Keith, Lindsay and Griffiths, Wyn (2015)

SMASHfestUK: exploring approaches for widening participation and increasing diversity in STEM through the arts.

In: Science in Public Conference, 9-10 Jul 2015, Bristol, United Kingdom.

Conference Programme, Abstracts and Presentation

Programme and Abstracts

Science in Public Conference
Thursday 9th and Friday 10th July 2015

University of the West of England, Bristol

Programme

Thursday 9th July	
11:30 – 12:45	Registration and lunch – R Block Foyer & Cafe
13:00 – 13:15	Welcomes – 1R026 Lecture Theatre
13:14 – 14:15	Keynote address – Professor Maja Horst, University of Copenhagen - 1R026 Lecture Theatre
14:15 – 14:30	Break
14:30 – 15:30	Papers Session 1
15:30 – 16:00	Tea R Block Foyer & Cafe
16:00 – 17:00	Papers Session 2
17:00 – 19:00	Break
19:00	Conference dinner – Holiday Inn, Bristol Filton (next to UWE's campus)
There will be a business meeting for the Science in Public network at 17:15 in 1R021 – all are welcome to attend	

Friday 10th July	
10:00 – 11:00	Papers Session 3
11:00 – 11:30	Coffee R Block Foyer & Cafe
11:30 – 12:30	Papers Session 4
12:30 – 13:30	Lunch R Block Foyer & Cafe
13:30 – 14:30	Papers Session 5
14:30 – 15:15	Closing address – Paul Manners, NCCPE 1R026 Lecture Theatre
15:15	Farewells & tea
When not in use, 1R026 (Lecture Theatre) will be available to participants as a quiet room throughout the conference	

Paper sessions

	A – 1R021	B – 1R022	C – 1R023	D – 1R024
Thursday 9th July 14:30 – 15:30 Session 1	Workshop: Research on science learning in the public sphere, within the public eye and with public participation: the museum as Cyberlaboratory *Susan O'Brien*	I want more and better cells! – an outreach project about stem cells and its impact in the Portuguese population *Sara Varela Amaral* Beyond the dissemination of projects' results: stakeholders' and users' involvement and project co-design *Alba L'Astorina* Trinity Access 21: A Google-funded project to bring 21st-century skills into the classroom and into society *Joseph Roche (MS)*	Making personalised medicine public – practising citizen engagement in Austria *Claudia Schwarz* Narrating science in public: the approach of an interdisciplinary project to create new reflective spaces *Natasha Constant* The potential of interactive storytelling in geocommunication - the example of seismic risk communication in Istanbul *Johanna Ickert*	Folk' responsible research and innovation: public comments on the proposed release of a genetically modified moth *Sarah Hartley* Conflict and resolution: a case study of the Highway 55 and the Camp Coldwater conflict *Michael Tomiak* Weird Science: ten years of informal science workshops *Robert Pyatt*
	A – 1R021	B – 1R022	C – 1R023	D – 1R024
Thursday 9th July; 16:00 – 17:00 Session 2	Workshop: Designing playful tools for learning and reflection in Responsible Research and Innovation contexts *Marjoleine van der Meij*	Ships, Clocks & Stars: the quest for impact *Katherine Alpine* Using smartphone apps to evaluate science communication experiences and impacts: opportunities and challenges *Eric Jensen* Impact in interaction – the use of broadcast talks in science communication training *Rony Armon*	Pioneering online science communication learning in Africa *Marina Joubert* Participatory research on nature's impact on health *Valentine Seymour* Science on air: RadioMoka *Giovanna Pacini*	Access to Understanding: promoting understanding of biomedical research *Anna Kinsey* Evaluating public engagement with science: who are the publics and does it matter? *Ruth O'Connor* The 'others' and the public voice *Clare Wilkinson*

	A – 1R021	B – 1R022	C – 1R023	D – 1R024
Friday 10th July 10:00 – 11:00 Session 3	Workshop: Communicating evolutionary science in diverse contexts: re-examining science versus religion narratives *Fern Elsdon-Baker*	Science communication for resilient cities *Rosa Vicari* Designing and delivery of an engagement strategy for a "National Science Challenge" *Rhian Salmon* Is it useful? Seven key principles for climate service development *Felicity Liggins*	Billions and billions of likes: understanding and representing science enthusiasm *Oliver Marsh* How does CERN's research become public? *Jamie Dorey* Online video as a science communication tool *Mari Carmen Erviti*	'Nerd-on-nerd violence': scientific conflict in quantum physics popularisations *Kanta Dihal* How the mass media use iconography in science communication? *Constantinos Morfakis* Invisible news: non-news values in science journalism *Felicity Mellor*
	A – 1R021	B – 1R022	C – 1R023	D – 1R024
Friday 10th July 11:30 – 12:30 Session 4	Workshop: Consistency within diversity: improving public engagement with scientific research through practice *Richard Holliman*	Unmasking the communication of biosecurity *Jess Phoenix* "The badgers have moved the goalposts": agency, expectations and uncertainty in UK debates over animal disease *Angela Cassidy* Public understanding and interest in food security research. *Nicola White*	Themselves and not themselves': theatrical representations of medical chimerism *Alex Mermikides* From reflection to catharsis: exploring audience responses to Bloodlines *Emma Weitkamp* The performing arts in science communication: explaining contemporary physical theories through theatre and dance *Mircea Sava*	Practices of animal interactions and their impacts on public perception of environmental risk *Monae Verbeke* Science, young Thai people and science communication activities in a regional science caravan *Wilasinee Triyarat*

	A – 1R021	B – 1R022	C – 1R023	
Friday 10th July 13:30 – 14:30 Session 5	Workshop: Social media in practice: evaluating the impacts of social media-based public engagement *Monae Verbeke*	Improving the quality of engaged research and creating a culture of reflective practice around engaged scholarship *Gareth Davies* Tips to MAKE YOURSELF HEARD *Ben Skuse* Science and Performance *Cristina Marques Gomes*	SMASHfestUK: Exploring approaches for widening participation and increasing diversity in STEM through the Arts *Lindsay Keith* Situated citizen science: rhetorical practices of public empowerment in makerspaces and science cafés *Colleen Kelley*	

Abstracts

Thursday 9th July; 14:30 – 15:30

Session 1A

Workshop: Research on science learning in the public sphere, within the public eye and with public participation: the museum as Cyberlaboratory

Susan O'Brien, Shawn Rowe, Mark Farley, Celeste Frazier Barthel
Oregon State University, USA

Thursday 9th July 14:30 – 15:30

Session 1B

I want more and better cells! – an outreach project about stem cells and its impact in the Portuguese population

Sara Varela Amaral, Teresa Forte, João Ramalho-Santos, M. Teresa Girão da Cruz
University of Coimbra, Portugal

Beyond the dissemination of projects' results: stakeholders' and users' involvement and project co-design

Alba L'Astorina, Irene Tomasoni, Anna Basoni, Paola Carrara
Istituto per il Rilevamento Elettromagnetico dell'Ambiente (IREA) – CNR, Comunicazione della Scienza ed Educazione, Milan, Italy

Trinity Access 21: A Google-funded project to bring 21st-century skills into the classroom and into society

Joseph Roche
Trinity College Dublin, Ireland

Thursday 9th July; 14:30 – 15:30

Session 1C

Making personalised medicine public – practising citizen engagement in Austria

Claudia Schwarz, Brigitte Gschmeidler, Andrea Petschnig
Open Science – Lebenswissenschaften im Dialog, Vienna Biocenter, Austria

Narrating science in public: the approach of an interdisciplinary project to create new reflective spaces

Natasha Constant, Antonia Liguori, Liz Roberts, Margarida Sardo
University of the West of England, Bristol, UK

The potential of interactive storytelling in geocommunication - the example of seismic risk communication in Istanbul

Johanna Ickert
University of Plymouth, UK

Thursday 9th July; 14:30 – 15:30

Session 1D

'Folk' responsible research and innovation: public comments on the proposed release of a genetically modified moth

Sarah Hartley, Warren Pearce and Orla Shortall
University of Nottingham, UK

Conflict and resolution: a case study of the Highway 55 and the Camp Coldwater conflict (1990-early 2000s) and the roles of archaeological practitioners, stakeholding indigenous communities, government agencies, and the public.

Michael Tomiak
University of Minnesota, USA

Weird Science: ten years of informal science workshops

Robert Pyatt
Nationwide Children's Hospital and Ohio State University, Columbus, OH, USA

Thursday 9th July; 16:00 – 17:00

Session 2A

Workshop: Designing playful tools for learning and reflection in Responsible Research and Innovation contexts

Marjoleine van der Meij and Frank Kupper
Athena Institute, VU University, Amsterdam, Netherlands

Thursday 9th July; 16:00 – 17:00

Session 2B

Ships, Clocks & Stars: the quest for impact

Katherine Alpine
National Maritime Museum, UK

Using smartphone apps to evaluate science communication experiences and impacts: opportunities and challenges

Eric Jensen
University of Warwick, UK

Impact in interaction – the use of broadcast talks in science communication training

Rony Armon
Kings College, London, UK

Thursday 9th July; 16:00 – 17:00

Session 2C

Pioneering online science communication learning in Africa

Marina Joubert
Stellenbosch University, South Africa

Participatory research on nature's impact on health

Valentine Seymour
University College, London, UK

Science on air: RadioMoka

Giovanna Pacini, Franco Bagnoli
University of Florence, Italy

Thursday 9th July; 16:00 – 17:00

Session 2D

Access to Understanding: promoting understanding of biomedical research

Anna Kinsey
The British Library, UK

Evaluating public engagement with science: who are the publics and does it matter?

