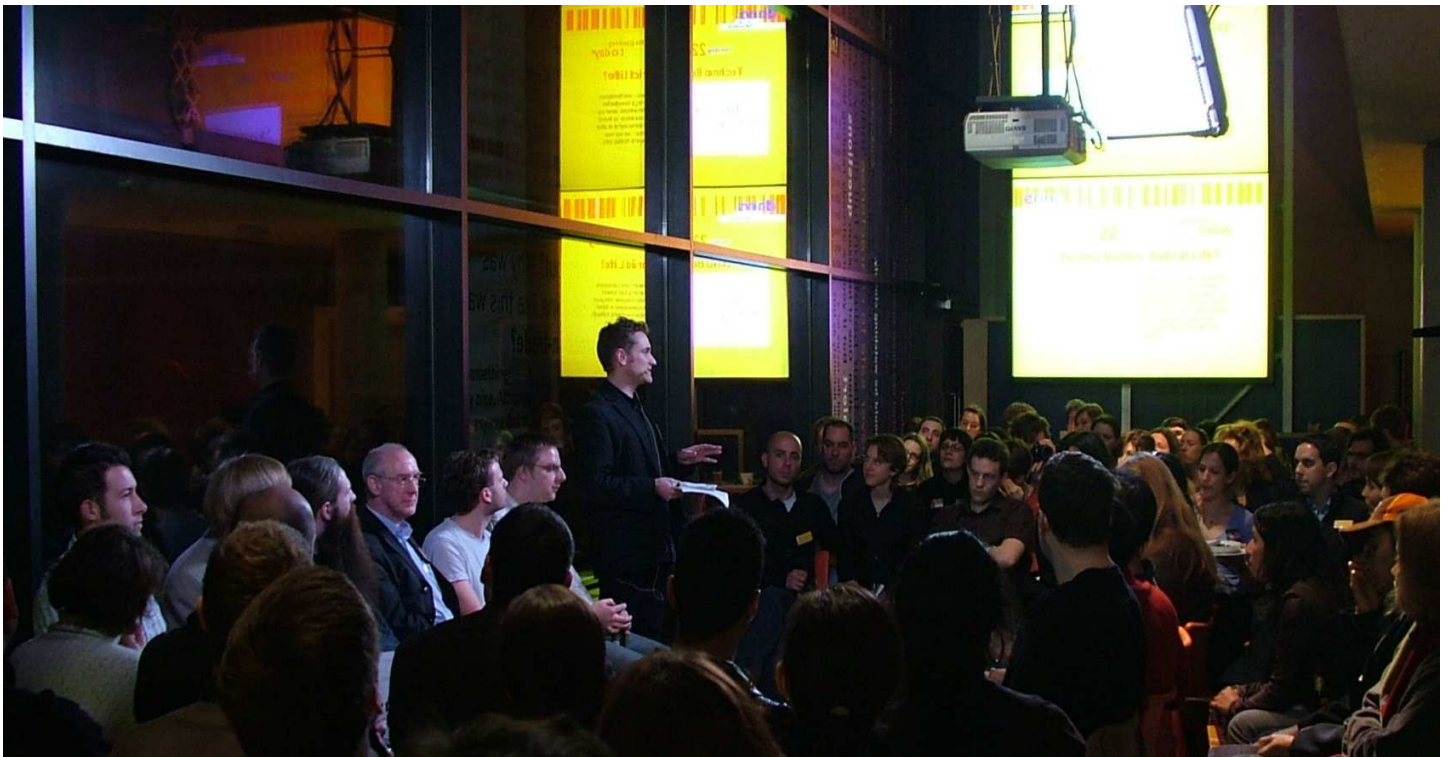


Summative Evaluation of Material Beliefs: engineers and designers in collaboration for public engagement.



Emily Dawson 11.05.09
emily.dawson@kcl.ac.uk

Contents

Evaluation summary	p.2
1. Introduction	p.3
1.1 The aims and objectives of Material Beliefs	p.4
2. Project outline	p.4
3. Evaluation methods	p.5
4. Evaluation findings	p.6
4.1 Evaluation against the Aims and Objectives of Material Beliefs	p.6
4.1.1 Engineers and scientists	p.6
4.1.2 Designers	p. 9
4.1.3 Publics and public engagement	p.10
4.2 Other issues raised in the evaluation.	p.13
4.2.1 Collaboration	p.13
4.2.2 Public engagement with science, technology and design?	p.14
4.2.3 Added value; “a journey of discovery.”	p.14
5. Conclusions	p.15
6. Lessons learnt	p.15
Appendix A: Material Beliefs network	p.18
Appendix B: Material Beliefs events	p.19
Appendix C: Material Beliefs work plans	p.21
Appendix D: part of an image cut from a diagram illustrating the breadth of the MB experience of a collaborating designer	p. 24
Appendix E: Evaluation methods; techniques, sampling and analysis	p.25
Appendix F: sample focus group outline	p.26

Evaluation summary: Material Beliefs was a multidisciplinary project that brought together designers and engineers for public engagement with science and technology (PEST). Material Beliefs (MB) experimented with the idea that speculative design might provide a space for publics to engage with unfinished engineering research, through the development of objects designed to provoke, question and inspire. The evaluation of MB combined an investigation of the extent to which the stated project objectives had been met, with creating a reflective space for collaborators to discuss the project. The approach to the evaluation was qualitative, exploratory and participatory where possible, with some use of monitoring data from PEST events.

MB achieved its proposed aims and objectives in many ways. The strengths of MB are apparent in the successful development and delivery of a number of public engagement events. Success is also evident in the creation and development of four collaborations between engineers, designers and in one case, members of the publics. Evaluating the extent to which the aims and objective were met has raised five lessons learnt for participants to consider in future projects. The project website is available at <http://www.materialbeliefs.com/>.

1. Introduction

Material Beliefs was a multidisciplinary project that brought together designers and engineers for public engagement with science and technology. In the last 30 years science has developed a range of communication techniques designed to better manage the public's perceptions of science, relationships with government and relationships with industry (Bauer and Gregory 2007, Gregory *et al* 2007). One development in this field has been the 'public understanding of science' (PUS) practice, which has more recently evolved into 'public engagement with science and technology' (PEST) (Irwin and Wynne 1996, Miller 2001). PEST practices were intended to attempt to redress the balance between sciences, publics and broader socio-political concerns (House of Lords 2000, Wynne 2007). Against a background of social studies of science where public engagement has a normative tendency towards democracy and citizenship, and science communication, where engaging the public has traditionally followed 'scientific' norms, Material Beliefs sought to experiment with alternative models of public engagement with science and technology..

Material Beliefs explored the possibilities for developing public engagement activities through collaborations between engineers and designers. In particular, Material Beliefs experimented with the idea that speculative design might provide a space for publics to engage with unfinished engineering research, through the development of objects designed to provoke, question and inspire. Speculative design has been described as follows:

“Unlike most design, we don't focus on commercial products, but on new understandings of technology. This allows us—even requires us—to be speculative in our designs, as trying to extend the boundaries of current technologies demands that we explore functions, experiences, and cultural placements quite outside the norm. Instead of designing solutions for user needs, then, we work to provide opportunities to discover new pleasures, new forms of sociability, and new cultural forms. We often act as provocateurs through our designs, trying to shift current perceptions of technology functionally, aesthetically, culturally, and even politically.” (Gaver *et al* 1999).

Speculative design is an emerging and contested concept within the broader design discourse and is referred to in a number of ways by the designers involved in Material Beliefs. For some designers such a practice is 'responsible' design, while for others it is 'critical' design (focus group transcripts 9.1.09 and 20.1.09). Material Beliefs investigated the potential of applying concepts from speculative design to public engagement with engineering through collaborative projects between engineers and designers. While the majority of MB documents refer to engineers, please note this was used as an umbrella term for a range of engineering related practices. 'Engineering' participants included a doctor, research scientists, roboticists and philosophers, however for clarity, this evaluation will refer to these participants as engineers. The working definition of public engagement with science and technology events for Material Beliefs was to “open up a reflective and critical space around the role of future technology, where the engineers' research can be represented to the public in a stimulating way”.¹

¹ Described in the initial EPSRC grant proposal.

