, to take part in a short interview or group discussion about science communication. Some useful questions for these discussions are outlined below:

These materials really stimulated people's interest at the PAS 2014 Day of Discovery, and they wanted to find out more about some of the topics immediately. One way to facilitate this could be to have wifi-enabled tablets available to allow for internet searches. You could also signpost participants to any scientists that you have at your event/workshop (see Chapter 3).

Another option would be to prepare some short hand-outs for people to take away with them if they want to know more, or print-outs of interesting newspaper or magazine articles on topics where participants are less likely to be informed (synthetic biology, nanotechnology, stem cell research). Useful links for these topics are included in the Appendices.

Prompts for interviews/facilitating interaction with the posters:

- Before you came here today, what did you think of when you thought about science? What do you want to know more about?
- How interested would you say you were in science? What would make you more interested in information about science? What about other people? *PROBE: Information source, topic, impact, relevance*
- Where do you come across science in your daily life?
- Where do you get information about the science topics you know most about from? Why do you choose these sources? Who would you like to get information about science topics from? Why?

- Would you like to know more about other science topics? Why?
- What do you think of the results about how informed people feel about science? Do they surprise you?
- Why do you think most people feel informed about climate change and vaccinations? Why do people say they are least informed about synthetic biology and nanotechnology? Did you know anything about these before today? If so, where did you get that information from?
- Overall, why do you think people feel more informed about some topics than others? Do you feel you know more about certain science topics? Why is this? *PROBE: media, access to information, lack of interest, salience in everyday life, type of jobs people do*
- Do you, the public need to know about science? Why? Why not? Is that different from wanting to know about science? How?
- Where should people get information about science from?
- What one thing would make you most interested in a science story on TV/in the paper/on social media?
- Do you think that the scientists working on these topics could do anything to make the public more informed? Should they? Why/why not?

Further probes for the specific topic posters:

- What would you like to know about this topic? If participants struggle, tell them "If you could ask a scientist working in this field one question, what would it be?" Why were you drawn to this topic?
- What interests you about this topic/What makes this topic less interesting to you?
- How would you like to find out about this topic? Who should tell you, or where should that information come from?
- Is there anything that would make you more interested in this topic? If so, what?
- What would make this topic more understandable to you?

Scientists' work

3 Scientists' work

PAS 2014 survey findings on this topic can be used to start a debate on questions including the following:

- What characteristics do people want scientists to have?
- What do people think of the level of engagement scientists have with the public and what form should this take?
- How much do people want to know about the scientific process?

Key findings from the PAS 2014 survey on this topic:

- The traits people consider to be most important for scientists to have are honesty, ethical behaviour and open-mindedness. For engineers, creativity, open-mindedness and honesty are considered the most important traits to possess.
- Generally, scientists and engineers are meeting these expectations. The public see them as creative, interesting and open-minded individuals, and continue to think that they make a positive impact on society.
- At the same time, many view both professions, more so scientists, as poor communicators and as secretive, even if they are broadly seen as honest individuals.
- These more negative perceptions of scientists may stem from a lack of awareness of how scientists carry out their work – even though most people think they have a good understanding of this, there is still uncertainty and scepticism about how scientific research is produced.

Materials and how to use them

For this theme, the 'materials' are working scientists; this can be you or scientists that you invite along to your event. The goal is to help participants better understand how scientists work by giving them a chance to 'ask a scientist' anything about their work, and working lives.

Involving and preparing scientists

Depending on your audience, many participants will never have met a working scientist before, and will be very excited to do so, although some may be slightly nervous. Where possible it is useful to have more than one scientist available on the day to talk to participants. Ideally invite a mix of ages and both sexes, as well as a mix of disciplines. We advise that you try to invite scientists early, at least several weeks before your event. Your local science centre or festival may have good links with scientists if you need some advice, as may the local branch of the British Science Association.