Ruth O'Connor
University of Queensland, Australia

The 'others' and the public voice

Clare Wilkinson
University of the West of England, Bristol

Friday 10th July, 10:00 – 11:00

Session 3A

Workshop: Communicating evolutionary science in diverse contexts: re-examining science *versus* religion narratives

Fern Elsdon-Baker, Alex Hall, Elisa Jarnefelt
Newman University, UK

Friday 10th July, 10:00 – 11:00

Session 3B

Science communication for resilient cities: monitoring digital communication to be weather-ready

Rosa Vicari
École des Ponts Paris, France

Designing and delivery of an engagement strategy for a "National Science Challenge" focused on climate change in New Zealand

Rhian Salmon, David Frame
Victoria University of Wellington, New Zealand
Nancy Longnecker
University of Otago, New Zealand

Is it useful? Seven key principles for climate service development

Felicity Liggins
Met Office, UK

Friday 10th July, 10:00 – 11:00

Session 3C

Billions and billions of likes: understanding and representing science enthusiasm

Oliver Marsh
University College, London, UK

How does CERN's research become public? An ethnographically informed account of life in the CERN Communications Group

Jamie Dorey, Richard Holliman and Eileen Scanlon
The Open University, UK

Online video as a science communication tool

Mari Carmen Erviti
University of Navarra, Spain
Erik Stengler
University of the West of England, Bristol, UK

Friday 10th July, 10:00 – 11:00

Session 3D

'Nerd-on-nerd violence': scientific conflict in quantum physics popularisations

Kanta Dihal
University of Oxford, UK

How the mass media use iconography in science communication?: a case study of biotechnology in the largest-selling national Greek newspapers

Constantinos Morfakis
National and Kapodistrian University of Athens, Greece

Invisible news: non-news values in science journalism

Felicity Mellor
Imperial College London, UK

Friday 10th July, 11:30 – 12:30

Session 4A

Workshop: Consistency within diversity: improving public engagement with scientific research through practice

Richard Holliman, The Open University, UK
Helen Featherstone, University of Bath, UK
Bryony Frost, Queen Mary University of London, UK

Friday 10th July, 11:30 – 12:30

Session 4B

Unmasking the communication of biosecurity: is the deficit model present in different forms of government-farmer interaction?

Jess Phoenix
Lancaster University, UK

"The badgers have moved the goalposts": agency, expectations and uncertainty in UK debates over animal disease

Angela Cassidy
King's College London

Public understanding and interest in food security research.

Nicola White
University of Birmingham, UK

Friday 10th July, 11:30 – 12:30

Session 4C

'Themselves and not themselves': theatrical representations of medical chimerism

Alex Mermikides, Kingston University, UK and Gianna Bouchard, Anglia Ruskin University, UK

From reflection to catharsis: exploring audience responses to Bloodlines

Emma Weitkamp
University of the West of England, Bristol, UK
Alex Mermikides,
Kingston University, UK
Ann Van de Velde
Antwerp University Hospital, Antwerp, Belgium,
Milton Mermikides
University of Surrey, UK
Anna Tanczos
Sci-Comm Studios Ltd, UK
Chimera Network

The performing arts in science communication: explaining contemporary physical theories through theatre and dance

Mircea Sava
University of Bucharest, Romania

Friday 10th July, 11:30 – 12:30

Session 4D

Practices of animal interactions and their impacts on public perception of environmental risk: a research study into penguin encounters at London Zoo

Monae Verbeke
University of Warwick, UK

Science, young Thai people and science communication activities in a regional science caravan

Wilasinee Triyarat
University of the West of England, Bristol, UK; The National Science Museum, Thailand

Friday 10th July, 13:30 – 14:30

Session 5A

Workshop: Social media in practice: evaluating the impacts of social media-based public engagement

Monae Verbeke
University of Warwick, UK

Friday 10th July, 13:30 – 14:30

Session 5B

Improving the quality of engaged research and creating a culture of reflective practice around engaged scholarship

Gareth Davies, Richard Holliman, Emma Rothero, James McGinlay, Gill Clough, Liz Hartnett
The Open University, UK

Tips to MAKE YOURSELF HEARD

Ben Skuse
Research Media Ltd, UK

Science and Performance: A Study of the International Public Communication of Science and Technology Conference

Arthur Belloni, Cristina Marques Gomes
Federal University of Santa Maria, Brazil

Friday 10th July, 13:30 – 14:30

Session 5C

SMASHfestUK: Exploring approaches for widening participation and increasing diversity in STEM through the Arts

Lindsay Keith
The Refinery Ltd, UK
Wyn Griffiths
Middlesex University UK

Situated citizen science: rhetorical practices of public empowerment in makerspaces and science cafés

Colleen Elizabeth Kelley
Penn State Erie, The Behrend College, USA

Thursday 9th July; 14:30 – 15:30
Session 1A

Workshop: Research on science learning in the public sphere, within the public eye and with public participation: the museum as Cyberlaboratory

Susan O'Brien, Shawn Rowe, Mark Farley, Celeste Frazier Barthel
Oregon State University, USA

Oregon State University houses a marine science research facility – Hatfield Marine Science Center (HMSC), which includes a public museum that functions as a living laboratory for studying self-paced, leisure-time lifelong learning. For the past 12 years, this Free-Choice Learning laboratory has allowed us to study visitor learning experiences on the floor, informing better communication practices in science education venues. In recent years, our work has attempted to include the learners themselves as co-researchers as way to bring forth their voices within their own learning experiences and as a way to open new ground for how the public can see and understand science.

The National Science Foundation has funded the "*Cyberlaboratory*", the installation of a research infrastructure within the museum, using emergent digital technologies to study behavior, capture responses and adapt content to visitor needs through *cyberlearning* - the use of networked computing and communications technologies to support learning. The basic premise underlying the cyberlab is that in order to support *cyberlearning* experiences, research and evaluation capacity must be built in from the very beginning, allowing for continuous data collection and visitor active participation.

The Cyberlaboratory holds the promise of becoming a remote social science research lab supporting interdisciplinary research and remote data collection, opening up a whole new world and ways for research development. Furthermore, we want the lab to also be a open source the public, bridging a stronger connection between the communication of science and science learning research. In this interactive session, participants will learn about Cyberlab by virtually engaging with its data collection tools, and will help brainstorm potential uses of the lab resources that align with contemporary research agendas in public science communication, including ways for the lab to serve as forum for visitor as active participants in the task of improving our science communication efforts.

Thursday 9th July 14:30 – 15:30
Session 1B

I want more and better cells! – an outreach project about stem cells and its impact in the Portuguese population

Sara Varela Amaral, Teresa Forte, João Ramalho-Santos, M. Teresa Girão da Cruz
University of Coimbra, Portugal

Although science and technology have an impact in every aspect of modern societies, there is an extensive gap between science and society, which impairs the full exercise of citizenship. In the particular case of biomedical research, the increase in investment should be accompanied by greater efforts in public information and engagement. Here we present a project regarding the production and evaluation of educational contents focused on stem cells - newspaper illustrated chronicles, radio interviews, a comic book, and animated videos - and their impact on the Portuguese population. The study of the outreach materials in a heterogeneous sample of the population suggests that we can consider them a valuable tool to disseminate scientific messages. Furthermore, the data showed that clear and interest stimulating outreach materials that are able to teach new concepts and to promote critical thinking, increase the engagement in science. Additionally, these materials can influence the political, social and personal attitudes toward science. These results, together with the importance given by the population to scientific research in stem cells, validate that the diffusion of these materials could be a significant contribution to the overall public understanding and engagement in contemporary science.

Beyond the dissemination of projects' results: stakeholders' and users' involvement and project co-design

Alba L'Astorina, Irene Tomasoni, Anna Basoni, Paola Carrara
Istituto per il Rilevamento Elettromagnetico dell'Ambiente (IREA) – CNR, Comunicazione della Scienza ed Educazione, Milan, Italy

Activities such as stakeholders' engagement and user requirements analysis are considered fundamental, in funded national and international research projects, in order to enhance outcomes and impact of researches. Scientists are strongly recommended to consider needs and expectations of stakeholders and potential users and to involve them, as research co-actors, since the first steps of the project design to the dissemination of results. Such innovative activities often ask for the presence, in the research team, of experts in social research methodologies.

This paper intends to illustrate a case study where the analysis of users' needs and requirements was intentionally included in the project workflow. The analysis was conducted within a project focused on the development of innovative products and services aimed at supporting the (Italian) agricultural management and providing technological and business opportunities.

The methodology for collecting user needs and requirements was recursive. Once identified target users, their "external needs" were investigated through qualitative tools such as semi-structured interviews. Thanks to the information provided by respondents, subsequent deeper interviews were conducted and other beneficiaries were derived. Starting from these elements, each domain of the project reconstructed its state of the art in order to collect methods or results and plan a workflow encountering as more as possible to the needs of the different stakeholders.

During the research process, a second category of needs, called "internal", emerged and was collected. These requirements derived from the mutual interactions between the 3 scientific domains, namely the remote observations from satellite, aircraft technologies for UAVs and Internet technologies 2.0 for smart exchange of data, revealed interesting issues concerning the

communication within and outside the scientific community and the perception of project co-design by all partners.