1.1 The aims and objectives of Material Beliefs

Material Beliefs (MB) aimed to²:

1. provide engineers with an expanded and invigorated sense of value in their own research activity.
2. challenge the working methods of designers by broadening their engagement with engineering processes.
3. create a range of deliverables that provides a broad audience with a rich set of insights into the potential of engineering research.

The aims of MB were broken down into a series of objectives for engineers, designers and the public.

Engineers. 1.1 To create new approaches to communicating the engineers work.

1.2 To expand the range of audiences experiencing their work.

1.3 To expand the range of critical feedback to their work.

Designers. 2.1 To broaden designers engagement with engineering processes.

2.2 To create new approaches to communicating the engineers work.

2.3 To engage critical feedback from design discourse.

Publics. 3.1 To resource collaborative and reflective space for the development of outputs for public engagement for engineers and designers.

3.2 To expand the awareness of a range of publics to the work of engineers and designers.

3.3 To actively involve audience participants in collaborative partnerships.

To this end between 2006 and 2008 the MB project brought together four collaborative projects, involving a mixture of publics, designers and engineers as participants, please see Appendix C for the project work plan.

The evaluation of MB combined an investigation of the extent to which the stated project objectives had been met, with creating a reflective space for collaborators to discuss the project. This evaluation report presents a brief outline of MB, the methods used to evaluate the project and the findings of this evaluation. The findings are organised to reflect on the proposed objectives of MB and additional themes that emerged from the evaluation. The findings are followed by learning outcomes and conclusions. At the end of the report appendices contain more detailed information; a description of the MB network, a list of MB engagement events, an extract from a diagram of one designer's experiences of MB, the evaluation methods and a sample focus group outline. This report has been organised with the EPSRC/RCUK evaluation guidelines in mind.

2. Project outline.

A filmed interview process was developed after an initial workshop explored what collaborations might look like, and how to go about creating them. Four main collaborative projects emerged from MB, each instigated by a designer after a series of interviews with engineers, shown in the photographs below. The filmed interview technique enabled MB designers to meet a wide range of engineers, and provided opportunities for starting collaborative relationships. Please see Appendix A for a list of the MB network and the project website for more details of the collaborations <http://www.materialbeliefs.com/>.

² These aims were initially submitted as part of the EPSRC grant proposal.



Vital Signs



Neural Animat



Carnivorous Domestic Entertainment Robots



Bonsai Cells

Throughout the 2 years of the project designers and engineers met outside the framework of the four projects, resulting in a number of additional public engagement events, ideas, conversations and design outcomes. These relationships are not captured by the focus groups, but through evaluation of documents, events and interviews with designers. For an idea of the breadth of experiences provided through collaborating with MB please see Appendix D for an excerpt from one designer's diagram of their participation with MB and the project website, <http://www.materialbeliefs.com/>.

MB was further supported by participants outside these collaborative structures. For example, a film maker, a project manager and a network of relationships with PEST organisations, design and engineering institutions, including the Science Museum's Dana Centre, the Royal College of Art and the Institute for Aging and Health in Newcastle.

3. Evaluation methods

The approach to the evaluation was qualitative, exploratory and participatory where possible, with some use of monitoring data from PEST events. The evaluation explored MB in a transparent and participatory manner by involving collaborators in planning evaluative focus groups, inviting feedback via emails and phone conversations and circulating the evaluation report among those involved prior to the production of a final draft. Rather than attempting to investigate simply whether MB had met proposed objectives, the evaluation also explored the experiences of those involved in the project, their relationships, collaborative processes, conceptions of public engagement and what might constitute criteria for success.

The evaluation methods comprised of a series of planned focus groups, informal interviews, participatory observation at PEST events and document analysis. Please see Appendix E for a more detailed outline of the evaluation methods. The focus groups involved a variety of techniques and their structures varied, a copy of a sample focus group outline can be found in Appendix F. In order to explore MB from more than one perspective a range of evaluation techniques were used. The data sets and participants involved in the evaluation are summarised below in table 1.

	Publics	Engineers	Designers
Participatory Focus Groups x 4	2 members of the public took part in focus groups	9 engineers took part in focus groups	5 designers took part in focus groups
Informal Interviews	8 members of the public were interviewed	1 engineer was interviewed	1 designer was interviewed
Documents	- Email conversations - Evaluations carried out with publics during other parts of the project	- Email conversations - Websites - Filmed interviews	- Email conversations - Websites & Blogs - Filmed interviews - Essays
Participatory Observation of Events	1 x event at the Women's' Library 2 x events at the Dana centre 1 x event at the Victoria and Albert Museum		
Evaluation reflections	Made after each event, interview and focus group		

Table 1: Data gathering methods used in the evaluation.

Although this evaluation is summative and therefore carried out towards the end of MB, the evaluation benefited from the previous involvement of the evaluator as a participant in the initial collaboration workshop, as an interviewee for the project and through the involvement of an MB event in a previous research project the evaluator was involved with. As a result this evaluation was able to benefit from both planned and unplanned participation with MB, thus taking into account an experience of MB on the part of the evaluator that spanned from the 18th of April 2007 to March 2009.

4. Evaluation findings

The evaluation findings are organised to reflect on the proposed objectives of MB and additional themes that emerged from the evaluation. Findings are structured into categories from the original EPSRC proposal, related to the objectives as follows: engineers, designers and publics/public engagement. Since certain objectives are repeated. (1.1 and 2.2, 1.2 and 3.2) their findings have been compiled at the first point the objective appears and have been presented from multiple perspectives, rather than just the perspective of the group of stakeholders that section relates to. Where this has been appropriate for other objectives, multiple perspectives have also been presented. As a result the engineering objectives contain large sections that are relevant for the designers and publics objectives. Evaluation of the proposed objectives of MB is evidenced through the presentation of quotes organised in stakeholder groups. Additional themes that emerged from the focus groups include issues around collaboration, public engagement and what has been termed 'added value' (personal outcomes and commitment to the project).

4.1 Evaluation against the Aims and Objectives of Material Beliefs

4.1.1. Engineers and scientists MB aimed to "provide engineers with an expanded and invigorated sense of value in their own research activity." There were 34 engineers and scientists (referred to from here simply as engineers) involved in MB, either directly in the collaborative projects or through interviews, attendance at workshops or PEST events and other meetings.

Objective 1.1. To create new approaches to communicating the engineers work. The engineers and designers involved in the four evaluative focus groups described how taking part in the collaborative projects had led to the development of new approaches to communicating engineering

research. Members of the public described enjoying these events and their developments. Over the course of the project, MB collaborators designed, led and participated in a large number of public engagement events, please see Appendix B for a complete list.

Table 2: Objectives: 1.1 to create new approaches to communicating the engineers work and 2.2 to create new approaches to communicating the engineers work

<p>Engineers perspectives (focus groups)</p>	<p>“We were quite excited when we were putting together the exhibition for the **** because normally our medium would be to stand up and give a talk whether that would be to other peer groups or whether that would be to a lay audience. It’s normally about us standing with lots of pictures on a slide, click next one, and speaking. So this was a completely novel way for us to introduce what we’re doing to the public I think.” Engineer # 25</p> <p>“We’ve been to the ***** centre, we’ve represented the institute in different ways in different places and that, and that I guess is the success for the [organisation] as a whole and the project as a whole.” Engineer # 11</p>
<p>Public perspectives (informal interviews at PEST event)</p>	<p>“she had not even heard of the ***** centre - but that she has still enjoyed herself, found the format effective and generally thought the whole event was interesting.” Publics # 4</p> <p>“He said he had enjoyed this event, that he found the robot session to be far clearer and better than the previous robot event, he mentioned that on this occasion there had been no mention of the ecological benefits of the robot, which had annoyed him on the previous occasion.” Publics # 3</p>
<p>Designers perspectives (focus groups)</p>	<p>“So the idea of these robots roaming around in your garden at night whilst you’re sleeping, eating slugs didn’t engage us very much, but...there were certain elements within that we thought that were potentially hugely engaging. So we were concentrating on was how people might get more out of that interaction as a way of communicating and exploring the technology.” Designer # 3</p>

While objective 1.1 was met from a number of perspectives, there were instances where it was clear that the expectations held by engineers about the ‘new approaches’ that working with a designer might lead to for public engagement were not fulfilled.

