



**BBSRC and EPSRC
Synthetic Biology Public Dialogues
TNS-BMRB Methodology**

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1. Introduction

This document provides an overview of the synthetic biology dialogue. The research was made up of two separate phases. The first phase of the research included a series of in-depth telephone interviews with stakeholders to understand some of the technical, social and economic drivers that are shaping synthetic biology in the UK. The second phase of the research included three workshops with members of the public.

Both data collection phases are discussed in more depth below:

2. Stakeholder Interviews

Stakeholder interviews were conducted prior to the public workshops in order to provide background to the study, understand the views of key stakeholders around the science and ethics, and feed into the development of the workshops. A total of 41 interviews were conducted with stakeholders from a variety of relevant sectors.

Type of interview	Interviews achieved	Intended interviews
Scientists and Engineers	9	12
Social Scientist/Ethics	7	8
Religion	2	2
Government Regulators/Risk	7	8
Funders	3	3
Industry/Insurance	5	4
NGO	6	4
Consumers Groups	4	2
Total interviews	41	43

The stakeholders interviewed were drawn from an initial list of people who were identified as being involved in different aspects of synthetic biology. The final list of stakeholders was agreed by the oversight group.

Stakeholders were initially sent an invitation letter and then contacted by telephone or e-mail to set up an interview. Interviews lasted approximately 45 minutes

Participants were asked about their views on:

- The science of synthetic biology
- Social and ethical considerations surrounding the science
- Potential application areas
- Any relevant lessons learned from the genetically modified foods controversy.

The topic guide used in the stakeholder telephone interviews can be found here: www.bbsrc.ac.uk/syntheticbiologydialogue

3. Public Workshops

In terms of the public workshops, 160 people were invited to participate - with 40 people in each of the following four areas - London, North Wales, Edinburgh and Newcastle. The participants were reconvened for three waves of workshops.

3.1 Sample

A combination of demographic, attitudinal and behavioural criteria were used to develop the sample for the workshops. Demographic criteria were: gender, age, socio-economic group, faith and children in household. Behavioural/attitudinal criteria were: environmental attitudes and level of community engagement. Sample composition for the environmental and community engagement groups were defined as follows:

Environmental attitudes (based on a segmentation for Defras pro-environmental behaviours framework):

- A **pro environment group** defined as: those who buy organic food; belong to a NGO; agree or agree strongly that they are prepared to pay more for environmentally-friendly products; disagree or disagree strongly with the statement that the environment is a low priority for me compared with other things in my life.
- a. **Environmental sceptics** defined as: those who do not buy organic food; do not belong to a NGO; disagree or disagree strongly that they are prepared to pay more for environmentally-friendly products; agree or agree strongly with the statement that the environment is a low priority for me compared with other things in my life

Community engagement (based on a segmentation from the Futures Company *Planning for Consumer Change* data)

- b. Highly engaged (defined as those who have at least X5 of the following in the past 12 months)
- c. Bystanders: (defined as those who have done 1 or less of the following in the past 12 months)
 - Written to your MP or councillor
 - Attended a local community meeting or participated in a local community group (eg. a school, council or religious group)
 - Undertaken voluntary work or activity for a charity
 - Joined a political group or campaign on a social networking site such as facebook, myspace or bebo
 - Been to a parents meeting at school
 - Attended a community event (eg. fireworks, fete etc)
 - Socialised with a neighbour
 - Organised a local community activity (eg. for a school council or religious group)

The final quotas for each area and overall across the three stages are below:

<i>Area/group</i>	<i>Gender</i>	<i>Socio-economic group</i>	<i>Age group</i>	<i>Children in household</i>	<i>Faith</i>
London 1	Female	AB	18-34	Mixed	No
London 2	Mixed	C1 C2	35-54	Yes	Yes