The overall approach finally combined external and internal needs highlighting critical issues and operational difficulties but also providing interesting ideas for possible applications and future developments in Science and Technology Studies.

Trinity Access 21: A Google-funded project to bring 21st-century skills into the classroom and into society

Joseph Roche
Trinity College Dublin, Ireland

As Ireland strives for the position of "Silicon Valley of Europe" it is becoming ever more important for institutions of higher education to provide teaching and learning in the key areas of science and technology. We will present initial results from a 3-year project called Trinity Access 21. This project is a collaboration between Trinity College and Google which was announced last year, and which aims to affect a significant long term change in science and technology education through a range of innovative interventions focused on the second level system. Google has provided funding of €1.5 million to Trinity College Dublin to support the programme. As part of this programme we have recently started offering a Postgraduate Certificate in 21st Century Teaching and Learning. This certificate will give 1,000 secondary school teachers continuing professional development in science and technology aimed at supporting cultural and pedagogical change within schools and building teacher capacity to leverage technology in creating an active, engaged classroom. The goal of this initiative is to drive educational and social change in Irish schools and Irish society.

Thursday 9th July; 14:30 – 15:30
Session 1C

Making personalised medicine public – practising citizen engagement in Austria

Claudia Schwarz, Brigitte Gschmeidler, Andrea Petschnig
Open Science – Lebenswissenschaften im Dialog, Vienna Biocenter, Austria

Over the last decade, the term "personalised medicine" has been increasingly used as a catchword for future trends in biomedicine. Although mostly referring to biomarker-based strategies of patient stratification, it may also denote proactive, predictive and post-treatment approaches to healthcare. Hence, personalised medicine is still a term subject to negotiation among stakeholders, including the general public. Since patients and healthy persons alike are called upon to make their biological tissue and genetic data available for research purposes, public engagement is considered necessary to realise the vision of personalised medicine (ESF 2012). While it has been the subject of various public engagement initiatives in the UK and elsewhere, the discussion about personalised medicine has been largely restricted to expert communities in Austria, thus reflecting the general non-participatory technopolitical culture in the country.

The paper analyses a public engagement project that seeks to make personalised medicine public in the Austrian context. A central element of this project was to organise four citizen dialogue events in three major Austrian cities in 2014. The citizen dialogues should provide a space in which interested lay people could familiarise themselves with personalised medicine and debate the term, as well as prevention, cost, and data contribution issues. First, the paper will reconstruct major design choices that shaped the content and choreography of these events, in particular the measures undertaken to avoid stakeholder capture by participating experts. Second, the participants' appropriation of these settings will be analysed with a focus on expert-lay discourse dynamics and the social, ethical and legal issues that were raised and most controversially debated in the dialogue process. Based on these findings, the paper will draw general conclusions for communicating biomedical issues to the general public and practising citizen engagement in Austria.

Narrating science in public: the approach of an interdisciplinary project to create new reflective spaces

Natasha Constant, Antonia Liguori, Liz Roberts, Margarida Sardo
University of the West of England, Bristol, UK

Scientists and researchers are beginning to explore different ways of communicating their research to reach different audiences. Some of these innovative methods include narrative, citizen science, storying and visualisation of data (e.g. Dahlstrom 2014; Kwan-Liu 2013; Avraamidou & Osborne 2009). The Drought Risk and You (DRY) Project interweaves narrative and drought science to explore the impacts of drought in the UK. The project will collect people's experiences of participating in citizen science activities and drought-science-narrative workshops through narrative approaches: videos telling the story of a day at a workshop, water and citizen science diaries, participant observation, digital storytelling, visual narratives and post-card evaluation. With the added layer of narrative acting both as a science communication act and as a form of evaluation for the project, we will create an iterative science communication methodology over the course of the four-year project. Science communication has been evaluated using traditional social science methods (Friedman, 2008) however narrative is only recently being used in this way (Negrete & Lartigue, 2010; Klaebe 2013). Through the narrative approach we aim to provide a greater understanding of the extent to which storying experience of science participation contributes to knowledge gain and learning processes, and perceptions, behaviours and values related to water use and drought impacts. For example, does participation in citizen science foster a stewardship ethic for local environments? Overall the project

will contribute to debates about the role of narrative for learning and evaluation in different science communication contexts and how different audiences respond to creative evaluative methodologies. We posit that the process of narrating 'Science in Public' creates a reflective space for critical thinking and self-evaluation where embedded behaviours may be challenged. This approach chimes with current research which questions science communication as a one-way or top-down process.

The potential of interactive storytelling in geocommunication - the example of seismic risk communication in Istanbul

Johanna Ickert
University of Plymouth, UK

Conflicting societal conceptions of earthquake safety provide challenges but also opportunities for the communication of seismic hazards, as exemplified in the controversial reactions on the latest "urban renewal projects" in Istanbul. Seismologists estimate that there is a high probability that a major earthquake will strike Istanbul in the next decade or so. Detailed earthquake risk analysis, and direct experience of the losses suffered during the major earthquakes that struck Turkey in 1999 and 2011, have engendered a broad societal recognition of the need for extensive earthquake preparedness and response planning. However, there has been dissent concerning the democratic legitimation of some of Istanbul's mitigation measures, most notably the implementation of the 'Law for the Regeneration of Areas Under Disaster Risk' (Law 6306, known as the 'disaster law') in May 2012. The strong interconnections between geological 'matters of fact' and societal 'matters of concern' raise fundamental questions for geocommunication on how to deal with this societal complexity, particularly in terms of maintaining trust in the geoscientist. There is a growing recognition among geoscientists that achieving disaster resilience in Istanbul is not solely the domain of 'earthquake experts' but rather requires a shared societal responsibility. However, the question arises as to how geocommunication can be designed to respond to this increased demand for interdisciplinarity and civil participation. This research will confront this question, exploring ways to combine qualitative and quantitative analyses, values and preferred norms with facts and observations, and organized around an interactive web-based documentary platform that integrates multiple knowledge bases and seeks to help connect different communication cultures.

Thursday 9th July; 14:30 – 15:30
Session 1D

'Folk' responsible research and innovation: public comments on the proposed release of a genetically modified moth

Sarah Hartley, Warren Pearce and Orla Shortall
University of Nottingham, UK

Responsible research and innovation is a framework for analysing the social dimensions of emerging technology by reflecting on and anticipating the impacts of technology through an inclusive process involving stakeholders and publics. A key, but under emphasised element of this framework is responsiveness: the opportunity to respond to this information and shape the direction of the research. We examine responsiveness through a case study of Cornell University's application to the United States Department of Agriculture (USDA)'s Animal and Plant Health Inspection Service (APHIS) to release the genetically modified (GM) diamondback moth in order to test its efficacy as an agricultural pest management tool. In 2014, APHIS published an environmental assessment of the GM moth and held a public consultation through its website that generated comments from 287 participants, raising hopes and concerns about the technology and the experimental release. We map the issues raised by the public about the GM moth and about GM insects more broadly, as expressed through APHIS's consultation. We argue that the consultation represents 'folk RRI' where the process of public reflection and anticipation is performed unintentionally, from the ground up. However, the decision to release the GM Moth will be based on an assessment of the environmental and human health risks alone, rendering the majority of public comments impotent. When this case is examined through an RRI lens, the consultation is a valuable mechanism for engaging the public in the process of reflection and anticipation. However, we observe that there is no opportunity or responsibility for responsiveness. We argue that the applicants at Cornell University may be better placed to respond to this folk RRI exercise.

Conflict and resolution: a case study of the Highway 55 and the Camp Coldwater conflict (1990-early 2000s) and the roles of archaeological practitioners, stakeholding indigenous communities, government agencies, and the public.

Michael Tomiak
University of Minnesota, USA

Camp Coldwater is located to the South-East of Minneapolis USA, and falls under Federal ownership in what is Community and Park Recreational land. Due to the planned construction of highway 55 that was to traverse this land, an archaeological investigation was carried out. Considered a sacred site by four federally recognized Native American tribes and being located near to Historic Fort Snelling the area is arguably a sacred place worthy of protection. The investigation however concluded that the areas did not provide enough evidence to warrant a re-route of the planned highway. This was met with strong opposition. Protests, negative media attention, and controversy severely damaged not only the reputation of the local archaeology sector and associated heritage management government agencies, but raised questions about the scientific methods and processes used and the legal frame work in which modern archaeology exists. A decade of investigations into Coldwater Spring's (located within Camp Coldwater) eligibility for the National Register as a TCP (Traditional Cultural Property) was pursued in an attempt to reroute the highway, but reports concluded again that neither Camp Coldwater nor Coldwater Spring met the criteria of the National Register. Amongst the technical and myopic analysis of the site, the underlying issue failed to be clearly communicated; the site was

already ‘protected’ to the highest level, as part of the Fort Snelling site, which was and is on the Register but the conclusion still remained. This was unfortunately not widely comprehended amongst the anti-construction parties who continues to fight for an independent TCP status.

This paper looks at how and why the conflict arose and attempts to locate and highlight where the issues derived from. It is concluded that much of the conflict could have been avoided through better communication and proactivity on both the archaeologists’ and government agency’s part. Future generations can therefore hopefully approach similar incidents with more diplomacy, preparedness, sensitivity, and tact.

Weird Science: ten years of informal science workshops

Robert Pyatt
Nationwide Children's Hospital and Ohio State University, Columbus, OH, USA

As educators, we are encouraged to develop robust methods to promote critical thinking skills in our classrooms. As researchers, we are encouraged to present our work at informal settings to promote interest in current science topics to the public. Unfortunately these efforts are all too often mutually exclusive.