“Yeah I think it was, I think it was successful. I think what I didn’t see which wasn’t necessarily going to show itself in that exhibition was the sort of the “wow” factor of that I think that perhaps **** and myself were certainly really looking, for as you know, that’s something that design can do that we can’t maybe.” Engineer # 8.

In this case the failure to meet expectations was related to confusion about the role of design and designers in the collaboration. It is suggestive of a particular collaborative model, where one discipline ‘uses’ another, rather than co-producing a project. This is discussed in more detail in section 4.2.1.

Objective 1.2. To expand the range of audiences experiencing their work. In evaluating MB it became clear that achieving this objective has been a challenge for the project. The events produced as a result of the 4 collaborative projects have in some ways expanded the range of audiences experiencing the work of the engineers and designers involved. Some engineers explicitly described how the project had enabled them to talk to new publics for their research. At the same time questions should be raised about the extent it is possible to expand ‘the range of audiences’, since the majority of the public engagement events were held in spaces where PEST audiences are normally found. Additionally while MB did produce a range of public events for schools, young peoples centres, science centres, festivals and galleries, the degree to which audiences for these projects self select should be kept in mind. However, MB also organised events with institutions whose publics, while self-

selecting, might not do so on the grounds that they are interested in science, for example, a series of events for young people organised through a theatre. These tensions are echoed throughout the focus groups and are illustrated in the extracted quotes in table 3 below.

Table 3: Objectives 1.2 to expand the range of audiences experiencing their [engineers] work and 3.2 to expand the awareness of a range of publics to the work of engineers and designers.	
Engineers perspectives (focus groups)	<p>“we may have been able to reach a different audience than we would normally through say a lot of lay people that we talked to were patient groups, I’ve done stuff with [medical charity] and people like that so it’s a completely different section of the public. So it’s given us exposure to different people who may not otherwise have known what we were doing” Engineer # 25</p> <p>“it’s nigh on impossible because you end up with a very self selecting smallish group of public who would go to all these events, and they’re, they’re all very interested and very bright and very knowledgeable and very erudite, but is that really public engagement or are you just playing to the same audience repeatedly. And I don’t know how successful we have been at, at engaging the public at that.” Engineer # 13</p>
Public perspectives (informal interviews at PEST event)	<p>“He explained that he just came along to the ***** centre whenever he had a free evening, that actually he hadn’t realised it was the same group doing the event as the **** event until he was about five minutes into the robot presentation, when it clicked, so he had not come to both on purpose – he just spends a lot of time at the ***** centre.” Publics # 3</p> <p>“Both worked in design and science, they both get the [institutions] emails but don’t come along to everything, they pick and chose and this event was selected, they were really aware that there was quite a small group of people who went along to these kinds of event, that they saw a lot of the same faces.” Publics # 5</p>
Designers perspectives (focus groups)	<p>“normally we go for the galleries well, we’re try and get in, in newspapers, occasionally an item on TV if we’re really lucky. And yeah, it’s been on Spanish TV. But that, the fact that it can go from popular to the academic is brilliant you know, so it’s unexpected because often, often these projects can be ignored as artsy stuff by the engineering community, but to be accepted, fantastic.” Designer # 3</p> <p>“the exhibition, you know...quite often what works well is the opening because you have the space you know easy you know you’re there you can engage with all sort of people, you might have mums and dads coming because they’re interested, generally interested in what’s going on at the [institution] but you might also have an expert who hasn’t been you know involved with that kind of work or they not familiar with you know art, or art and design and so on. Or there was someone who was just passing by.” Designer # 1</p>

Objective 1.3 to expand the range of critical feedback to engineers work. Engineers described their experiences of increased critical feedback to their work in three ways. The first kind of experience involved an engineer dramatically altering their views and practice around their research in response to critical design and public feedback. The second kind of experience, which was the most frequently reported, described engineers’ awareness of critical feedback, but the extent to which such feedback was taken on board varied. The third kind of experience acknowledged little or no change in the face of any critical feedback from the engineer’s perspective. Therefore, while engineers experienced more

critical feedback to different degrees through their collaboration with MB, the degree to which feedback was engaged with varied.

Table 4: Objective 1.3 to expand the range of critical feedback to their work.

<p>Engineers perspectives (focus groups)</p>	<p>“So I kind of treated this as pretty much as another demo and I, and so initially the talks, that was just like the one I didn’t change any of that really. It was only when Nellie came in with her scattering of porcelain objects and said to me, “What do these mean to you?” then I sort of, “Oh my God I’ll have to start thinking differently now”.” Engineer # 12</p> <p>“given the main part of this whole thing was to engage the pub-, the public and also to see if our own science in a different way it’s kind of helped a lot in, in sort of stepping back from just the pure science and looking at it in a more abstract way and also obviously all this team work is, is helpful in all team work between different disciplines has helped in, in, in engagement, not just with us but with people from different practices like [designer], and with the public” Engineer # 9</p> <p>“E: And does it add anything new to your discourse in, in your research? E6: (pause). Not further to what I’ve you know talked to friends about, who are also members of the public so not for that” Engineer # 6.</p>
---------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

4.1.2 Designers. MB aimed to “challenge the working methods of designers by broadening their engagement with engineering processes.” Five designers were directly involved in the MB collaborative projects. For the evaluation findings relating to Objective 2.2 (to create new approaches to communicating the engineers work) please see table 2 above.

Objective 2.1 To broaden designers engagement with engineering processes. Designers involved with MB did use the opportunity to engage with engineers and their research. All the designers involved worked with a number of engineers across a range of projects and this was reported as a very rewarding part of the project by collaborating designers.

Table 5: Objective 2.1 To broaden designers engagement with engineering processes.

<p>Designers perspectives (focus groups)</p>	<p>“So basically it was like a process of me learning what, what it was coming here and see what they are doing ...the other thing was looking at the way they work, I think you also learn new methods of you know project development you know. That’s kind of my words but it was like interesting to see how they probably use photography to take pictures of the you know the, the cells and the microscope and it, it’s sounds silly but it’s quite familiar to me and I thought, how, how interesting they probably use almost the same software but towards a different purpose.” Designer # 4</p> <p>“But then that made me think about the, the **** event...one of the most sort of interesting things that we did in the project because there’s these different prescriptions of the technology and from, from kind of different perspectives a lot of them about on the potential for what the application would be at the, then [the engineer] kind of got very distinctive viewing upon that because as a [engineer] you know he would be kind of negotiating use and stuff.” Designer # 5.</p>
---------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Objective 2.3 To engage critical feedback from design discourse. The extent to which the designers involved in MB engaged with critical feedback from design discourse was harder to establish because of the nature of the objective. Designed objects from some of the collaborative

projects went into design oriented exhibitions, magazines and were reviewed on design blogs, see Appendix B for a more detailed table of dissemination events. Designers were able to describe a range of spaces they thought the designed objects from the collaborations could be disseminated in, within the broader field of design. However this tells us little about whether the designers engaged with the feedback from these opportunities. There was some discussion around the extent to which these were ‘engagement’ opportunities or served to enhance a designer’s professional status. The importance of engaging with feedback from the design community seemed at times to be eclipsed by a perceived need to engage with publics instead, and publics were conceptualised as distinct from design discourses.