London 3	Male	DE	55+	No	Mixed
Newcastle 1	Male	C1 C2	35-54	Mixed	Mixed
Newcastle 2	Female	DE	18-34	Yes	Yes
Newcastle 3	Mixed	AB	55+	No	Mixed
Edinburgh 1	Male	AB	35-54	Mixed	Mixed
Edinburgh 2	Female	DE	55+	Mixed	No
Edinburgh 3	Mixed	C1 C2	18-34	No	Mixed
Wales 1	Mixed	DE	18-34	Yes	Mixed
Wales 2	Female	C1 C2	35-54	Mixed	No
Wales 3	Male	AB	55+	Mixed	Yes

<i>Area/group</i>	<i>Pro-environmental attitudes</i>	<i>Community engagement</i>
London 4	High	Not recruited in this area
Newcastle 4	Not recruited in this area	Low
Edinburgh 4	Low	Not recruited in this area
Wales 4	Not recruited in this area	High

3.2 Recruitment

Participants were identified through qualitative free-find techniques, with the following recruitment procedures:

- After providing details of the research, individuals were asked to undertake a short screening questionnaire to assess eligibility and ensure that the designated quotas are accurately filled. If they met the requirements they would be invited to participate in the research.
- Following recruitment, a confirmation letter or pack was sent out to respondents, providing details of the event, such as the nature of the study, the voluntary nature of participation, the date/time/venue and the confidentiality principles. It included a named contact within the BMRB research team.
- Attendees received a reminder phone call in the week leading up to the event and priority alerts were fed back to the research team in any areas where the quotas were falling short. Replacement participants were recruited where necessary.

The screening questionnaire had two purposes: 1) to provide demographic and other classification data; 2) to ask a series of attitudinal questions with regard to current

views on science and technology as noted above. This was used to inform the composition of individual groups and benchmark key views to be tracked over the course of the project.

3.3 Maintenance of sample

From the 160 participants recruited, a total of 152 attended the first workshop, 137 attended the second and 129 attended the third.

Participants were offered the following incentives for their time::

Public

- First workshops (2.5 hours on a weekday evening) - £45
- Second workshop (whole day event on the weekend)-£85
- Third workshop (whole day event on the weekend)-£90

Scientists and social scientists attending the groups

- Second and third workshop (presentation and attendance of whole day event)-£500

3.4 Workshop structure

The dialogue comprised 3 workshops.

The first workshop session was held in the evening and lasted approximately 2.5 hours. The four groups in each area were kept separate for this discussion. The second and third sessions were day long events (approximately 5.5 hours) and held on weekends. For these sessions, all four groups per area were convened in a single workshop. Introductions and learning sessions were held in plenary but for discussion sessions, participants were separated into their groups.

The content and structure of each event is discussed below:

Workshop 1: Science and Technology in General

The **overall aim** of workshop 1 was to understand the views of the public around science and technology developments in general, before introducing people to synthetic biology. The workshop lasted 2.5 hours.

A few tools and techniques were used in this workshop both to facilitate discussion and map out public opinion. These included:

- Pre-group activity: participants were asked to bring in a newspaper or magazine article that had some significant to them in terms of developments in science and technology. These were used to open up discussions at the beginning of the workshop.
- Ecological Systems Theory diagram: to explore the perceived impact of science and technology on a personal and broader societal level.
- Clip board: used to cluster discussions around who was driving science, where it was going and how it was shaping society.

The following table briefly outlines the themes discussed in the workshop as well as the tools used. A complete list of the tools and techniques used in the workshops can be found at: www.bbsrc.ac.uk/syntheticbiologydialogue

Time	Session and aims	Topic areas	Tools/Stimulus material
18:30	Session 1: Introductory views on science and technology	Participant introductions/welcome Ice-breaker: talk through newspaper clipping. Topics – Impact of science on daily life/broader society and how it has progressed Activity: Using stimulus 1, participants created a collage of images and views associated with developments in science and technology that had an impact on a personal, community or societal level.	Ice breaker: use newspaper clipping to describe thoughts on science and technology Stimulus 1: My world; our world; the world diagram for participants to