For the last ten years I have conducted workshops called “Weird Science” for diverse audiences including summer school programs, book clubs, and science fiction conventions in informal learning environments including waterparks, bars, and churches. These workshops are part journal club, part citizen science project, and part stand-up comedy. Each session includes a group discussion covering three to four science articles and participation in a hands-on, citizen scientist experiment. Articles are chosen from the literature specifically to include topics with a minimum of background information, simple experimental methodologies, and subjects which can quickly grab an audience's attention like “Do Women Spend More Time in the Bathroom Than Men?" (Baille et al., 2009). Audiences with little to no formal training in science can then be guided through a critical review of the methodology, analysis, and conclusions presented in these publications.

Weird Science workshops also include audience participation in a citizen science project. These experiments are selected so participants can actively be involved in both data collection and interpretation of the data. Topics are again derived from the peer-reviewed literature and have included testing if modelling clay activities can alleviate chocolate cravings (Andrade et al., 2012) and examining nose picking behaviour (Chittaranjan and Srihari, 2001).

In this presentation, I’ll introduce the educational concepts behind Weird Science and the strategies I have used to promote science and critical thinking skills to diverse audiences. Finally I’ll conclude with some challenges I have encountered and provide anecdotal feedback from attendees on the significance of these events.

Thursday 9th July; 16:00 – 17:00
Session 2A

Workshop: Designing playful tools for learning and reflection in Responsible Research and Innovation contexts

Marjoleine van der Meij and Frank Kupper
Athena Institute, VU University, Amsterdam, Netherlands

Science communication is moving towards a new era. 'Science' is asked to engage citizens and stakeholders upstream in their processes, science communicators mobilise people in society for deliberation on innovative sciences and technologies, while science education is meant to prepare youngsters for this 'engagement era'. Adequate tools for engagement and deliberation are therefore essential.

However most investigations into 'engagement' and 'deliberation' seem to focus on the outcomes such as the gathering of citizen- or stakeholder views for strategic reasons such as policy making, while less emphasis is put on making such efforts (more) engaging by for example analysing the different applied tool designs. In our current research into science:society interfaces, we are designing, applying and analysing various playful tool designs. We observed that the impact of playfulness lies in the support it provides for engaged publics to deal with the complexities of research and innovation, as it supports reflection and learning in change. Being one of the pioneers on research into designing playful tools for such deliberative contexts, we ask ourselves: What playful engagement and deliberation tools work for which kind of participants? What are the desired/required facilitator roles? And how to relate playful tool design elements to goals and outcomes of engagement and deliberation processes? In this session we will co-create together with the participants' tentative answers to these questions, fed by our research outcomes about playful learning and reflection tools for citizen and stakeholder engagement and deliberation on Synthetic Biology: the Frame Reflection Lab and the Theatrical Debate (developed for Synenergene, a large European Research Consortium for Responsible Research and Innovation in Synthetic Biology). This session alternates between interaction by co-creation and small presentations by the organizers: Session participants will engage in a playful brainstorm to create playful tools for their own science communication contexts.

Thursday 9th July; 16:00 – 17:00
Session 2B

Ships, Clocks & Stars: the quest for impact

Katherine Alpine
National Maritime Museum, UK

Write a grant application to one of the Research Councils these days, and you'll be expected to trace out 'Pathways to Impact', a set of plans which will – you hope – lead to your project having demonstrable 'impact'. But can you really plan to make impact happen? Does it take too much time away from the research? Is it worth it? Is it 'impact', or 'public engagement'? Which sorts of plans are most effective?

Since 2009, a group of history of science researchers at the University of Cambridge and the National Maritime Museum have been engaged in an AHRC-funded project into the Board of Longitude. To deliver their impact agenda, they appointed a dedicated Public Engagement Officer to engage audiences with the research and to deliver part of them impact agenda.

The National Maritime Museum celebrated the 300th anniversary of the 1714 Longitude Act with a major exhibition, Ships, Clocks & Stars, which told the story of the 18th century quest for longitude, alongside a longitude themed events season. To commemorate the same anniversary, NESTA launched the 2014 Longitude Prize, a challenge prize for a solution to today's equivalent of the longitude problem, the topic chosen by a public vote.

Using these two examples as a case study, I will explore whether history of science help science communication organisations engage people with science, and vice versa. Can science communicators help historians of science meet their own impact agendas?

Using smartphone apps to evaluate science communication experiences and impacts: opportunities and challenges

Eric Jensen
University of Warwick, UK

This presentation focuses on ways in which science engagement organisations can gather audience evaluation and feedback data using automation to enhance efficiency and quality. Advantages of such a technology-enhanced evaluation system include:

- Less expensive than a market research company
- Far less staff time needed when compared to in-house data collection (effectively no on-going staff time needed)
- Better quality data available than is likely from either a market research company or in-house (in most cases)
- More extensive and timely data can be gathered than would otherwise be feasible
- Real-time automation of analysis provides results as the data rolls in.
- Minimise logistical challenges to organise for data collection
- Organisations own their data

The presentation draws upon insights from the Qualia project (qualia.org.uk), funded by NESTA, the Arts and Humanities Research Council and Arts Council England. Qualia is an ambitious project that has developed an open source smartphone app, sentiment analysis tool and web engine for analysing audience feedback and evaluation. The project involved developing and critically evaluating the utility and validity of evaluation using smartphone apps and other tools. The open source software

developed through this project allows digital data to be easily and inexpensively used by cultural institutions (including science engagement organisations) to assess audience responses in real time, as well as tracking audience responses over time (e.g. over the course of a festival or museum visit). It also critically engages with a growing call for greater use of mobile technologies in cultural institutions. Qualia-generated results have been refined and tested using conventional social scientific evaluation methods (e.g. at the Cheltenham Science Festival).

Impact in interaction – the use of broadcast talks in science communication training

Rony Armon
Kings College, London, UK

The news media are a major source of scientific information for the general public and are considered crucial in presenting the social impact of scientific research. But though journalists usually hold scientists as credible experts (Anderson, Petersen & David, 2005) science coverage is largely attuned to traditional news values (Verhoeven, 2010) and recurrent news frames (Nisbet & Huge, 2006).

Responding to the mismatch between scientific and journalistic norms, research institutions invest dearly in trainings their staff and members for talking to the media. In this talk I will present an approach that builds on conversation analysis (CA) of expert interviews in the news as a way to inform and support science communication training.

The main focus of CA research is "to discover how participants understand and respond to one another in their turns at talk, with a central focus being on how sequences of actions are generated (Hutchby & Wooffitt, 2008, p.14)." A focused and detailed examination of naturally occurring interactions enables the tracing of how participants analyse, interpret and reference each other's stories, contend over their respective agendas as the interaction progresses. Based on this premise I examine expert interviews as essentially unscripted and as shaped by the interviewees as well as the host. My approach to using CA in science communication training builds on the Conversation Analytic Role-play Method (CARM) (Stokoe, 2014) that replaces a reliance on role-play scenarios with naturally occurring recorded interactions. I will present an adaptation of this approach to the context of the expert interview as a way of identifying troubled moments and informing communication training of scientists and journalists.

Thursday 9th July; 16:00 – 17:00
Session 2C

Pioneering online science communication learning in Africa

Marina Joubert
Stellenbosch University, South Africa

There is a dire need and growing demand for professional development in the field of science communication across the African continent. People who are eager to develop their skills in this field are mostly working in communication or research offices in universities, science councils, NGOs and other research organisations. For most of them, it would also be difficult and/or unaffordable to travel to another country for training.

Stellenbosch University responded to this need by launching the first fully online course in science communication in South Africa (and Africa) in January 2015 (the course was announced in November 2014). This online course is presented by the DST-NRF Chair in Science Communication, hosted by the Centre for Research on Evaluation, Science and Technology at CREST.

More than 100 participants from across Africa applied and eventually 87 completed the registration and payment and are currently enrolled for this course running from January to April 2015.

This course has pioneered a new way of building capacity in science communication. It allows people who are already work in the field to acquire relevant theoretical knowledge about science communication, while also introducing them to current research in the field (and how research can inform and enrich their science communication practice).

My presentation will outline the process of designing, developing and presenting this course, including the assessment of participants' performance. I will share the highlights of the formal and informal feedback from participants, and describe how the lessons learnt during the first round will shape the course content and delivery when it is repeated towards the end of 2015.

Participatory research on nature's impact on health

Valentine Seymour
University College, London, UK

With the increase in aging population, costs of health provision and the growing important of wellbeing is of increasing concern for UK policy makers and public health officials. The exponential rise in the numbers of eco-health programmes emerging in the past decade can be seen as an attempt to address these concerns. Calls for a green agenda within the UK health care system follows the growing evidence that suggests nature's benefits of people's physical health and wellbeing. A key challenge in existing research is the need to close existing gaps in knowledge on what environmental activities might increase levels of wellbeing in real time and space which reflects the true social, economic and political diversity of a community.

The aim of the study is to develop a novel mobile data collection tool to measure the impact that connecting with nature has on people's physical as well as mental wellbeing. It is expected that the health impact tool could serve as a potential framework that can be widely applicable to other environmental volunteering organisations and public health research within communities.