Table 6: Objective 2.3 To engage critical feedback from design discourse.	
Designers perspectives (focus groups)	<p>“You know because you can tap into the art world, you can tap into the engineering world, you can tap into the design world as well and, and all the publications that go with that. You’ve got all the galleries and I think, and, and got all the, all the internet stuff, all those forums.” Designer #4</p> <p>“D1: I want to [find] a group of people which question what I do and then maybe go away and maybe somehow the question if it is, is it good enough what I do, is it worth it? Why am I doing it? E7: Valid use of public money. D1: Exactly. Is it and then if so should I change something about it? Is it meaningful? Is it, am I just doing it for my own sake” Designer #1.</p> <p>“always struggle to find in you know what is the purpose of an exhibition you know there’s one major you know is it for the sake of having you know to tick one again once a box I’ve been to that place, I had a show, you know, it’s good for my CV.” Designer # 1.</p> <p>“Because for me that’s the normal design (laughs). You know, you do an object and then you might be exhibiting at the fair or you know at the, an exhibition space and I mean you just do it for yourself you know, that’s the traditional design role and what we would like to explore it was different design roles and how design can contribute to you know to research and to raise awareness and to public engagement.” Designer #2.</p>

4.1.3 Publics and public engagement. MB aimed “to create a range of deliverables that provides a broad audience with a rich set of insights into the potential of engineering research”. A number of different publics were involved in MB, through a range of different processes. These included school and university students, young people from cultural centres, self-selecting publics at science centres and galleries amongst others. For the evaluation findings relating to Objective 3.2 (to expand the awareness of a range of publics to the work of engineers and designers.) please see table 3 above.

Objective 3.1 To resource collaborative and reflective space for the development of outputs for public engagement for engineers and designers. MB did resource 4 collaborative projects for public engagement. Some engineers commented on the need for another party to drive public engagement on their behalf and the value of having someone take on that role. There was a general consensus that people were collaborating with MB projects because they provided a space to develop public engagement ideas and events, otherwise unavailable in their daily work practices. While the resources provided by MB were appreciated, it was noted by both designers and engineers that more time and more resources would have enabled them to have developed more substantial events, relationships and design outcomes. Collaborators highlighted that they were only contracted to use a small proportion of their working time for the projects, and mentioned that they frequently put far more of their own time into the project. Despite the ‘extra-curricular’ commitments to the project, all

collaborating groups described their willingness to continue working together after the end of the project, though it should be noted that in one case, this was more focused on delivering a final public engagement event than extending the collaborative relationship.

Table 7: Objective 3.1 To resource collaborative and reflective space for the development of outputs for public engagement for engineers and designers.	
<p>Engineers perspectives (focus groups)</p>	<p>“I think it’s one of those things that you think, “Yes it would be great”, but you need someone like [designer] to actually organize it because we all have our own more pressing needs in terms of deadlines for grant applications or paper submission or whatever. And I think one of the things generally about this whole public engagement across the science, arts or engineering discipline is that the people on the engineering and science side who do it are usually so busy with the day to day stuff and their projects and their, their deliverables that it often just slips away, whereas having someone who’s primary responsibility is to, you know, organize them then you find a lot of willingness amongst the researchers to, to get engaged but if it was requiring someone to actually organize from amongst the research community they would kind of plummet down the list of priorities.” Engineer # 11</p> <p>“We don’t have the time or the contacts to organize that ourselves but if, if [a colleague] says, “Do you want to come over to the **** and do this?” “Yes delighted no problem at all”.” Engineer # 13</p> <p>“I think if we’d had more time, especially to work together, we would have perhaps achieved a bit more than, than we did or at least the project could have matured a bit more, because I feel like, you know, we waffled about [engineering research project] a lot... it would have been nice if we’d had more time I think to, to work together if that had been possible I think we would have achieved even more” Engineer # 26.</p>
<p>Designers perspectives (focus groups)</p>	<p>“even though it was quite ad hoc and quite messy in terms of what the collaborations were and when they happened that there was erm people want to do that that stuff, researchers wanted to do that stuff and erm and enjoy it I think, I think (laughs). And so, so it wasn’t, there, there wasn’t, it’s not easy to do, is my point I think and erm we, we went a small way I think in trying to do, do, to make that be possible. And so kind of make the institute slightly permeable to, to non-specialists, public sort or whatever you want to call it.” Designer # 5</p> <p>““the way material beliefs has worked during the past year and a half is also to always look for opportunities to work hard at how you can actually disseminate the work and also how you can create or find opportunities for public engagement activity such as the ***** Centre or you know the ***** Centre event or the teaching experience that you had. And so on. So the ***** exhibition is just one of them.” Designer # 1</p>

Objective 3.3 To actively involve audience participants in collaborative partnerships. One of the collaborative projects achieved this objective and involved members of different publics actively in the collaboration, to the extent that they were also involved in the project evaluation as well as a number of public engagement events. However, this was the only project to actively involve audience participants in the collaboration. Collaborators from other projects described public engagement events as a means of involving the public, but this was limited to the event or to a more theoretical approach about the value of including voices from different publics in research. It became evident in the process of evaluating MB that actively involving members of the public in collaborations is no easy task. Not only do collaborating members of the public require a high level of interest and commitment

to take part in an academic project, they also require sufficient flexibility in their work and lifestyle to be able to take part. There are other practical difficulties, for example, ought collaborating members of the public be paid for their time and how might this be negotiated. Despite these difficulties, members of the public who did participate actively in the collaboration reported a high level of satisfaction and interest as a result of taking part.

Table 8: Objective 3.3 To actively involve audience participants in collaborative partnerships.	
<p>Public perspectives (focus groups and informal interviews at PEST events)</p>	<p>“these guys talked about not wanting to ask questions because they felt that their questions were too detailed and at a level a bit higher/harder than those being asked by the rest of the group, so they didn’t want to draw attention to themselves in that way. They felt that asking their questions wouldn’t have been entirely appropriate, however, they were talking about these things amongst themselves and would continue to do so afterwards”. Publics # 5</p> <p>“I got involved in material beliefs when I came along to ***** centre presentation week and [designer] was involved in and I was interested because I am a [patient group description] and use an [tool] and following the ***** Centre discussion [designer] via ***** made contact and said, “Well why don’t you pursue the conversation a little”, so I came in for a day’s filming and some discussions with [designer] and came in for a day’s filming which is go on the website. So my involvement is quite small but interesting” Public # 2</p> <p>“basically for me to work with scientists who know what they are, what they are making, basically because it brings me inside, you know, so ... it is like a mix of kind of two universes” Public # 1</p>
<p>Engineers perspectives (focus groups)</p>	<p>“The idea is, is really to get the public to physically interact with the [engineering research project] and asking the question, are human beings better able, or better at eliciting a particular combination of responses than are entirely machine system.” Engineer # 6</p> <p><i>[One participant had suggested a scenario where the research of the participating engineer might be used by insurance companies to monitor their clients]</i></p> <p>“E12: It certainly raised the question, maybe not everybody will want to have one, even it if is for their health ...</p> <p>E: Was that quite challenging to your previous perspective?</p> <p>E12: Oh yeah I would have assumed, “Oh of course this is everybody’s benefit” like you, you may not want one you know but you know, people’s civil liberties and everything and, and it was ***** who first raised the issue of, well, what, what if your [organization] will make you have an implant or else won’t cover your hospital expenses.” Engineer # 12.</p>
<p>Designers perspectives (focus groups)</p>	<p>“talking to my mother-in-law. It was seeing them laugh was yeah, yeah OK there’s something there to be used and they thought they saw the kind of weird logic in it. They didn’t think it was too far out there and that, that’s good, that’s sort of proof it’s almost like the first bit of public engagement that allow, and they were due to take the idea further and then realise it.” Designer # 3.</p> <p>“D 4: until recently science was like a kind of bubble.</p> <p>E: (laughs)</p> <p>D4: You know, untouchable and it was like almost like a, a dogma. You couldn’t I mean you couldn’t discuss or argue anything about what, what’s science does, does or you know you couldn’t argue and I think now it’s very healthy that you can actually you know argue and discuss. Because I think what I see you know they</p>

are like normal people like us perhaps they have some doubts in their work also” Designer # 4.