Be sure to brief the scientists in advance. Make sure that you cover the following information when briefing your scientists (it might be worth preparing a short written document):

- Objectives
- Outline of the event and how it will work
- Practical information (venue, timings)
- Scientists' role
- Contact details for the main organiser

Reassure the scientist participants that they don't need to bring anything they have prepared in advance, just that they need to come ready to talk about their work. You could describe their role as below:

"You will not need to prepare a presentation as such, just be willing to talk with members of the public about how you work – for instance, what you do, what a typical day is like, how you get funding, how long it takes to complete and publish research, and what it's like dealing with the regulations and ethical implications of research. Having a few examples ready beforehand to explain each of these areas would be helpful. The idea is for you to generate discussion with participants who want to talk to you – you will not be required to record what people say or think as that is the job of the facilitator

You will not know how much science knowledge participants already have, so please pitch your language at layperson level, avoiding any technical words or jargon, and explain anything they look confused about. It is a two-way conversation so listen to their thoughts and ask them questions as opposed to solely talking about what you do."

Stimulus materials (see accompanying PowerPoint pack)

A hand-out with a suggested list of questions/prompts should be given to participants to give them some ideas of what to ask the scientists, as they may not have considered this before, or feel somewhat daunted. Share the list with scientists beforehand also lets them know what to expect. However, you can let participants know they can ask anything they wish – while the prompts encourage participants to focus on how scientists work, they are likely to also want to ask questions about the specific work that the individual scientists do, their findings, and advances in their field.

There is also a worksheet for participants to complete that helps them to describe their vision for scientists. Participants can do this after they have talked to scientists, but you can also ask participants to fill it in even if they haven't yet had a chance to speak to the scientists. Once participants have completed the worksheet they should be stuck on the wall so other participants can read and compare their suggestions.

Example probes to guide the discussion

Once participants are in a dialogue with the scientists, they may ask many questions on the precise aims or technical details of the scientists' research, rather than their day to day work or processes. It can therefore be useful to encourage participants to think beyond the field in question, and think about how scientists in general get their jobs, get funding, publish their work etc.

Where possible, encourage participants and scientists to work together to think of new ideas for public engagement, and new techniques that scientists could use to explain what they do. The prompts below can be used to facilitate interaction between the participants and scientists. Alternatively, if dialogue is proceeding well without the need for facilitation, facilitators can use the questions to interview participants individually.

- Do you feel you know how scientists work? What more would you like to know?
- When you imagine a scientist at work, what do you see? What are they doing? Where do they work?
- How did they come to have that job? How were they trained?
- Do they ever engage the public in their work? If so, when? How? What more could they do? How many ideas can you think of?!
- Would you like to know more about scientists and the way they work? Do you think that would have any effect on how you feel about science generally?
- What are the most important things a scientist could do to help you understand how they work?

Trust in science

4 Trust in science

PAS 2014 survey findings on this topic can be used to start a debate about the questions including:

- How could trust in (different types of) scientists be improved?
- What would it take to improve trust in the media reporting of science?

Key findings from the PAS 2014 survey on this topic:

- Half think the information they hear about science is generally true. Trust in this information is often implicit – many people have no specific reason for trusting it. However, hearing things from scientists directly rather than from journalists seems to engender greater trust.
- This may be linked to negative perceptions of media reporting of science. Seven-in-ten think the media sensationalises science, and many doubt the scientific qualifications and rigour of journalists who write about science.
- While these concerns do not necessarily stop people from feeling informed or even from trusting what they hear, it does leave some confused about the conflicting information they see and hear.
- Trust in regulation is complex. Scientists are highly trusted to follow regulations and to consider the risks. However, even those who trust scientists in this way have concerns about the *effectiveness* of government regulation.
- Awareness of regulation does not necessarily lead to trust in scientists and their work. The latter seems more linked to the perceived intentions of scientists than to confidence in regulation.

Materials and how to use them

Stimulus materials (see accompanying PowerPoint Pack)

These posters are based on the trust-related questions in the PAS 2014 survey, and cover views on risk, regulation, and the media reporting of science.

Each poster should be hung up on the wall, ideally with facilitators stationed nearby. Participants can record their reactions to the findings on post-its and stick them on or around the posters.

Prompts for facilitating interaction with the posters:

- What makes you trust in science?
- What parts of science make you worry?
- What do you think about new technologies? What are the risks involved that scientists should be thinking about?
- Should the public have more of a say in the rules around how science is carried out? How?
- Do you trust scientists to always have good intentions?
- Do you trust what you hear about science?
- What do you think when you see scientific discoveries in the media? What about when you see debates about controversial science issues?
- What would increase your trust in science? And in media reporting of science?