A novel mobile data collection tool with spatial mapping is currently being trialled with the new web platform, GeoKey, using The Conservation Volunteer's (TCV) environmental volunteering programme as a case study. This has been achieved through the combination of participatory research and exploratory techniques in collaboration with TCV staff and volunteers, to ensure that the impact

measurement tool can be integrated into TCV's environmental volunteering programmes as well as meets their needs, skills and knowledge.

Preliminary findings have highlighted the potential for the use of mobile data collection and open source technologies to further understand the effects of environmental volunteering on local communities. The need for increased participatory involvement within the development process of the impact monitoring tool has further been indicated in relation to effective functionality and usability requirements, providing a better understanding of the life course of volunteer's wellbeing by tracking their activities over a longitudinal timescale.

The combination of both rigorous scientific analysis as well as collaborative participatory research this has brought a greater depth to the data collection framework. From this, both the true social, economic and political diversity of 'real life' as well as the optimal health across the human and the environmental interfaces can be measured gaining a more multidimensional perspective of wellbeing. Future on-going research will include longitudinal analysis across volunteering programmes, further exploring the relationship dynamics between human wellbeing, the environment and volunteering as well as using this methodology to examine the influences of a variety of environmental settings.

Science on air: RadioMoka

Giovanna Pacini, Franco Bagnoli
University of Florence, Italy

Science, technology and innovation play an increasing role in our lives. At an increasingly rapid pace we are faced with major changes with regard to our habits, work, leisure, health and food, just to speak of some themes.

Is therefore essential the ability to understand, to be able to criticize and to be able to argue about these issues. One of the methods that the scientific community has found, in order to more easily reach the general public, was the "Café Scientifique" ("Science Cafés"), founded in the UK and France in 1998.

A Science Café is a discussion on an issue of science and/or technology among public and some experts, engage in an informal place. Unlike a conference, the trend of the debate is largely determined by audience questions. The science cafes are today a methodology of science communication established and known throughout the world. Nowadays, among all the traditional channels involved in Science dissemination, one of the less explored is radio.

Basing ourselves on this observation, in October 2010, we started to produce a radio transmission named "RadioMoka", diffused by the local Radio station "NovaRadio" and entirely devoted to topics regarding Science and Technology. The idea was to generalize the Science Café experience through a communication channel that could be able to reach most people in the fastest and easier way and get the population closer to scientific themes in a "light" way. The transmission has been fully designed and realized by the authors of this work, both for what concerns the 'making of' of the episodes and the editing process. Although the program is not broadcasted live, we produced a survey for understanding the feeling and expectation of our public, with encouraging results.

Thursday 9th July; 16:00 – 17:00
Session 2D

Access to Understanding: promoting understanding of biomedical research

Anna Kinsey
The British Library, UK

Access to Understanding (www.access2understanding.org) is a collaboration, led by the British Library, uniting organisations that want to improve public understanding of the latest biomedical and health research findings. Our mission is to bridge the gap between public access to biomedical research articles online, and the wider understanding of the findings described in those articles.

Although online, open access to current research is increasing, much of this information is only accessible to a niche audience, usually just other scientists, due to the use of highly technical language. Access to Understanding aims to make scientific knowledge truly accessible by championing clear, concise and balanced summaries of research findings making them understandable to non-specialists. We are doing this by:

- Providing guidance for anyone who is planning to write about biomedical research for a non-specialist audience.
- Promoting online resources that support the use of plain English writing in biomedical and health research.
- Encouraging early-career scientists to write about research in an accessible way through our Access to Understanding science-writing competition, and giving anyone the opportunity to vote in our People's Choice Award – since the entries are written for the public, we think they should be judged by the public.
- Working with like-minded organisations and individuals who want to help us bridge the gap between access and understanding.

In this presentation I will give further information about the activities described. I will give some insight into our experiences of engaging with key stakeholders including scientists, patients and funders, and also share some of the lessons we have learnt as the project has developed. I will finish by giving a flavour of some of the activities we are working on to further develop the project.

Evaluating public engagement with science: who are the publics and does it matter?

Ruth O'Connor
University of Queensland, Australia

Public Engagement with Science (PES) is a term that has become part of the science communication lexicon. Despite this, it is a poorly conceptualised term used interchangeably with Public Participation. A good conceptualisation of PES is a fundamental pre-requisite for its evaluation. The view I will put forward is that PES requires publics valuing science in some way. Valuing of science can then initiate a demand from publics for science (or parts thereof), and so empower publics to drive the engagement process. When viewed in this way, it is apparent that the predominant framing of PES in terms of inspiring interest (e.g. museums, citizen science) or building trust around areas of controversial science (e.g. public dialogue exercises, participatory technology assessment) omits a large proportion of engagement activities. This includes engagement with the bulk of science that is non-controversial and engagement that does not target the general public—such as science institutions engaging directly with decision-makers.

The predominant framing of both PES and Public Participation as activities involving the general public has also influenced the research and practice of evaluation. Evaluation frameworks have been developed for public participation and dialogue exercises that are based primarily on criteria related to process and outcome (e.g. Beirele et al. 1998; Rowe et al. 2004 and the Sciencewise guidelines). This paper will discuss a set of guiding principles to evaluate decision-makers' engagement with science based on a critique of these existing frameworks. For example, how do criteria such as building trust and representativeness, etc apply to decision-makers? What additional criteria such as empowerment are needed? Exploration of PES through the lens of evaluation may ultimately provide new evaluation guidelines, but it also provides an opportunity to better understand the process of engagement itself, its potential and limitations.

The 'others' and the public voice

Clare Wilkinson
University of the West of England, Bristol

Public engagement brings new responsibilities to citizens that are involved to be 'representative'. Yet at the same time it appears that many public participants may in fact work to conceptualise themselves as 'unique'. When compared to 'other people' who they see as unconcerned, misinformed or relatively ignorant.

When compared to our understanding of the motivations and aims of scientists and engagement practitioners, we still know relatively little about how public participants understand, justify and explain their own involvement in engagement processes. In addition many practical resources on the benefits of engagement focus on the researcher's and/or communicator's perspective, few start from the perspective of the public voice.

This presentation will explore public perceptions of their role in public engagement, drawing on findings from a number of projects and evaluations.

Friday 10th July, 10:00 – 11:00
Session 3A

Workshop: Communicating evolutionary science in diverse contexts: re-examining science *versus* religion narratives

Fern Elsdon-Baker, Alex Hall, Elisa Jarnefelt
Newman University, UK

This session will examine some of the drivers of contemporary debates in relation to public perceptions of the relationship between science and religion from historical, philosophical and psychological perspectives.

Clash or conflict narratives relating to evolutionary science and personal belief are a recurrent and popular theme in media or public space discourse. However, it is entirely plausible, and indeed common, for individuals to accept both worldviews. One problem we have in countering these established, and in places prejudicial, narratives is that there has been little to no research done to date that explores what the public think about the relationship between science and religion. Even more surprisingly, outside of the US, we have very little comprehensive knowledge of what the level of public acceptance or understanding of evolutionary science actually is. This is especially startling given the high profile discussion in the past two decades of the relationship between evolutionary science and religion in relation to 'new atheist' stances. How, then does the popular conception that there is an on-going conflict between evolution and belief in God arise, how does this relate to processes of identity formation, and what impact might this have for engaging diverse communities with evolutionary science?

Building on, experience in communicating evolutionary science internationally this session will also outline the ways in which the 'Science and Religion: Exploring the Spectrum' project team will seek to expand our understanding of the underlying process at play both historically and contemporaneously. This project will employ four intersecting approaches to analysis the public perceptions of evolution and religion debates: social science field research; oral history, historical and media analysis; experimental social psychology; and a large-scale survey of public perceptions, attitudes and identity formation in the UK and Canada. It is expected that this integrated multidisciplinary approach will bring innovative new perspectives to the question of how best to engage diverse audiences with evolutionary science.

Friday 10th July, 10:00 – 11:00
Session 3B

Science communication for resilient cities: monitoring digital communication to be weather-ready

Rosa Vicari
École des Ponts Paris, France

The quality of science and technology communication has become more challenging due to the fact that access to information has hugely increased in terms of variety and quantity. This is a consequence of different factors, among others the development of public relations by research institutes and the pervasive role of digital media (Bucchi 2013; Trench 2008). A key question is how can we objectively assess science and technology communication? Relatively few studies have been dedicated to the definition of pertinent indicators and (Neresini and Bucchi 2011).

This research aims to understand how communication strategies, addressed to the general public, can optimise the impact of research findings in hydrology for resilient cities and how this can be assessed. Indeed urban resilience to extreme weather events relies both on engineering solutions and increased awareness of urban communities as it was highlighted by the FP7 SMARTesT project and the experiences carried out in the framework of TOMACS (Tokyo Metropolitan Area Convective Studies for Resilient Cities) and CASA (Engineering Research Center for Collaborative Adaptative Sensing of the Atmosphere, supported by the U.S. National Science Foundation).

The research will greatly benefit from the development of automated analysis of unstructured Big Data that allows the exploration of huge amounts of digital communication data: blogs, social networks postings, press articles... Furthermore, these techniques facilitate the comparison of socio-economic trends with physical-environmental trends.

We will also investigate case studies corresponding to several research projects under the umbrella of the Chair "Hydrology for resilient cities": for example the Interreg NWE IVB RAINGAIN project, the KIC Climate Blue Green Dream project and worldwide collaborations such as TOMACS. All these projects involve awareness raising and capacity building activities aimed to stimulate cooperation between scientists, professionals (e.g. water managers, urban planners) and beneficiaries (e.g. concerned citizens, policy makers).