4.2 Other issues raised in the evaluation. While the evaluation above illustrates the ways in which MB met the proposed aims and objectives for the project, a number of other issues emerged from the evaluation. Since MB was an experiment in collaboration for public engagement, it is not surprising that these issues concern the nature of collaboration, public engagement and what, from an evaluative perspective has been described as added value.

4.2.1 Collaboration. Within MB each project developed different models of collaboration, based on differing expectations about the project and the role of design or engineering. MB was designed to be flexible and open about what kinds of collaboration and public engagement would result from the project. For some collaborators this was frustrating, perceived as lacking clearly defined processes and outcomes, while it was liberating and exciting for others. There was a disciplinary split between these viewpoints, with designers appearing more comfortable with the open nature of the project. This perhaps reflects the design led nature of the project and different working practices between disciplines. However, within the engineering and publics collaborators, there was a split between those who appreciated the lack of parameters and those who did not. Therefore differences in opinion were not driven solely by subject disciplines.

Two main models of collaboration can be seen in MB projects. In the first model, people from one discipline (engineering or design) ‘use’ the other to develop a project for public engagement, see figure 1. This model of collaboration appeared in projects where collaborators seemed to have a limited or confused sense of what the design role was, which seemed especially difficult for some engineers to articulate. Some designers involved in the project also became very aware of the difficulty of communicating clearly about their work, their role in the collaborative project and, in particular, the differences between various aspects of design, for example, between product design and speculative/critical design.

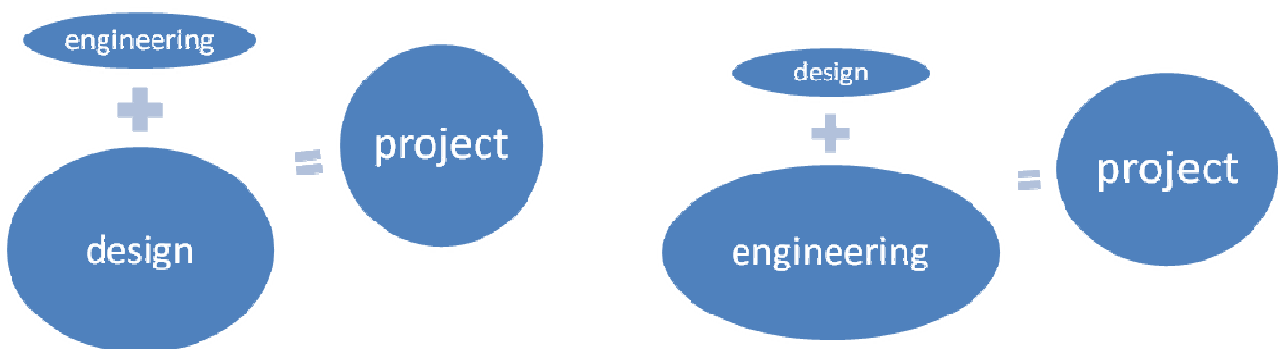


Figure 1: one discipline ‘uses’ another to develop a project.

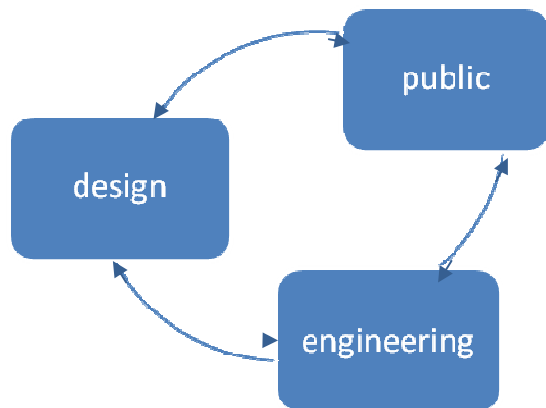


Figure 2: co-production model of collaboration within a project

In the second model of collaboration, people from different disciplines, and the public, work together to ‘co-produce’ a project for public engagement, this may also involve further direct collaboration with publics, see figure 2. In this model collaboration was characterised by an acceptance of a lack of clearly defined roles and an appreciation that the outcomes of the project were open and therefore unknown.

It also became clear that over the two years the design participants met with a number of different engineers and research groups, but for a collaborative project to emerge from these meetings a certain degree of empathy and mutual understanding was required.

4.2.2 Public engagement with science, technology and design. MB was intended to provide public engagement opportunities for collaborating engineers and designers, with an emphasis on engaging publics with engineering. As could be expected there were a range of motivations, expectations and approaches to public engagement across the different collaborative projects. The two most striking issues to emerge from the evaluation focus groups concerned the question of appropriate forums for PEST and multiple, overlapping views of PEST and motivations held by project collaborators. These accounts illustrate a more complicated and nuanced experience of PEST than the theoretical formulations presented in academic or policy texts. The focus groups demonstrate a view of PEST in keeping with more recent representations of public engagement as part of a continuum of communicative and participatory practices around science and society (Trench 2008, Macallie *et al* 2009). These studies eschew the apparent dichotomy of ‘PUS or PEST’ generated by decades of seemingly oppositional positioning from proponents of each approach. The empirical data from Material Beliefs demonstrate that collaborators and public participants simultaneously hold multiple, and at times potentially contradictory motivations for taking part in engagement activities. For example, a collaborating engineer described their reasons for taking part as wanting to raise the profile of their project, their institution, generate public approval, genuinely engage with the user group for their research and develop an outcome which demonstrated experience with public engagement for future funding applications. This kind of overlap was articulated across all focus groups, engineers, designers and publics, suggesting that participants did not experience such a range of motivations as mutually exclusive, but were able to locate their practice simultaneously in multiple conceptualisations of public engagement.

4.2.3 Added value; “a journey of discovery.” A number of additional outcomes that sit outside the aims and objectives framework of MB and alongside the themes of collaboration and public engagement have been taken into account in this evaluation and will be briefly mentioned. These are as follows:

- Personal outcomes
- Commitment to the project

Across all the focus groups and evenly spread between engineers, participating members of the public and designers were descriptions of the personal outcomes of the project. These ranged from enjoyment, learning new skills and developing relationships to career defining moments that changed a project, idea or professional decision.

Several collaborators described very high levels of commitment to taking part in the project, in one case at the expense of taking another job in a different country. The responsibility taken on by collaborators extended to several describing the amount of time they had contributed to the project in addition to their contracted hours. Therefore one outcome of MB has been a dedicated team of participants who have been committed to the project and to each other. Across a number of focus groups participants described intentions or real plans to continue working together.

5. Conclusions

MB can be best understood as an umbrella project that created a space for collaborators to develop new relationships, new forms of working and to develop their public engagement practices. MB also provided collaborators with opportunities to experiment with working more directly with publics and with each other, and the processes with which to reflect on their work. The strengths of MB are apparent in the successful development and delivery of a number of public engagement events. Success is also evident in the creation and development of four collaborations between engineers, designers and in one case, members of the publics. The personal commitment of collaborators to the project, the enjoyment experienced by collaborators and participating publics and the interest from all parties in continuing to work together, are a testament to the effort, energy and support developed in MB.

Evaluating the extent to which the aims and objective were met has raised five lessons learnt for participants to consider in future projects. These concern the extent to which two objectives had been met through different views of the issues involved, the need to develop collaborators engagement with design practices, issues involved in building collaborations and concerns about managing expectations. While illustrating the successes of MB, this evaluation has also highlighted a number of tensions between different models of collaboration and different approaches to PEST. To put these tensions into perspective, it should be taken into account that such issues are also present in the broader fields of public engagement and collaborative practices (Trench 2008). Therefore, as an experiment in developing collaborations for public engagement, Material Beliefs achieved its proposed aims and objectives in many ways and has produced a number of interesting projects, relationships and insights to reflect upon.