18.55	Session 2: Medical applications	<p><i>Considerations around:</i></p> <ul style="list-style-type: none"> – Where participants saw medical sciences going in the future and how this impacted on them/boarder society – Consideration of who was driving change/innovation in this area – Discussion of who is driving development in this area 	Cluster of key factors on clip board
19:30	Break		
19.40	Session 3: Agricultural applications	<p><i>Considerations around:</i></p> <ul style="list-style-type: none"> – Where participants saw agricultural/food sciences going in the future and how this impacted on them/boarder society – Consideration of who was driving change/innovation in this area – Discussion of who is driving development in this area 	Cluster of key factors on clip board world
20.15	Session 4: Pulling it all together	<p>What are the similarities and differences between medical and agricultural applications in relation to:</p> <p>Where it is going Who is driving it How it has shaped society/their relationship with the world?</p>	Cluster the cards from previous sessions
20.30	Session 5: Introduction to synthetic biology	Initial thoughts and understanding of synthetic biology	Stimulus 2: Handout on synthetic biology
20.50	Session 6: Wrap up	Conclusion and information about the next sessions	

Workshop 2: The governance of synthetic biology

The overall aim of workshop 2 was to explore the views of the public concerning the social and ethical issues surrounding synthetic biology in general, as well as discuss the governance, regulation and funding of synthetic biology. This workshop lasted for 6 hours and cover the following:

- General perceptions surrounding synthetic biology and science
- Exploring different stakeholder visions of synthetic biology
- Exploring how science gets done
- Funding and regulation of synthetic biology

A number of tools and techniques were used in this workshop both to facilitate discussion and map the public's opinion and possible opinion change over the course of the discussions. These included:

- Interactive voting sessions: conducted at the beginning and end of the workshop to track the public's opinions over the day. It should be noted that although polling provides a useful means of tracking views, it should only be used as an adjunct to the qualitative data. In addition, polling data is not representative of the views of a wider population.
- Presentations by specialists: used to outline views on synthetic biology. Scientists and social scientists were asked to discuss the science, challenges and ethics involved. Following they were invited to rotate between the moderated group discussion to act as a resource and answer any potential questions.
- Actors were used to present four different stakeholder perspectives on synthetic biology to the public. These perspectives were derived from the stakeholder interviews conducted at the outset of the research and covered a scientists/engineers, social scientists/ethicist, NGO and commercial perspective.
- Video diary: prior to this workshop, a number of scientists were asked to complete a brief video diary, exploring their day to day lives as a scientist and work being done on synthetic biology. These diaries were then combined into

one clip and shown to the public as an example of the day to day lives of synthetic biologists.

The following table briefly outlines the themes discussed in the workshop as well as the tools used. A complete list of the tools and techniques used in the workshops can be found here: www.bbsrc.ac.uk/syntheticbiologydialogue

Time	Session and aims	Topic areas	Tools/Stimulus material
09:30	Arrival and Registration		
10:00	Session 1: Welcome and Introductions (Plenary)	Welcome and housekeeping Reflections from Workshop 1	
10:20	Session 2: First interactive voting session (plenary)		IML voting handsets and equipment
10:35	Sessions 3: Presentations and questions (Plenary)	Presentation to outline synthetic biology as well as the hopes, concerns, challenges and uncertainties surrounding the field.	Scientist and social scientists presentations asked to put together 10min presentations
11:00	Session 4: Discussing synthetic biology (break out rooms)	Discussion of presentation/ initial reactions and thoughts Discussion of hopes, fears and uncertainties surrounding synthetic biology	Stimulus A: Overview of synthetic biology Stimulus B: Overview of social and ethical issues
11:40	Session 5: Hearing different views and responses to synthetic biology (plenary)	Actors to perform views from the following areas: <ul style="list-style-type: none"> – Scientist/ Engineer – Social scientist/ ethics – Ethicist/NGO – Industry/ commercial 	Actors, acting out different perspectives
11:55	Session 6: Discussion of stakeholder perspectives (break	Discussion of what the hopes and concerns were about the views presented as well as thought around who or what was driving the scientists.	<i>Actors scripts handed out</i>