Designing and delivery of an engagement strategy for a "National Science Challenge" focused on climate change in New Zealand

Rhian Salmon, David Frame
Victoria University of Wellington, New Zealand
Nancy Longnecker
University of Otago, New Zealand

In 2013, new government investment in science research in New Zealand led to the creation of "National Science Challenges" that are expected to "respond to the most important, national-scale issues and opportunities identified by science stakeholders and the New Zealand public" and "have major and enduring benefits for New Zealand". The resultant eleven cross-disciplnary, collaborative research programmes are primarily focused on human health and living conditions, environmental issues, and science innovation. The Challenges are not only meant to be informed by the priorities of New Zealands publics, but "public outreach, communication, public engagement, and education activities" are also expected.

Such large, collaborative, national-scale, mission-led science research programmes are familiar territory in other countries. In New Zealand, however, these multiple, simultaneous, large national science research programmes are presenting a challenge because of limited capacity. This is especially the case for science outreach and engagement since many of these programmes have lofty, ambitious (and often ill-defined) mandates to 'engage with key stakeholders and the public'.

After presenting the science and science communication context within which these Challenges have been created, we will discuss the development of an engagement strategy for one of these Challenges, focused on climate change, which has a mission "to transform the way New Zealanders adapt, manage risk, and thrive in a changing climate". We will explore difficulties related to different interpretations of the mission, connecting this publics-oriented mission with the core science research focused on development of an Earth System Model, and tensions between delivering a robust and a theoretically-grounded engagement strategy with the need to meet (or manage) "outreach" expectations from the science community, government funders, and different publics and end-users.

Is it useful? Seven key principles for climate service development

Felicity Liggins
Met Office, UK

Natural variations in the climate and longer-term changes due to human activities are increasingly affecting us and the environment we live in, such as the availability of fresh water, food security, our health, and social and economic infrastructures. Tackling these issues to ensure that society is sufficiently resilient and prepared requires the development and delivery of operational climate services - climate information prepared, interpreted and delivered to meet society's needs.

The engagement of users of these climate services, often called stakeholders, is essential to ensure the data and information provided by scientists are accessible, fit for purpose and address the requirements of the users. Without this engagement throughout service development and implementation, there is a risk that the stakeholders can't use the data to drive their models; that the information provided is not compatible with existing decision-making processes; or that the messages being conveyed are not communicated effectively.

Managing the multiple boundaries between producers and users of climate services is of crucial importance in this process. Although the concept of co-design and more generally the co-generation of knowledge is perceived to be central to the success of the new generation of climate services, relatively little experience exists on how to implement this in a climate prediction context. In this paper we present some of the results that are emerging from EUPORIAS, an FP7-funded project on climate services for Europe, around effective engagement of stakeholders and the importance of multidisciplinarity in the development of climate services. We also identify seven general principles which could help the development of a new generation of climate services.

Friday 10th July, 10:00 – 11:00
Session 3C

Billions and billions of likes: understanding and representing science enthusiasm

Oliver Marsh
University College, London, UK

One phenomenon emerging from the growing popularity of social networking sites is the visible growth of online 'science enthusiast' groups. Examples include the Facebook page 'I Fucking Love Science' (IFLS), which has over 18m 'likes' and regularly tops Facebook's user engagement statistics, or Reddit threads such as r/science or r/AskScience which offer thousands of users the chance to ask and answer one another's science questions. My research particularly considers questions around identity within these spheres – if and how the pseudonymity of users complicates the usual distinctions between 'scientist' and 'lay audience', and whether these groups facilitate performance of a 'science person' identity. In this paper I shall focus on the methodological challenges of asking qualitative questions about groups which are a) extremely large and b) only usually accessible to a researcher via their online activity.

In order to efficiently acquire large quantities of data from these groups, I use a combination of 'web scraper' programmes. Drawing on perspectives from the growing field of DigitalSTS, which encourages un-black-boxing of digital research methods, I shall reflect on questions around the role of these tools. Firstly, what are the research benefits of customising one's own digital tools versus using existing programmes, and do they outweigh the significant costs of time and effort? Secondly, what ethical issues arise from accumulating large amounts of data from sites which encourage people to reveal information about themselves, even if those sites are nominally 'public spaces'? Thirdly, given the problems of 'Big Data' and the distinctive features of different online platforms, how can the qualitative researcher still discern features of interest? This last question is a particular challenge within my research: how to usefully consider the relatively personal concept of 'science enthusiasm' when faced with thousands of users and many hundreds or thousands of posts per day.

How does CERN's research become public? An ethnographically informed account of life in the CERN Communications Group

Jamie Dorey, Richard Holliman and Eileen Scanlon
The Open University, UK

Exploring current research into the dissemination of scientific information in the digital age shows a dearth of empirical studies into the role of media professionals within scientific organisations. As a group that carry out many functions of mediation, it could be argued media professionals within scientific organisations play an important intermediary role between scientists, external media professionals and publics, often being the first to mediate information for audiences beyond academia. Such groups, therefore, need to be explored in order to understand the role they play in science mediation in the context of openness and transparency, which is increasingly mediated through technology.

This paper presents the findings of a study into how CERN's research becomes public in an era of digital scholarship, with a particular focus on how digital tools and technologies have influenced the communication practices of media professionals and academics at CERN. A mixed methods approach was used, combining ethnographic observations, semi-structured interviews and document analysis to create eight case studies that examined the communication and working practices of various members of the CERN Communications Group and

The study shows how the use of technology, the organisation of the Communications Group, and the nature of the scientific work carried out at CERN come to influence levels of openness and internal and external communications. This paper also proposes a methodological approach for the continued research of communications groups in other scientific organisations.

Online video as a science communication tool

Mari Carmen Erviti
University of Navarra, Spain
Erik Stengler
University of the West of England, Bristol, UK

Online video has become a widely used tool for science communication and dedicated channels are becoming more numerous, in some cases reaching popularity levels that are comparable to those of music-stars and celebrities. We explore this science communication format in the context of the UK, through interviews with the people behind some of the most successful and representative YouTube science channels: Periodic Videos, Sixty Symbols and Numberphile, made by independent filmmaker Brady Haran; the YouTube channels of the journals Nature and New Scientist; BBC Earth and Earth unplugged by the BBC; and the YouTube channel of the Royal Institution. In particular, we explored the aims, objectives and audiences they intend to reach; their different strategies of communicating science; and similarities and differences between on-line science videos from these different sources: individual, corporate, institutional. Although obviously no one has the key for making a successful science video, the interviews reveal interesting features and common themes that show different approaches to make the best use of on-line video to communicate.

Friday 10th July, 10:00 – 11:00
Session 3D

'Nerd-on-nerd violence': scientific conflict in quantum physics popularisations

Kanta Dihal
University of Oxford, UK

Aside from the altruistic ideal of educating a mass audience about scientific developments, most scientists have a personal motivation for writing a popular science book. In several instances, astrophysicists try to convince the lay audience via their popularizations that their specific interpretation of modern physics, concerning the structure of the universe, is correct. This paper will look at two such conflicts. Firstly, the conflict on the origin of the universe – the big bang versus the steady state theory – was popularized in George Gamow's book series Mr Tompkins (1939) and Fred Hoyle's lecture series The Nature of the Universe (1950). Secondly, the black hole information paradox is the source of debate in Stephen Hawking's A Brief History of Time (1988) and Leonard Susskind's attack on this book, The Black Hole War (2008).

In order to convince such a wide audience of their stance, it is necessary for the authors involved to first explain the basic principles of astrophysics to their audience, which leads to a delicate balance between rhetorical and instructive language. Affective engagement with the reader is a central tenet of the works. The authors fight for the audience's engagement – whether inadvertently or consciously – employing in this process their own, the reader's, and other people's physical human bodies. Self-praise and criticism of other scientists are present in equal measure, in spite of the alleged objectivity and impersonal nature of science.

Rhetoric and philosophy here seem to be more important in convincing the reader than the actual scientific content of both books. This paper looks into the two physicists' motivations for and approaches to writing these books, paying particular attention to their views on the philosophy of science, their intended audience and the manner in which they use metaphor rather than difficult mathematical content to convey their ideas.

How the mass media use iconography in science communication?: a case study of biotechnology in the largest-selling national Greek newspapers

Constantinos Morfakis
National and Kapodistrian University of Athens, Greece

The mass media serve as intermediate between science and the public, framing technoscientific news for their readers and shaping the public consciousness about science-related facts. Particularly, the iconography in media acts as a powerful means of communication. A powerful and potent iconography can achieve the beautification of a technoscientific fact or can underscore the open resistance and widespread public concern about it more effectively than any words. It facilitates the understanding of an, often obscure, technoscientific discourse and/ or an elaborate experimental methodology. Moreover, it portrays scientists at work or at the time of their scientific triumph, makes the microcosm visible, depicts our biological structure and generally through its rhetoric and ideological charge often contributes to shaping the public opinion (positive or negative acceptance) on a scientific fact or a new technology. Finally, the iconography is part of a journalist's routine and used for the purposes of popularizing, concretizing and dramatizing issues, in brief for making issues both newsworthy and interesting for their audiences

In this context, images, such as Dolly the sheep, the Genetic Map or the Frankenfoods play an important role in the public communications of biotechnology. Understanding media iconography of biotechnology is important because the media are one of the main actors for the production and

dissemination of the public image of emerging biotechnologies and related research. The purpose of this paper is to present a review of results of a case study that focuses on the media iconography of biotechnology in the largest-selling national Greek newspapers and how the use of iconography affects science communication. Specifically, I examined a series of selected photographs, sketches and drawings that surrounded / accompanied the publications which, have contributed to the development of a specific public image for biotechnology.