6. Lessons learnt

Key lessons learnt from the evaluation of MB cover concern the following issues:

- Objective 1.1. 'to expand the range of audiences experiencing their work'.
- Objective 3.3. 'to actively involve audience participants in collaborative partnerships'.
- A missing objective; 'to broaden engineers' engagement with design'?
- Issues of how to 'construct' collaborations.
- Managing collaborators expectation.

Objective 1.1. 'to expand the range of audiences experiencing their [engineers] work'.

Collaborating engineers and designers described tension about whether the MB public engagement activities had reached new audiences. However, the extent to which public engagement activities *can* expand the range of audiences for engineering, or design, is questionable. Public engagement often tends to take place in settings where self selection of audience members results in the same kinds of publics taking part in the same kinds of events. MB did target some publics outside traditional science and design institutions, for example, through events with youth centres and young people's theatrical groups, where self-selection of participants might arguably be less based on a previous interest in science than for publics recruited from a science cafe. Therefore this objective should be understood in two ways. Firstly, MB clearly produced a large number of public engagement events, which, given the testimony of engineers, designers and public participants in the focus groups, took their specific research projects to new publics since aspects of these projects had not previously been involved in public engagement. Secondly, further reflection on the intentions of this objective are required to determine to what extent collaborative projects could and should reach 'new' audiences.

Objective 3.3. ‘to actively involve audience participants in collaborative partnerships’. This objective was met by one of the four collaborative projects. All the collaborators in the project where members of the public actively took part in the collaboration reported high levels of satisfaction and value from this experience. However it must be taken into account that actively involving audience members in collaborations is a difficult task that requires careful negotiation, relationship building and support. It is not easy for members of the public to take part in academic projects and there are a number of barriers to this kind of active participation. This objective ought to be considered in light of the complexity of arranging such public collaborations and whether such relationships are achievable in small collaborative projects verses the added value such partnerships bring to projects.

A missing objective; ‘to broaden engineers’ engagement with design’? One element that emerged from this evaluation was confusion about the role of design and designers in the collaborative projects. This issue ought to be given attention since it impacted on the expectations of engineers, the model of collaboration followed in projects where engineers were unclear about the design element and the relationships between designers and engineers. Consideration should be given to improving communication around this issue and providing opportunities for engineers to become familiar with design practices. Perhaps in future, the inclusion of an objective similar to 2.1 ‘to broaden designers engagement with engineering processes’ ought to be considered, for example, 1.4 ‘to broaden engineers engagement with design practices’?

Issues of how to ‘construct’ collaborations. Constructing collaborations between different disciplines is complicated and nuanced. MB did provide the space, resources and support to successfully develop a number of collaborations, including the four main collaborative projects. However, the designers involved in the collaborations described a range of problems with developing collaborations, including a perception of being ‘on the back foot’ when approaching engineers, as well as difficulties arising when offers of collaboration were rejected. While constructed collaborations may always differ from more organic collaborations, the process deserves more reflection. In particular, issues of managing relationships, balancing the needs of different collaborators, communication and the different models of collaboration should be considered carefully in light of this project.

Managing collaborators expectation. Across all focus groups, interviews and different stakeholders, issues were raised about the open and relatively unplanned nature of MB. For some this was a welcomed freedom to experiment while others perceived this lack of process and outcome planning as a hindrance, which in turn had a negative impact on their experience of MB. In one case a collaborator articulated their frustration by commenting;

“I remember going away from one of these with this big headache, “How on earth I’m going to make everybody happy?” Which was, you know, it was highly frustrating for me and that made me step back a little bit”. Designer # 1.

One aspect of this that deserves further reflection is how collaborators expectations might be managed, and who might take responsibility for organisation, communication and management.

Reference List

- Bauer M. W. and Gregory J. 2007. 'From journalism to corporate communication in post-war Britain'. Pp. 33 – 51. In Bauer M.W. and Bucchi M. (eds.). *Journalism, Science and Society*. New York and Abingdon: Routledge.
- Gaver B., Dunne T. and Pacenti E. 1999. 'Cultural Probes'. *Interactions*. 6 (1) : 21-29.
- Gregory J. Agar J. Lock S. and Harris S. 2007. 'Public engagement of science in the private sector: A new form of PR?'. Pp. 203-214. In Bauer M.W. and Bucchi M. (eds.). *Journalism, Science and Society*. New York and Abingdon: Routledge.
- House of Lords. 2000. *Science in Society*. London: Her Majesty's Stationary Office.
<http://www.publications.parliament.uk/pa/ld199900/ldselect/ldscitech/38/3801.htm> accessed 9.11.08.
- Irwin A. and Wynne B. 1996. 'Introduction'. Pp.1-18 in *Misunderstanding Science? The public reconstruction of science and technology*. Irwin A. and Wynne B. (eds.). Cambridge: Cambridge University Press.
- Macallie E., Bell L., Lohwater T., Falk J., Lehr, J., Lewenstein, B., Needham. C. and Wiehe B. 2009. *Many experts, many audiences: Public engagement with science and informal science education*.
http://caise.insci.org/uploads/docs/public_engagement_with_science.pdf accessed 23.3.09.
- Miller S. 2001. 'Public understanding of science at the crossroads'. *Public Understanding of Science*. 10: 115-120.
- RCUK. 2005. *Practical guidelines* evaluation. <http://www.rcuk.ac.uk/news/evaluation.htm> accessed 14.11.08.
- Trench B. 2008. 'Towards an Analytical Framework of Science Communication Models'. Pp. 119-135 in Cheng D., Claessens M., Gascoigne, T., Metcalfe J., Schiele B. and Shi S. (Eds.). *Communicating Science in Social Contexts*. London: Springer.
- Wynne B. 2006. 'Public engagement as a Means of Restoring Public Trust in Science – Hitting the Notes, but Missing the Music'. *Community Genetics*. 9: 211-220.

Appendix A: Material Beliefs network (association, name and contract or payment in *italic*)

PI: Bill Gaver (*1 hour per week, 24 months*)

Project Manager: Andy Robinson (*0.2, 22 months*)

Designers : Tobie Kerridge (*0.4, 24 months*)

Susana Soares (*0.2 16 months*)

Jimmy Loizeau & James Auger (*0.2 combined, 14 months*)

Elio Caccavale (*0.2, 14 months*)

EPSRC adviser: Ray Mathias

Publication: Sarah Pennington, Jake Beaver (*contracted*)

Documentary film: Steve Jackman (*contracted*)

Photography: Michael Venning (*contracted*)

Designers: Hyperkit (*contracted*)

CDER: Aleksandar Zivanovic (*contracted*), Julian Vincent , Alan Winfield

Neuroscope (*contracted, expenses, ad-hoc visiting tutor rates*): Kevin Warwick, Slawomir Nasuto, Ben Whalley, Mark Hammond, Julia Downes, Dimitris Xyda, David Muth

Vital Signs (*expenses, ad-hoc visiting tutor rates*): Tony Cass, Olive Murphy, Nick Oliver, Shahid Aziz, Patrick Degenaar, Rob Fenton, Thao Le, Timothy Constandinou, Amir Eftekhari, Pantelis Georgiou, Wanda Pilipkiewicz, Kostis Michelakis

Bonsai Cells (*expenses, ad-hoc visiting tutor rates*): Dianne Ford, Luisa Wakeling, Julie Daniels and Anna Harris.