Prompts for facilitating discussion groups and interviews:

You might also want to invite people, once they have looked at the posters, to take part in a short interview or group discussion about science communication. Depending on your objectives, you might want to really focus in on either trust in scientists or trust in media reporting of science, or you could look at a particular sector/type of science and explore trust in that.

<u>Trust in Scientists and Science Regulation</u>

- When we talk about "science", what comes to mind? Is it a positive or negative thing?
- Do you think science and scientific developments are a good or a bad thing?
    - In what ways? Any examples? Why do you think that? What were you taught / brought up to believe about science?

- How would you describe scientists? Why do you think that they do what they do? How do you think that they report their findings? Do you trust them to do so honestly?
- How much do you trust in scientists to 'follow rules'?
    - Is it different for different types of scientists? Why? Why not?
- How do you feel about the development of new technologies in the UK?
- To what extent do you trust in scientists to consider the risks of new technologies or the consequences of their work?
    - How should they look at the risks?
    - Who should they talk to about those risks? Other scientists? Politicians? The public? How could they include your views?
- How much do you trust what government agencies or private companies do with science?
- What, if anything, would it take to improve trust in science? And scientists?

Trust in Media Reporting of Science

- How do you feel about the media reporting of science? Is it reliable or unreliable? Where does it come from?
- How much do you trust media reporting of science? Why?
    - Do you trust some sources more than others? Why?
    - How likely would you be to investigate or think about the sources for the information reported in the media?
- How do you think science journalists check their stories/check the reliability of new science findings? Does it matter?
- How important is it for journalists to have a specialisation in science to report on it? Why?
- Should there be any rules around the media reporting on science? What should they be?
- How do politicians react to media reporting of science? How should they?
- What would it take to improve trust in the media reporting of science?

Science and the economy

5 Science and the economy

PAS 2014 survey findings on this topic can be used to start a debate about the questions including:

- How can the economic effects of science be better publicised and explained to the general public?
- What kind of messages would help people to understand and support investment in science and technology?
- How can young people be encouraged to take an interest in working in science?

Key findings from the PAS 2014 survey on this topic:

- People's knowledge of who funds science tends to be low. Seven-in-ten are aware of the Government's funding of science, but just over a third mention private companies when asked who funds science.
- In spite of this low level of knowledge, many are concerned about funding – especially private funding – and the impact this has on the independence of scientists.
- At the same time, people are strongly supportive of government funding of science, and tend to consider it as a priority area that should not be cut. This is perhaps because people consider science to have an important role in the UK economy, driving growth, international competitiveness and future prosperity.
- The perceived importance of science to the UK economy appears to be received wisdom, rather than being based on people's knowledge of science or of economics.

Materials and how to use them

Stimulus materials (see accompanying PowerPoint pack)

These posters are based on questions in the PAS 2014 survey that related to science's effect on the economy, and cover views on science funding, economic growth, international competitiveness and young people's interest in science.

Each poster should be hung up on the wall, ideally with facilitators stationed nearby. Participants can record their reactions to the findings on post-its and stick them on or around the posters.

One of the posters refers to the £600 million BIS funding for the 'eight great technologies'. An option for taking that conversation further would be to print out infographics that BIS have produced for each of these eight technologies[5], and either hang them on the wall with the other stimulus, inviting comment, or use them as hand-outs for interested participants to take away, as in the PAS 2014 Day of Discovery.

Another option would be to choose a topic that highlights the ongoing debates about government funding of science. For example, the question of whether the UK is effectively exploiting the discovery of graphene at Manchester University is one that could easily spark a more in depth debate.[6] You could print out several articles that outline the different viewpoints in the debate, and participants with more time can read these articles, and chat with facilitators about their views.

Prompts for facilitating interaction with the posters:

- What kind of economic benefits do you think science can bring? Any examples?
- How well do you think the UK is doing in terms of science compared to the rest of the world?
- What should the UK be doing to develop its science and technology sector? Who should be responsible?
- Should potential for contributing to the economy be taken into account when deciding about what scientific research gets done? How so? What should be the balance between advancing knowledge and economic impact?