Invisible news: non-news values in science journalism

Felicity Mellor
Imperial College London, UK

Conventionally, academics studying science journalism, as well as practising science journalists, claim that science reporting follows the same news values as other forms of news. Whilst this is true in many respects, it fails to account for how science journalism differs from many other beats in its failure to adopt a critical stance. This paper explores the extent to which an additional set of 'non-news values' also operates, and suggests that it is here that the science beat differs from other beats. Taking the news coverage of invisibility research in the field of transformative optics as an example, I show that sources of funding, uncertainties, and limitations are routinely excluded from science news, suggesting that an implicit set of normative values structures what is omitted from news reports. These non-news values draw on a naïve, idealist philosophy of science which construes questions of interests and fallibility as a non-concern for news discourse about science.

Friday 10th July, 11:30 – 12:30
Session 4A

Workshop: Consistency within diversity: improving public engagement with scientific research through practice

Richard Holliman, The Open University, UK
Helen Featherstone, University of Bath, UK
Bryony Frost, Queen Mary University of London, UK

How do we manage the tension between doing more public engagement with scientific research and improving the quality of the engagement for all parties?

The eight RCUK-funded Public Engagement with Research (PER) Catalyst universities have spent the last three years working to change the research culture of their organisations, with a view to embedding a "culture of public engagement with research across all research domains." Working with researchers from the social sciences to the sciences and beyond, we have found the drivers for public engagement with research to be diverse, arising from top-down and ground-up research-led rationales. In part, this is due to theoretical and practical considerations that are discipline specific, but there are also underlying tensions that span all forms of research. We have found that public engagement with research in practice is similarly diverse. While quality research has to some extent clear and accepted criteria within and across disciplines, criteria for public engagement with research (and engaged research, where knowledge is produced in partnership with non-academics) are less well defined. It follows that issues of definition and quality are important threads that run through the work of the eight PER Catalysts.

Two clear messages have emerged from the PER Catalysts' learning, and will form the basis for this session: 1) researchers are looking for consistency in how their engagement practices are assessed; and 2) researchers want to retain flexibility in how they plan for, enact, and review their engagement practices. In other words, researchers are looking for consistency within diversity.

Using materials and examples from several of the eight the PER Catalyst universities, this workshop will draw out these issues by considering the challenges of supporting diverse public engagement with research whilst also raising the quality of engaged research.

Friday 10th July, 11:30 – 12:30
Session 4B

Unmasking the communication of biosecurity: is the deficit model present in different forms of government-farmer interaction?

Jess Phoenix
Lancaster University, UK

Over the last decade, Bovine Tuberculosis (bTB) has had immeasurable consequences for English agriculture. Biosecurity (the attempt to secure agricultural space and animals from infectious disease) is an important method used to control the spread of bTB within the dairy and beef industries. However, temporal variation of biosecurity communication exists between HM Government and farmers, and the degree to which biosecurity measures have been implemented has not increased under the neo-liberal agenda, potentially related to the continued perception of farmers within the deficit model. This presentation will introduce the three primary models of scientific communication- public understanding of science (PUS), dialogue and participation- provide a background to bTB and biosecurity, and examine the influence and disguise of the deficit model within biosecurity communication.

I argue that the deficit model can still be found within government communication strategies. Department for Environment, Food and Rural Affairs' (Defra) use of biosecurity to create spatial dualism is rejected by many farmers in preference for spatial uniformity by badger culling (Enticott 2008). It appears that many of Defra's policies have not taken on board farmers' situated or tacit knowledges. Participatory approaches to biosecurity allow for certain enactments of the disease to be heard whilst silencing others. The deficit model can therefore be identified as disguised within some government communication strategies as farmers are included but their opinions are lowly valued.

The South West TB Farm Advisory Service provides on-farm biosecurity advice and brings together farmers, vets and government representatives. It appears to be free of the deficit model, both in visible and disguised dimensions, by recognising actors' equally important but differing contributions to bTB. Government could consider more approaches akin to the advisory service which utilise the strong farmer-vet relationship in order to make themselves, and their views, more credible and trustworthy.

"The badgers have moved the goalposts": agency, expectations and uncertainty in UK debates over animal disease

Angela Cassidy
King's College London

Since badgers were first linked to the spread of bovine TB in cattle in the UK during the early 1970s, the question of whether to cull these wild animals in order to control the disease in cattle has formed a longstanding public controversy which has become increasingly visible and polarised in recent years. The UK has seen a repeating cycle of policymaking, research investigation, controversy, expert-led policy reviews, and escalating disease rates. In 1998, the Randomised Badger Culling Trial (RBCT) was commissioned by New Labour: this study sought to determine the effects of badger culling by enacting a randomised experiment across 3,000km2 of the South West of England. Since its completion in 2007, the findings of the RBCT have been subject to an ongoing process of reinterpretation and contestation, supporting a colourful spectrum of policies. The public uncertainty around these findings has been due to the contingencies of field research, but also the unexpected, uninvited contributions of landowners, animal welfare activists, badgers and an outbreak of foot and mouth disease to the

experiment. This paper will draw on the sociology of expectations in order to explore the contrasting and shared assumptions that the various actors in badger/bTB have made – about science (that it would solve the problem), about policy (that it would be directed by 'evidence'), about publics (that they would be absent from the experiment), and about animals (that they would lack agency and sociality). I argue that these persisting expectations, combined with ongoing legitimacy struggles between multiple 'ways of knowing' about the problem of badgers and bovine TB, have led to the long-term continuation of this cycle.

Public understanding and interest in food security research.

Nicola White
University of Birmingham, UK

In a recent study, the general opinion of scientists was that public understanding of science is insufficient (Besley 2011), and addressing this problem is now often a mandatory component of research grants. In the context of research linked to enhancing food security, public misunderstanding or insufficient knowledge of new technologies, can have a major impact on their acceptance. For example, the use of GM crops within Europe has been slow and limited due to often misguided public opposition, e.g. one third of the people questioned believed GM tomatoes have genes whereas 'ordinary' tomatoes do not. (Mielby et al. (2012)

Media coverage plays a key role in the public understanding of science, but the topics selected as worthy of coverage are often limited. The aim of this research was to assess the public's understanding of three related areas of biological research linked to sustaining food security: pesticides, genetically modified (GM) crops, and biological control agents. Pesticides and GM crops have recently received a significant amount of media attention, and we wanted to identify which media based sources of information underpinned public understanding of these issues. Media coverage of biological control has been minimal by comparison, and we sought to determine the public's awareness of this topic. Finally, we wanted to find out if the general public were actually interested in direct engagement with researchers, e.g. through "pathways to impact" activities such as attending free seminars to increase their understanding of food security issues.

The questionnaire data presented here outlines the importance of accurate media communication, where clear gaps in this communication remain, and the public's appetite for receiving information via non-media sources/directly from researchers.

Friday 10th July, 11:30 – 12:30
Session 4C

'Themselves and not themselves': theatrical representations of medical chimerism

Alex Mermikides, Kingston University, UK and Gianna Bouchard, Anglia Ruskin University, UK

How theatre stages aspects of science can be an important access point for the public into its research and practices. Theatre can offer creative and imaginative ways of exploring its impact on our biological, social and psychological lives. These two papers will explore how the concept of medical chimerism - the phenomenon of two genetically distinct organisms co-existing in a single body – is represented in two recent theatrical performances, both drawn from real life events.

Alex will present on her current immersive performance work, Bloodlines, in which 'John', a young man diagnosed with a deadly leukaemia, undergoes an haematological stem cell transplantation for survival. This treatment is simultaneously miraculous, mysterious and slightly macabre. Alex's discussion will focus on scenes relating to donor-recipient chimerism, a period of uncertainty, in which the potentially lethal and life-saving aspects of the treatment are in balance.

Gianna will consider the 2014 play Chimera, presented at the Gate Theatre, Notting Hill, which imagines a mother discovering that she has chimerism and that her son is, in fact, her nephew, as a result of this rare condition. Based on recent court cases in America, the play explores questions of kinship and destabilises the myth of DNA as providing unequivocal access to and confirmation of the individualised and originary self.

Both performances explore genetic science in order to consider identity through the mediation and findings of biotechnologies. Using modes of physical theatre, projections and text, they stage the chimeric body as both inherently destabilising and potentially life saving. Using performance as a mode to explore the condition of chimerism, these works ask questions about our identity and humanise the molecular and biologised aspects of our selves.

From reflection to catharsis: exploring audience responses to Bloodlines

Emma Weitkamp
University of the West of England, Bristol, UK
Alex Mermikides,
Kingston University, UK
Ann Van de Velde
Antwerp University Hospital, Antwerp, Belgium,
Milton Mermikides
University of Surrey, UK
Anna Tanczos
Sci-Comm Studios Ltd, UK
Chimera Network

Fictional and dramatic formats, such as theatre and literature, can provide an emotional and subjective context for medicine that is often missing from non-fiction accounts. In this project we have explored the ways that different types of audiences engage with a devised theatre performance focusing on haematological cancers, bloodlines.