You Live what you eat (*expenses*): Anders Sandberg, Aubrey de Grey

Evaluation: Savita Custead, Emily Dawson (*contracted*)

Advisory Group (*expenses*): Fiona Raby, Tony Dunne, Lesley Paterson, Noel Sharkey

Interviewees not mentioned above: Joanne Ingram, Ben Hanson, Adrian Bowyer, Chris Melhuish, Claire Rocks, Peter Walters

Women's library workshop participants not mentioned above: Ian Thompson, Steve Benford, Zoe Laughlin, Jane Prophet, Brendan Walker, Mark Palmer, Nicola Triscott, Alex Wilkie, Vicky Jones, Jo Coleman, Karen Cham, Andy Boucher, Pete Sampson, Sarah Ketley, Tom Hulbert

Human Futures Book: Cathrine Kramer, Nelly Ben Hayoun, Will Carey, Daisy Ginsberg and Sascha Pohflepp.

Appendix B: Material Beliefs events

Material Beliefs was involved in a number of events. Events ranged from those designed specifically to engage publics with the projects, (adult discussion events for example), to activities oriented towards presenting or describing the projects. For clarity, this appendix separates 'engagement', 'dissemination' and 'project' events. However, because the ethos of engagement was at the core of Material Beliefs, events frequently had multiple and overlapping purposes. The participating publics figures are estimates from collaborating institutions and the project manager's records. This evaluation recognises that these numbers are not necessarily meaningful indicators of the amount of value of engagement or dissemination across the project. The numbers provided by these tables are presented to illustrate the breadth and depth of the project.

Engagement mechanism	Activity duration	Number of participants (approx.)	Participant type	Venue type	Location	Event ref
Discussion / debate	3 hrs	25	S2, S3, A	science centre	Newcastle	03
	3 hrs	110	S2, S3, A	science centre	London	05
	3 hrs	30	S2, S3, A	university - sociology	Lancaster	10
	4 hrs	30	S2, S3, A	university - art	Syracuse, USA	11
	2 hrs	4	A	university - science	London	12
	1hr	12	M	department store	London	24
	1 day	60	M	culture museum	London	26
	1 day	50	S2, S3, A	science institute	London	32
	3 hrs	80	A	science centre	London	33
Exhibition	1 hr	50	S3, A	university - art	London	36
	3 months	90000	M	science centre	Newcastle	01
	1 week	2000	M	department store	London	22
	7 weeks	15300	M	science institute	London	29
	6 months	60000	M	art museum	Gijon, Spain	30
	1 day	120	S3, A	conference	London	34
	2 days	300	S2, S3, A	student centre	Zagreb, Croatia	39
Workshop	1 week	1200	M	art gallery	London	43
	2 days	12	S3	university - design	Eindhoven, Netherlands	04
	2 days	30	P2	community centre	London	14
	2 days	35	S3	university - art + science	London	17
	1 day	30	S3, A	business	Chicago, USA	19
	4 weeks	25	S3	university - art	London	21
	4 hrs	30	M	summer festival	Cambridge	23
	1 day	25	S2, S3, A	urban	London	27
Talk / presentation with Q+A	1 day	60	M	science institute	London	35
	3 hrs	10	P2	school	Gateshead	02
	3 hrs	25	S2, S3, A	science centre	London	06
	2 hrs	40	S3	university - art	Connecticut, USA	08
	3 hrs	60	S2, S3, A	art museum	New York, USA	09
	2 hrs	35	A	art museum	New York, USA	15
	3 hrs	50	S2, S3, A	arts centre	Lisbon, Portugal	16
	2 hrs	25	S2	university - design	London	18
	3 hrs	60	S2, S3, A	university - design	Karlsruhe, Germany	20
	2 hrs	70	S3, A	conference	Rijeka, Croatia	25
	3 hrs	50	S2, S3, A	design museum	London	28
	3 hrs	70	S2, S3, A	arts centre	London	31
	3 hrs	12	P2, S1	arts centre	London	37
	2 hrs	50	S2, S3, A	student centre	Zagreb, Croatia	39
	2 hrs	50	S2, S3, A	arts centre	Madrid, Spain	40
	2 hrs	100	S2, S3, A	university - design	Brighton	42
2 hrs		S3, A	research centre	Aarhus, Denmark	44	
2 hrs		S3, A	university - art design	Falmouth	46	
Participants total (approx.)		170325				

Table 1: Material Beliefs public engagement events

Audience / participant type codes for Table 1

- P1: pupil - primary
- P2: pupil - secondary
- S1: student - further education
- S2: student - undergraduate
- S3: student - postgraduate
- A : adults
- M : mix of all types

dissemination mechanism	item total	audience total	audience type
project website	1	NA	mix of all types
academic conference	5	300	Academic: HCI, Art Theory, Design, HE Education, Sociology
published papers	2	NA	Academic: HCI, Art Theory, Design
national press	2	NA	mix of all types
television	1	NA	mix of all types
catalogues and books	5	NA	mix of all types
ejournal articles		NA	
interviews	12		mix of all types
blogs	100+	NA	mix of all types

Table 2: Material Beliefs dissemination activities

event type	item total	audience average
scoping workshop	1	30
team meetings	7	4
collaboration meetings	6	
evaluative focus groups	4	4
advisory meetings	4	5
Film Recording	9	3
interviewing engineers	8	3

Table 3: Material Beliefs internal project events

Appendix C: Material Beliefs work plans
Year 1: Work plan at time of proposal

Year 1 /07

	1	2	3	4	5	6	7	8	9	10	11	12
workshops			W1									
collaboration					C1							
meetings				M1				M2				M3
partnership	P1		P2									P3
engagement	E1											
reports												R1

Revised Work plans - Jan 08

Year 1 /07

	1	2	3	4	5	6	7	8	9	10	11	12
collaboration					C0						C1	
advisory group												
partnership	P1		P2									P3
engagement	E1			W1						E3/4		
evaluation / reports	EV1			EV2				EV3			EV4	R1

Year 2: Work plan at time of proposal

Year 2 /08

	13	14	15	16	17	18	19	20	21	22	23	24
workshops												
collaboration	C2											
meetings				M4				M5				M6
partnership												
engagement							E2		E3			
reports								R2				R3

Revised Work plans - Jan 08

Year 2 /08

	13	14	15	16	17	18	19	20	21	22	23	24
collaboration					C2							
advisory group		A1			A2				A3			A4
partnership												
engagement	E5			E6		E7			E8			
evaluation / reports			EV5		EV6		EV7	R2	EV8		EV9	R3

Collaboration		Engagement (inc. workshops)		Advisory group		Partnership		Evaluation / reports		
C1	Explore	E1	Online / Media	A1 - A4	meetings	P1	Research institutions	EV1	Online documentation	
		C2	Research	W1	Collaboration Workshop			P2	Exhibition & Media	EV2
C3	Create	E3	Debate - Newcastle				P3	Peers	EV3	Film Recording
		E4	Workshop - Newcastle						EV4 -8	Team eval meetings
		E5	Debate - London						R1	Explore / Research
		E6	Workshop – London						R2	Research / Develop
		E7	Debate						R3	Final report
		E8	Exhibitions and workshops							

Table 4: Event type codes

Revising the work plan

An initial work plan was submitted with the original proposal to EPSRC. This work plan was revised at the end of the first year, to reflect the development of the project, and to provide some additional detail. Key changes included:

Collaboration - The revised plan acknowledges an important initial stage to establishing collaboration with engineers and scientists. This took place through visits to labs, leading to discussions and filmed interviews with scientists and engineers. Proposals for collaborations were negotiated from these start points

Engagement - The revised plan provides some additional details of public engagement events.