[5] https://www.gov.uk/government/publications/eight-great-technologies-infographics

[6] Some useful links to the graphene debate are included below, but you could choose a different topic, depending on your objectives.
http://www.theguardian.com/science/2011/oct/07/huge-investment-graphene-nobel-prizewinner
http://www.telegraph.co.uk/technology/news/9802050/Graphene-research-moving-abroad.html
http://www.theguardian.com/science/2013/dec/03/graphene-wonder-substance-uk-economy
http://www.bbc.co.uk/news/science-environment-20975580

- How should the government choose which areas of science to allocate funding to?
- How does business funding affect science? How do you feel about business funding of science? Why?
- Is enough being done to encourage young people's interest in science, and the development of scientific skills? What more would you like to see?
- IF USING STIMULUS ON GRAPHENE OR ANOTHER SCIENCE FUNDING DEBATE: What do you think of this debate? How does it make you feel about the science and technology sector in the UK?

You might also want to invite people, once they have looked at the posters, to take part in a short interview or group discussion about science communication.

Prompts for facilitating discussion groups and interviews:

- Do you think the sciences contribute to the economy? How?
  - Who uses the sciences, and how? Can you think of any examples?
- How important would you say the sciences are to the UK economy? Why? Which areas of the sciences make contributions?
- Who benefits economically from scientific advances, and how? What could be done to ensure that benefits are distributed fairly?
- What would happen if we did not have science to contribute to the economy?
  - How do you think the economy would change? Nationally? Globally?
- Who do you think contributes? What do scientists actually do, how do businesses play a role, and how does that feed into economic benefit?
- What should the UK government be doing to ensure that it gains the most economic benefit from sciences? What about the private sector? And scientists themselves?
- Do you think young peoples' interest in science is important for future prosperity? What do you think could be done to ensure that young people take an interest in science, and develop the skills they need?
- Who do you think should fund scientific research? Why?
- How much should the government contribute? In what ways? How should the government choose which areas of science to allocate funding to?
- How do you feel about business funding of the sciences? How could greater business funding of science be encouraged?

Science journeys

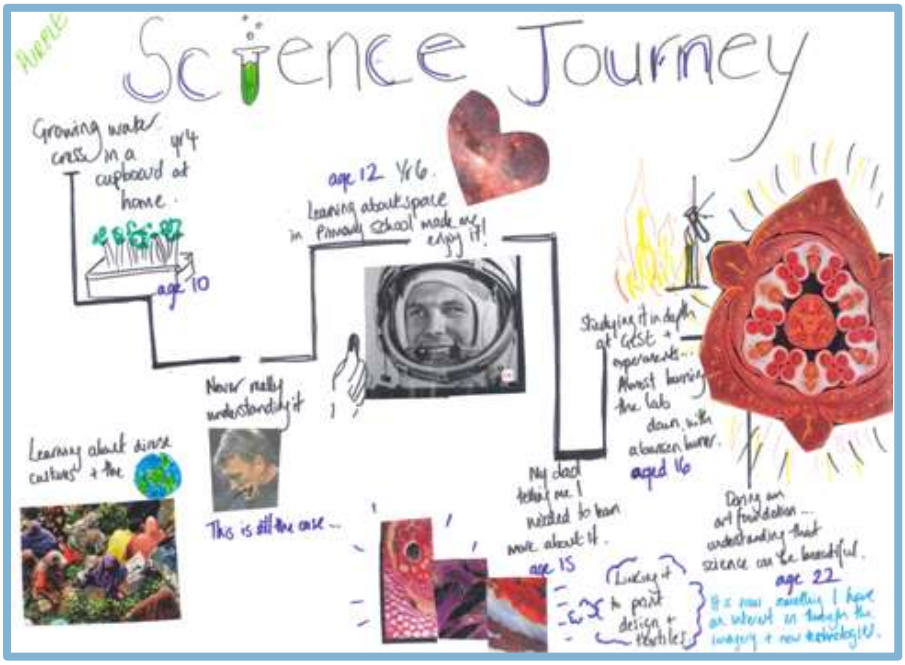
6 Science journeys

PAS 2014 survey findings on this topic can be used to start a debate about the questions including:

- How do people see science throughout their lives?
- What are the times and where are the places that people are most open to learning about science, and most likely to come into contact with it?