	out)		
12:40	Lunch		
13:30	Session 7: Views from the scientists (plenary and then breakout)	General views on the cultures and practices of research and working lives of scientists	Scientist video diary
14:10	Session 8: How science gets funded (breakout)	<p>Discussion of the role of research councils:</p> <ul style="list-style-type: none"> – Where responsibilities lie in terms of thinking about the wider implications of the science – Are risks adequately stated and picked up – Should scientists consider wider implications of their work <p>Discussion of the commercialisation of research:</p> <ul style="list-style-type: none"> – Any conflict of interest when academic scientists work with industry – Transparency and protecting investments. 	<p>Handout C: Research councils</p> <p>Handout D: Commercialising research</p>
15:00	Session 9: Regulation and control (break out)	<p>Discussion of:</p> <ul style="list-style-type: none"> – Prediction and control of synthetic biology – Whether there should be specific regulations for the field and who should be responsible for it – Regulation in a globalised economy – Environmental release 	Handout E: Synthetic biology and regulation
15:30	Session 10: Reflections on the day (break out)	Summarised the day's discussions and looked at key questions for the next workshop.	
15:45	Session 11: Final interactive voting session (plenary)		IML voting handsets and equipment
16:00	Wrap up and close		

	<i>workshop</i>		
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Workshop 3: Potential application areas

The final workshop explored in more detail potential application areas for synthetic biology and specifically looked at how particular uses mediate people's views on the science, together with its relative risks and benefits.

Four application areas were discussed:

- Environmental, with particular focus on bioremediation
- Energy, with particular focus on bio fuels
- Food/Crops, with focus on crop optimisation
- Medical, with Artemisinin used as a primary example

The applications were split so that only three would be discussed in each workshop area. These were broken up as follows:

London: Environmental, Energy, Food/Crop

North Wales: Medical, Energy, Food/Crop

Newcastle: Medical, Energy, Environmental,

Edinburgh: Medical, Food/Crop, Environmental

A couple of simple tools and techniques were used in this workshop both to facilitate discussion and map the public's opinion and possible opinion change over the course of the discussions. These included:

- Interactive voting sessions: conducted at the beginning and end of the workshop to track the public's opinions over the day, as with workshop 2.
- A scientist and social scientist were invited to attend each workshop to have a brief discussion on their views surrounding the different application areas. Following this the scientist and social scientist were invited to rotate between moderated groups as they had different discussions and answer any potential questions.

- Video overview: prior to discussing each application, a brief video overview was given of a scientist discussing the particular application area as well as their hopes, concerns and aspirations for the application. Videos used included:
 - Video overview of regulation: explaining regulation of synthetic biology through existing provisions on GMO's, commentary on current regulation and deliberate release and how it may apply to different application areas.
 - Video overview of environmental applications: showing a scientist discussing and explaining the potential use of synthetic biology in bioremediation.
 - Video overview of energy applications: showing a scientists focusing on the potential use of synthetic biology in bio fuels and the conversion of cellulose into sugars.
 - Video overview of food applications: scientists describing the potential use of synthetic biology for new crops
 - Video overview of medical applications: showing the potential use of synthetic biology in the production of Artemisinin.
- Trade off exercise: after discussing each application area, participants were asked to plot out risks against benefits.