Resourcing documentation and reflection

Managing the ongoing documentation of the project, and encouraging participants to reflect upon the development of their collaborations was resourced in a number of ways:

- Film documentation played a key role in developing collaborations and recording the projects development
- Team meetings with the project manager and collaboration leaders were set up bi-monthly rather than quarterly, to better manage the projects individual patterns of development
- An advisory group was established with representation from design, engineering, sociology and public engagement
- The website developed an active blog, communicating and archiving reflection, discussion, key moments of collaboration, and documentation from engagement events

More about the Advisory Group

The advisory group met quarterly throughout the second period of the project. The role of this group

was to support the Material Beliefs team (researchers, engineering collaborators and project manager) towards achieving a high quality project. Meetings were arranged to offer critical reflection, advice and support on the following aspects of Material Beliefs:

- current activity and progress of the collaborations
- the development and delivery of any public engagement activities
- the creation, realisation and communication of a final exhibition
- the evaluation and documentation process, and its dissemination

Issues and debates that arose in the meetings and informed development included:

- User experience of speculative design products.
- How can a user make sense of the engineering through this design?
- How to provoke questions and debate, and explore subtlety in some of the engineering research?
- Building uncertainty into design projects in order to engage debate
- How can design enable possible uncomfortable areas of engineering research to be explored productively?



Dr. Aubrey De Grey
Dr. Anders Sandberg

Dana Centre
22 Jan 08

Tecno Bodies



Dr. Aubrey De Grey
Deputy Director of the
Ageing Research Foundation
7 Dec 07
**Intelligence and
tension**

**Intelligence and
tension**

Dr. Chris Mason

11 Mar 08 - 1st meeting

Regenerative Medicine
and tissue engineering



Dr. Chris Mason
Regen med

Stem Cell + Regenerative Medicine
Bioprocessing Unit
Advanced Centre for Biochemical
Engineering - UCL
30 May 08 - 2nd meeting

Ethical Skin

By 2009 EU has to reduce
or stop animal testing



Dr. Julie Daniels
Stem cells

Epithelial Stem Cell Biology, Institute
of Ophthalmology
Cells for Sight Tissue Bank, Moorfields
Eye Hospital - UCL

"Bonsai cells"

Steve Jackman - UCL
22 Aug 08

"Vegetarian tooth"



Royal In
01 Oct 08
CrossOver

Dec 07

2008

Jan 08

Feb 08

Mar 08

Apr 08

May 08

Jun 08

Jul 08

Aug 08

Sept 08

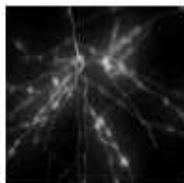
Dr. Anders Sandberg

Researcher, Oxford Uehiro

Centre for Practical Ethics

15 Dec 07

**biological frame
VS
digital frame**



**Appendix D: part of an
image cut from a
diagram illustrating the
breadth of the MB
experience for a
collaborating designer.**

Prof. Thomas Kirkwood

Institute for Ageing -Newcastle

15 Jun 08

Dr. Dianne Ford & Luisa Wakeling

Institute for Cell and Molecular

Biosciences
Newcastle University

28 Jun 08

"we live what we eat"

caloric restriction research



Appendix E: Evaluation methods; techniques, sampling and analysis

E.1 Techniques and sampling

E.1.1 Focus groups. Four focus groups were carried out between November 2008 and January 2009. The focus groups corresponded to the four collaborative projects that emerged from MB. The focus groups involved a variety of techniques and their structures varied, a copy of a sample focus group outline can be found in Appendix F. Focus group outlines resulted from negotiations between the focus group participants and the evaluator via emails, where participants were asked to highlight evaluative issues of importance to them in advance for the focus group. Semi-structured discussion outlines were emailed to participants in advance to provide some reflective space before the focus groups. Techniques included post-it note records of personal views, group brainstorms and controversial phrases from emails used as discussion prompts. MB collaborators were recruited for the focus groups via a snowball sampling technique initiated by the evaluator and the MB Project Manager. As a result varying numbers of collaborators were recruited from across each collaborative project, including where possible, members of the public who had been directly involved.

E.1.2 Participatory event observations. As a result of the summative nature of this evaluation only one of the PEST events delivered by MB was attended as part of the evaluation strategy. However, the evaluator had participated in two events and worked on a third as part of another research project. A semi-structured observation was carried out at the event attended for this evaluation.

E.1.3 Informal interviews. A number of informal interviews were carried out for this evaluation as gaps were identified in the focus group samples. Therefore at the PEST event attended for this evaluation, the opportunity was taken to informally interview eight of the audience participants. Audience members were approached during breaks between presentations and at the end of the event and asked about their expectations and their experience of the event. Supplementary interviews were carried out with collaborators where it was felt their work in the project had encompassed more than the collaboration experiences discussed in the focus groups. As a result additional interviews were carried out with one engineer and one designer.

E.1.4 Documents. A number of documents informed this evaluation and were involved in the analysis. These included the MB website, MB proposal documents, previous evaluative reports and data, essays forming exhibition texts around MB projects, conference presentations and emails from different points in the project. Transcriptions of steering committee meetings were also included as were the many filmed interviews created throughout the project. These documents were selected for the evaluation on the basis that the Project Manager and Researcher Co-Investigator made available all their documents in an attempt to be transparent about the project, and the evaluator extracted documents of interest.

E.1.5 Personal experiences and reflections. In addition to participating in MB through taking part in the initial collaboration workshop, being interviewed and attending related PEST events a number of informal conversations with MB participants informed this evaluation. A series of reflections recorded after each data gathering exercise also contributed to the evaluation.

E.2 Analysis. The focus group transcripts, text from focus group post-it notes, reflections, interview notes, previous evaluation data, event observations and other documents were analysed using the qualitative coding software nVivo 7. All the documents were coded according to the proposed objectives of MB and other themes that emerged through the analysis. After an initial analysis, the themes and quotes were discussed at length with another MB participant who was in the process of reviewing MB materials for a publication. Further to this discussion a third stage of analysis refined the initial coding.

Appendix F: sample focus group outline

Material Beliefs: Focus Group (FG) **.**. 2-3ish.

Participants: 1 x designer, 2 x participating members of different publics, 3 x engineers, 1 x evaluator.

Location ***: 2-3ish:** The room is booked for 1 ½ hours.

Emergency contact: Emily's mobile ***** in case you are running late etc.

We would like to audio record the focus group. Please let me know if this is a problem.

FG Outline:

- Introductions, introduction (what we're going to do), and ice-breaker exercise
- Post-it notes structured evaluation = individual responses to MB evaluation, answers to the question "In what way has collaborating in MB impacted on you and your work?"
- Issues about 'how' to assess the MB collaborative projects. One of the things that came up pre-FG is a sense of uncertainty, around 1) whether pre-input would help, 2) participants clarity about how to begin to evaluate the MB projects. So I would like us to try and establish some criteria for success (and conversely failure).
- **Discussion** themed around mapping of post-it responses, emailed issues and broader MB issues. Issues that have come up through the emails and working with MB include...
 - Relational issues: participants have had different relationships with the project and other participants. What have these relationships been like? How have they impacted on participants and the project?
 - Internal relationship issues: praise/interest (or lack of) from colleagues, managers, work related publics, i.e. patients, students, visitors, user groups. Changing (or not) established relationships through new collaborative project.
 - External relationship issues: praise/interest (or lack of) from new collaboration partners, external stakeholders, new publics, i.e. new students, new users. Personal and professional risks through opening up work/research to professionals from other disciplines and the public. Developing new relationships with a range of groups. Learning through working with different people.
 - Personal issues: enjoyment, frustration, new insights.
 - Uncertainty issues: what is the wider impact of MB project in work environment, especially in terms of cross-disciplinary transferability. How might this be achieved?
 - Role of public engagement within project: frustrating, enjoyable, confusing. How do participants feel about public engagement in terms of manageability, value, potential outcomes?
- What do participants consider the main challenges and opportunities?
- Issues to consider from the MB report evaluation perspective:
 - Create new approaches to communicating the engineers work
 - Expand the range of audiences experiencing engineers work
 - Expand the range of critical feedback to engineers work
 - Broaden designers engagement with engineering processes
 - Create new approaches to communicating the designers work
 - Engage in critical feedback from design discourse
 - Carry out public engagement for project collaborations
 - Expand awareness of a range of publics to the work of engineers and designers
 - Actively involved audience participants in collaborative partnerships