Key findings from the PAS 2014 survey on this topic:

- In the past year, two-thirds have undertaken a science-related leisure or cultural activity, such as a visit to a science museum. This group are also more likely than others to have participated in non-science related cultural activities as well.
- Women appear to play a particularly important role in informal science learning. For example, people are more likely to go with their mother than their father to these types of activities
- While a quarter think school put them off science, most still feel that the science they learnt at school has been useful in their everyday lives. People think that the maths they learnt at school has been useful day-to-day and in the workplace.



Materials and how to use them

Stimulus materials (see accompanying Power Point pack)

For this theme, there is little stimulus: the goal is to help participants reflect on the part science has played in their lives, by getting them to map their 'science journey' on a poster.

Each participant should be given a hand-out explaining the task (there is a customisable example in the accompanying PowerPoint pack) and access to card, pens, coloured paper, scissors, newspapers and science and other magazines to use for images. There are two examples in the Powerpoint pack that can be printed for participants to look at to give them some guidance on how to approach the task.

Facilitators should encourage people to use a timeline structure, and to be as visually creative as they are comfortable with. Discuss the task with people as they carry it out, and ask for more detail around elements of the posters that are unclear. At the end, you should ask people to reflect on the times in their lives when and the places where they have been most open to science, and add some ideas for engaging people like them at the bottom of their poster.

When people have finished their posters, hang them up on the wall, and encourage other participants to put post-it comments on other people's 'journeys' – this can allow them to comment on things they identify with in their lives.

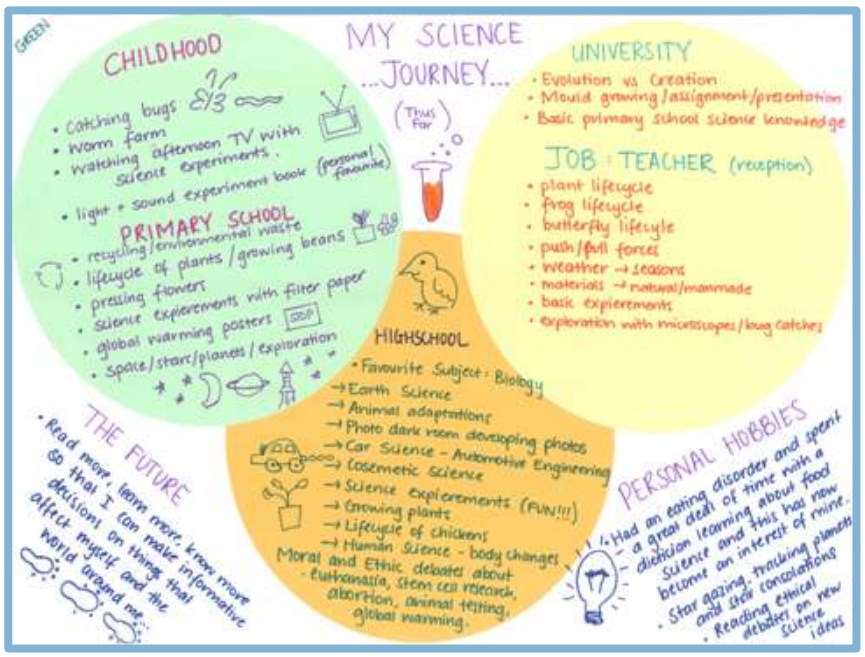
There is also a poster based on a question in the PAS 2014 survey that asked about where people come into contact with science in their everyday lives, which can also be used as stimulus material for this topic.

Prompts for facilitating journey descriptions:

Some may not feel comfortable drawing or writing their own science journey, and may prefer to tell their story to a facilitator. Below are some questions they could ask to help participants fully explain how they've interacted with and felt about science at different points in their lives:

- Can you describe for me, your first memory of science in your life? It may be a memory from school, maybe a lesson, or it could be a memory of wondering about or finding out how something works. Anything that sticks out as an interest in science.
- As a child were you encouraged to learn about and use science? Did you enjoy that? What did you feel about science in childhood? What about now?