The following table briefly outlines the themes discussed in the workshop as well as the tools used. A complete list of the tools and techniques used in the workshops can be found here: www.bbsrc.ac.uk/syntheticbiologydialogue

Time	Session and aims	Topic areas	Tools/Stimulus material
09:30	Arrival and Registration		
10:00	Session 1: Welcome and Introductions (Plenary)	Welcome to participants and housekeeping Reflections on workshop 2	
10:20	Session 2: First interactive voting session (plenary)	Respondents were asked to vote on questions relating to the application of synthetic biology in the areas they would be discussing	IML voting handsets and equipment
10:35	Session 3: Overview	Video overview of regulation, following	Video overview

	of Regulation (plenary)	questions raised in Workshop 2.	from a regulator
10:50	Session 4: Overview of application 1 (plenary)	Video overview of first application, followed by brief discussion by the scientist and social scientist.	Video overview of application followed by a brief discussion of the application by the scientist and social scientist
11:05	Session 5: Discussion of first application area (break out)	Discussion of: <ul style="list-style-type: none"> – Presentation and understanding of the application – Possible alternative approaches – Regulation of the area – Possible future scenarios – Environmental, social and ethical issues 	Card A: Current Research Card B: Other ways to address needs Card C: Regulation Card D: Possible future scenarios Card E: Environmental, social and ethical considerations Risk/Benefit Matrix
12:00	<i>Lunch</i>		
12:45	Session 6: Overview of application 2 (plenary)	Video overview of second application, followed by brief discussion by the scientist and social scientist.	Video overview of application followed by a brief discussion of the application by the scientist and social scientist
13:00	Session 7: Discussion of second application area (break out)	Discussion of: <ul style="list-style-type: none"> – Presentation and understanding of the application – Possible alternative approaches – Regulation of the area – Possible future scenarios – Environmental, social and 	Card A: Current Research Card B: Other ways to address needs Card C: Regulation

		ethical issues	Card D: Possible future scenarios Card E: Environmental, social and ethical considerations Risk/Benefit Matrix
13:55	<i>Break</i>		
14:10	Session 8: Overview of application 3 (plenary)	Video overview of third application, followed by brief discussion by the scientist and social scientist.	Video overview of application followed by a brief discussion of the application by the scientist and social scientist
14:25	Session 9: Discussion of third application area (break out)	Discussion of: <ul style="list-style-type: none"> – Presentation and understanding of the application – Possible alternative approaches – Regulation of the area – Possible future scenarios – Environmental, social and ethical issues 	Card A: Current Research Card B: Other ways to address needs Card C: Regulation Card D: Possible future scenarios Card E: Environmental, social and ethical considerations Risk/Benefit Matrix
15:10	Session 10: Summing up and looking forward (break out)	Discussing: <ul style="list-style-type: none"> – Overarching thoughts on synthetic biology and regulation – Recommendations for the research councils – Areas that should be covered by future dialogues 	

16:00	Session 11: Second interactive voting session (plenary)	Respondents were asked to vote on questions relating to the application of synthetic biology in the areas they would had discussing	IML voting handsets and equipment
16:15	<i>Wrap up and close (plenary)</i>		

4. Technical Report

The information in the following tables are required to comply with ISO 20252. These can be completed as a technical appendix.

Qualitative research

Client	<ul style="list-style-type: none"> • BBSRC and EPSRC
Conducted by	<ul style="list-style-type: none"> • TNS-BMRB Ltd
Objectives	<ul style="list-style-type: none"> • See listed above
Sample size	<ul style="list-style-type: none"> • 41 stakeholder interviews and 160 public participants recruited.
Fieldwork period	<ul style="list-style-type: none"> • October 2009 to March 2010
Method	<ul style="list-style-type: none"> • In-depth telephone interviews and focus groups
Recruitment	<ul style="list-style-type: none"> • Free find and purposive sampling
Incentives	<p>Public</p> <ul style="list-style-type: none"> • First workshops (2.5 hours on a weekday evening) - £45 • Second workshop (whole day event on the weekend)-£85 • Third workshop (whole day event on the weekend)-£90 <p>Scientists and social scientists</p> <ul style="list-style-type: none"> • Second and third workshop (presentation and attendance of whole day event)-£500
Topic Guide	See link www.bbsrc.ac.uk/syntheticbiologydialogue
Analysis	<ul style="list-style-type: none"> • Please note that the results of this qualitative research are indicative and cannot be projected onto the overall population.