- Was science am important part of your education at school? Was it encouraged? Were there many lessons? Who promoted it? Teachers? Parents? Own interest?
- Can you describe for me your interest since then, through growing up into adulthood? What triggered any further interests? *PROMPT events like new scientific discoveries or controversies, personal experiences, experiences of family or friends etc.*
- When do you think you were most open to learning about science in your life? *Ask about associations, people, life events, news events, jobs etc.*
- When were you most likely to come into contact with science throughout your life? And in what ways?
- When have you been most and least interested in science? Has age had an effect? Have you become more or less interested as you have become older? Have your job/peers/family had any influence?
- What topics have you been most interested in? Why? Have you taken it any further or actively looked for more information? Why/why not?
- What science related activities have you been involved with through your life? Who with? Any favourites? Any more in the future?
- How much of an interest do you see yourself taking in science in the future? In what circumstances would you take more of an interest than you currently do?



Science attitudes

7 Science attitudes

Discussing the PAS 2014 science attitudes with participants can start a debate about the questions including:

- How to engage people with each of the different broad attitudes in science (see Appendix 1 for descriptions):
  - Confident Engagers
  - Distrustful Engagers
  - Late Adopters
  - The Concerned
  - The Indifferent.
  - Disengaged Sceptics

Key findings from the PAS 2014 survey on this topic:

- The groups who are most engaged with science not only tend to have a greater factual knowledge of science, but also appear to have greater non-science related cultural knowledge. This again suggests that there are perhaps not two cultures of science versus arts, but instead a group of people who are more engaged with both these areas.
- Those from the Concerned attitude group tend to have stronger spiritual or religious beliefs than the other segments.
- The most engaged groups – Confident Engagers, Distrustful Engagers and Late Adopters – are among the most likely to use new communications technologies such as smartphones and tablets, and to use social media. Late Adopters in particular are more likely to have recently used a variety of social media platforms.

Materials and how to use them

Stimulus materials (see accompanying PowerPoint pack)

For each 'science attitude' there is a poster describing the typical views and values. Participants should be given a hand-out which explains that the 'science attitudes' are based on the survey answers and encouraged to study the posters. Facilitators on hand can guide participants through the posters, answering any questions they have. When they have studied the six segments, they can complete the worksheet which has space for them to write:

- Which attitude they think best describes them
- Which attitudes they think best describes their friends or family
- What the government and scientists should do to engage people with the different science attitudes (although they don't have to answer for each of these individually)

Prompts for facilitating discussions and interaction with the posters:

- Which of these best describes your attitude towards science?
- What about the attitudes of other people you know?
    - Think about your family members or friends. Do you think they have different attitudes towards science to you?
- How well does this describe your attitudes towards science or the attitudes of the people you're thinking about?
    - What's really accurate?
    - What does it miss out?
- What are the best ways for people with each of the different attitudes to be kept informed about and engaged with science?
    - What kind of messages would work best?
    - Where would be the best places/media to reach people in this group?
    - Who would they trust the most?

Appendices

Appendix 1: Summary of the Public Attitudes to Science (PAS) 2014 study

The Public Attitudes to Science studies

Public Attitudes to Science (PAS) 2014 is the fifth in a series of studies looking at attitudes to science, scientists and science policy among the UK public. The study was conducted by Ipsos MORI, in partnership with the British Science Association, on behalf of the Department for Business, Innovation and Skills and the Economic and Social Research Council. The main element of the study was a representative survey of 1,749 UK adults aged 16+ and a booster survey of 315 16-24 year-olds, which were carried out from 15 July to 18 November 2013[7]

Key findings about attitudes

- **The public continue to see science as important:** four-fifths (81%) agree that science will make people's lives easier, and over half (55%) think that the benefits of science outweigh any harmful effects.
- **People are positive about the contribution science makes to the UK economy:** (76%) think scientific research makes a direct contribution to economic growth in the UK.
- **Scientists and engineers are highly respected:** Nine-in-ten think that scientists (90%) and engineers (88%) make a valuable contribution to society and eight-in-ten (83%) agree scientists want to make life better for the average person.
- **People do not know much about how scientists work:** While a large majority (82%) understand that it is normal for scientists to disagree, a third (35%) still think that scientists adjust their findings to get the answers they want.
- **The public lack awareness of how scientific research is funded:** just over a third (36%) mention private companies.

Key findings about engagement

- **People are interested in knowing more about science:** over eight-in-ten (84%) agree that science is such a big part of our lives that we should all take an interest, and seven-in-ten (72%) agree that it is important to know about it in their daily lives.
- **Public involvement is important:** seven-in-ten (69%) think that scientists should listen more to what ordinary people think.

[7] The main survey used a probability sampling approach while the 16-24 year-old booster survey used a quota sampling approach.

- **Traditional media is still important:** six-in-ten (59%) say TV is one of their most regular sources of information on science and a quarter (23%) say print newspapers are one of their most regular sources. By contrast, under two-in-ten (15%) say online newspapers or news websites are one of their two most regular sources.
- **There is low trust in science journalism:** seven-in-ten (71%) think that the media sensationalises science – a consistent concern since the 2000 study.
- **How people discuss science online depends on various factors:** the perceived scientific authority and vested interests of the communicator are important. Humour, visual impact and perceived relevance to everyday life all draw people in.
- **People treat science activities as part of a wider range of cultural activities**: in the past year, two-thirds (67%) have undertaken a science-related leisure or cultural activity, such as a visit to a nature reserve (40%), a zoo or aquarium (39%), a science museum (23%) or a science and discovery centre (13%).

Attitudes among different groups

- Women are less likely than men to feel informed about science and often feel less confident in engaging with it.
- Young adults aged 16-24 tend to be more neutral in their attitudes to science.
- Those who are less affluent tend to feel less well informed about science and are less likely to feel they know what scientists do. Perhaps as a result they tend to feel more concerned about the speed of development and the conflicting information they see.

Different public attitudes to science

The survey identified six broad attitudes to science that exist among the UK public:[8]

- **Confident Engagers** tend to have the most positive attitude towards science of all the segments, and have relatively few concerns about scientists, regulators, or the relationship between the Government

[8] To examine differences in attitudes, Ipsos MORI carried out a cluster analysis on the 2011 PAS survey data. This is a statistical technique used to segment the population into distinct clusters of respondents who have similar overall attitudes to science. It is important to note that the clusters group together respondents who tend to have similar attitudes across a range of areas, but not identical attitudes in each area. Clusters should be seen as illustrative typologies rather than exactly representing the views of a group of the population. PAS 2014 retained questions from the 2011 survey in order to map the 2014 sample to this existing segmentation.

and science. However, they are concerned about how the media reports science and the media's influence on science policy.

- **Distrustful Engagers** are highly enthusiastic about science but tend to be less trusting of scientists, regulators and the Government. Consequently, they tend to think the public should play a larger role in decision-making and are less satisfied with leaving this to "experts".
- **Late Adopters** did not enjoy science at school, but have become more interested in it as adults, and now want to have more of a say in decision-making. Their interest tends to be linked to their environmental and ethical concerns, so they tend to be more engaged with specific issues such as climate change and genetically modified crops.
- **The Concerned** tend to have a more religious or spiritual outlook on life and consequently have stronger views on the limitations of science. They support Government efforts to consult the public on science, but have concerns about whether scientists themselves take the findings of these consultations on board.
- **The Indifferent** tend to be older, often retired people. They are not especially negative or worried about science, but tend to think science is not for people like them, so are less interested in finding out about it or in getting involved in decision-making.
- **Disengaged Sceptics** have typically found science overwhelming since school, and do not feel informed about it today. They are often concerned about the speed of development in science, so tend to favour a conservative approach to regulation, and one that takes the public's views into account. However, they are less confident in getting involved themselves.

Appendix 2: Tips for organising, facilitating and writing up the findings

Organising the event/workshop:

Decide how many participants you'd like to engage and how you're going to make sure that they turn up! For the Ipsos MORI Day of Discovery, it was important to get a really wide range of different people, across different ages, social grade and ethnicities, so people were asked to take part in the street by members of the Ipsos MORI team, and participants were given a small financial incentive to take part for at least 40 minutes. However many stayed for much longer and said they would have come along for free. You might be taking advantage of footfall, or be talking to a group during a scheduled class/lunch break, or you could be organising a bespoke event.

Try to ensure that there's something obvious 'in it' for participants; refreshments may help to draw people in if you're relying on footfall, for students the chance to grill a working scientist about their job might be a selling point!

Whatever you do, have a plan to make sure you get enough people along, and that you get the right people, by doing enough to make contact with your target audience in advance of your event.

Before the day, make sure you have a large enough space, and the right set up for the types of activities you plan to do. If there are a few facilitators, have a meeting to make sure that everyone knows what their role is, and how you're going to work together to ensure that participants engage with the materials and feel like they've all been heard. It can really help to do a checklist of the materials you'll need on the day (an example is included in the Powerpoint pack).

Using the materials

The materials have been designed to be printed on A3 or A2 paper, and stuck to walls, to allow participants to read them and add their responses/ideas on post-its at their own pace.

Participants should get a hand-out when they first arrive at your event/workshop or information point. Each person should also get some post-its, a pen and ideally a clip-board to allow them to capture their thoughts on the stimulus materials as they go along.

When participants arrive

Make sure people are greeted and have the purpose and structure of the workshop/event explained to them at the very start. There is an example hand-out in the materials that can be customised for you to give to your participants. Having refreshments available at this point also helps to put people at ease.

It can be helpful to record some basic demographic information about your participants, for example their age and gender, just so that you'll know later who took part.

Depending on the number taking part, giving people a name tag can help in group discussions. Give your facilitators a name tag as well, and vary the colours so that it is clear who participants can talk to if they have questions.

Facilitating interaction with the stimulus materials and discussions

All of the posters have a question at the end, to encourage the participants to think about the implication of the survey findings. These were the questions that were used at the PAS 2014 Day of Discovery, but you can easily change the questions if you think different ones would better suit your objectives. In each of the relevant chapters, there are some prompts that might be helpful to get participants thinking and talking about the posters, the themes they cover and the questions they raise.

You can run an event that focusses solely on the posters and participants' reactions to them. However, you may also want to engage participants in more in-depth discussions, either by carrying out interviews with individuals or pairs, or by facilitating a group discussion. If you do this, there are a few key things that are worth doing:

- Let people know what the objective of the discussion is at the start, and make sure they understand that you want to have a conversation with them – it's not a quiz!
- Tell them how long the discussion lasts and try to stick to it where possible, especially as participants might be under time pressure.
- Allow people to talk – ask open questions, and then sit back and ignore the urge to follow up every single thing. Silence is your friend! Many will not have discussed science before so may need time and space to gather their thoughts.
- Make sure everyone gets the chance to speak. It's good to set ground rules at the start so that everyone knows what's expected, and has a chance to agree rules for behaviour.

If a participant says something incorrect about science, it is worth resisting the urge to correct them, and instead asking them where they heard that or why they believe it. If you do want to give the participant correct information, make sure that you do so in a sensitive and friendly manner so that they do not get embarrassed about having 'got it wrong'.

Make sure you thank participants, and give them opportunity to feed back on their experience. An example feedback form that can be handed out at the end of the event is included in the materials for you to use and customise.

Capturing what your participants are saying

There are several ways you can capture participants thoughts:

- On post-its, which they should stick on the relevant stimulus posters
- On worksheets (some are included for the activities outlines in Chapters 3 & 7, but you could also make your own)
- Hand-written notes taken by facilitators
- Recording the discussions to listen back to later (you need to tell participants very clearly what is going to happen to the recording, and gain their informed permission to record them)
- The science journey posters that participants make

You will very easily forget what people say, so do try to capture as much as possible in as many ways as possible in order to gain the most from your event.

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The Social Research Institute works closely with national governments, local public services and the not-for-profit sector. Its c.200 research staff focus on public service and policy issues. Each has expertise in a particular part of the public sector, ensuring we have a detailed understanding of specific sectors and policy challenges. This, combined with our methodological and communications expertise, helps ensure that our research makes a difference for decision makers and communities.