Devising is a method of creating performance through collaboration rather than a singly-authored play-text. Such collaborations draw on the diverse perspectives of the creative group so that the resulting performance incorporates views and art-forms that might otherwise be omitted from more traditional narratives. Bloodlines was devised by a group of artists and medical practitioners, including

members with personal or professional experience of acute haematological cancers. For example, composer Milton Mermikides is a survivor of Acute Lymphoblastic Leukaemia, director Alex Mermikides was his sibling haematological stem cell donor and Ann van de Velde is a clinical haematologist with an interest in medical art.

Through surveys and interviews we explored the impact of the performance on the audience in terms of their engagement and interest, their subjective feelings and their views about the way that the performance presented information about haematological cancers. Performances have engaged with audiences that might be described as arts interested, science interested, personal experience and professional. Here we compare the impact of the performances on these different groups. All audiences felt that the performance communicated information about haematological cancers as well as the subjective experience of treatment. Audience members with personal experience found the performance cathartic and an opportunity to reflect on their own personal experience of cancer.

The performing arts in science communication: explaining contemporary physical theories through theatre and dance

Mircea Sava
University of Bucharest, Romania

Public performance as a means of communicating science to the lay audiences is not a new endeavour, having precedents at least as early as the 18th century. However, with the emergence of the Public Understanding of Science movement and its demands for active engagement with the public, the performing arts were brought to new dimensions by the social actors involved in the practice of science communication. As a specific scientific domain, contemporary physics remains a difficult subject to approach using the non-verbal communication predominant to the performing arts, and is traditionally thought of as being much more suited for the written or audio-visual media, which are the conventional media for communicating science. This paper aims to analyse the mechanisms through which the highly specialised contemporary physical theories – relativity, quantum mechanics and string theory – succeed in reaching the general public by unconventional media such as theatre and dance. The play *Spooky Action: The Drama of Quantum Mechanics* (World Science Festival, 2013) or the contemporary dance *Three Theories* (Karole Armitage, 2008) are only two of such recent performances which deal with physics topics, for which scientists, artists and science communicators cooperate in a common effort to use the human body in order to create these elaborate science shows. Placed at the boundary of science and art, and frequently integrated into science festivals, these performances offer an unequal, though efficient mix of information and entertainment, in the quest of making science accessible and appealing to the public. The impact of these shows on the audience must be judged in an extended context, the performing arts being only one link, an important one, in a highly intricate communication process, which completes and sustains the traditional popular science books and science documentaries.

Friday 10th July, 11:30 – 12:30
Session 4D

Practices of animal interactions and their impacts on public perception of environmental risk: a research study into penguin encounters at London Zoo

Monae Verbeke
University of Warwick, UK

An increasing number of zoos offer animal encounters each year. The role of these sessions may be the key to encouraging resource conservation and environmental protection, by providing an opportunity while encouraging a highly emotional connection between the animal and participant. Each encounter allows participants to join in a unique science engagement programme, yet the impact of these programmes has not been well documented. This session will describe case studies on how the interactions between the participant, keeper and penguins impact participant's conservation attitudes and perceptions of environmental risk.

This presentation will describe, how science communication performances, in artificially created nature environments, encourage risk awareness, reaffirm the boundaries of humans and other animals, protecting a mentality of the threatened environment. Second, I review the interventions, and consequences of such interventions, that are associated with the animal encounter, which frames nature as a source of danger, whilst simultaneously mitigating risks of closeness. Third, I will discuss how environmental crisis theories obscure sociological explanation of the 'animal turn', which can legitimate the destruction of nature. I conclude by discussing broader theoretical issues of including nature in society and advocating for multi-dimensional approach towards the use of animal encounters as a conservation education tool, including a potential change in the discourse we use in these sessions.

Science, young Thai people and science communication activities in a regional science caravan

Wilasinee Triyarat
University of the West of England, Bristol, UK; The National Science Museum, Thailand

The National Science Museum, Thailand (NSM) has been commissioned by the government to enhance science and technology learning for the whole of Thai society. The NSM developed the Science Caravan Project in order to take science communication activities from the capital city alone and to diversify it to local areas of Thailand. In 2012, the NSM established a smaller scale version of the Science Caravan called 'The Science Caravan-Red Route' for local children who lack opportunity to participate in the Science Caravan because they cannot travel or do not have the budget to participate in the larger scale activity. . The Science Caravan is set up at remote schools over a three day period and includes science exhibitions, science shows and science games. Other remote schools can also travel to it and access the caravan. The Science Caravan has not explored the impact of these activities on young people in different regions. In Thailand, there are different four regions identified by the National Statistic Office, Thailand based on economic, social and ecological dimensions are as follow: the North, the South, the Centre and the North East of Thailand. Therefore, this research is the first consideration of the impact of these activities on young people in different regions of Thailand, as well as the different understandings, interests and access to science that they might possess. In this research, mixed methods are bring used to explore the activities of the Science Caravan, and this presentation will consider preliminary findings, as well as how such projects may support the needs of Thai people in different regions.

Friday 10th July, 13:30 – 14:30
Session 5A

Workshop: Social media in practice: evaluating the impacts of social media-based public engagement

Monae Verbeke
University of Warwick, UK

As social media platforms expand, science communication practitioners are increasingly considering what their role should be in science engagement. There are important limitations, as well as opportunities, involved in using these media as sites for public engagement with science, some of which are not well understood. One key question facing science communicators is how to evaluate the impacts of social media-based science engagement. This topic is the focus of the proposed workshop.

This workshop draws on methodological development from the Public Engagement with Research Online (PERO) project funded by the UK government Joint Information & Skills Committee that was completed in November 2012. This project yielded recommendations about how to effectively measure the spread and impact of scientific ideas communicated online. Since this time, the panel has been working on ways in which the process of evaluating public engagement impact in social media settings can be automated through developing valid forms of (automated) sentiment analysis. This work is currently being conducted as part of the Qualia project, which is funded by the UK's National Endowment for Science, Technology and the Arts (Nesta), the Arts and Humanities Research Council (AHRC) and the Arts Council: qualia.org.uk. This work will be further developed by a 2014 project on 'The role of technology in evaluating the non-economic impacts of arts and culture' (funded by the UK's Arts & Humanities Research Council). This workshop will offer cutting edge advice and practical experience with evaluating science communication impacts on social media, drawing upon techniques and methodology developed through the projects described above.

Friday 10th July, 13:30 – 14:30
Session 5B

Improving the quality of engaged research and creating a culture of reflective practice around engaged scholarship

Gareth Davies, Richard Holliman, Emma Rothero, James McGinlay, Gill Clough, Liz Hartnett
The Open University, UK

In this paper we will report research undertaken to improve the quality of engaged research, and to create a culture of reflective practice around engaged scholarship. We undertook a review of approaches for evaluating the impact of engaged research. A supporting framework for the selection of appropriate data collection methods and techniques of analysis was developed, with worked examples taken from the RCUK-funded School University Partnership Initiative (SUPI) project, Engaging Opportunities, and the seed funding scheme that was run as part of the Public Engagement with Research (PER) Catalyst project. The framework captures the challenge researchers' face regarding the complexity and interdependence of methods of data collection and techniques of analysis for evaluating different scales of impact. This framework adds to past literature by building on established typologies of knowledge & impact. Using worked examples we will provide practical guidance for understanding the relationship between project objectives (decision requirements), methods of data collection & techniques of analysis, and the affordance of these with regards to the reach and significance of impact being evaluated. We also explain the scope that the framework has for advancing the quality of pathways-to-impact plans and historic assessments of research impact, through mechanisms such as the Research Excellence Framework (REF).

Tips to MAKE YOURSELF HEARD

Ben Skuse
Research Media Ltd, UK

Getting your important work noticed above the millions of scientific journal articles published every year and countless novelty project titles (eg. were James Bond's drinks shaken because of alcohol-induced tremor?) is a tough but necessary job in order to secure future funding, find new collaborators and advance your studies. In this talk, Ben will discuss how judicious use of SEO techniques can enhance the discoverability of your work, the benefits of publishing in open access journals, and how infographics and animations can build buzz and strengthen your online presence.

Science and Performance: A Study of the International Public Communication of Science and Technology Conference

Arthur Belloni, Cristina Marques Gomes
Federal University of Santa Maria, Brazil

The present work is a report concerning the Research Project "Science and Performance: Study of International Public Communication of Science and Technology Conference" funded by the National Council for Scientific and Technological Development (CNPq) (Universal Call - MCTI / CNPq No. 14/2013) - Brazil. Incorporating elements of "science communication" and "performance", the research seeks to answer the following questions: What are the interfaces between Performance and Science Communication? Taking into account different realities how do, practically, the actions of Performance materialize within the Science Communication? Specific objectives: 1. to identify and analyze the interfaces between Performance and Science Communication; 2. to map what has been done in the field of performance over the twelve editions of the "International Conference on Public Communication of Science and Technology"; 3. to collect impressions, directly from the target

audience, at the moment of a Performance - at the 13th International Conference on Public Communication of Science and Technology which was held on May 2014 in Salvador, Bahia, Brazil. In terms of methodology it is divided into three phases, namely: bibliographical research; dialogue with representatives of this Conference; and surveys applications. It intends, at the end, to outline innovative aspects from the interface between "Performance" and "Science Communication".

Friday 10th July, 13:30 – 14:30
Session 5C

SMASHfestUK: Exploring approaches for widening participation and increasing diversity in STEM through the Arts

Lindsay Keith
The Refinery Ltd, UK
Wyn Griffiths
Middlesex University UK

Recent studies show that there is a known lack of gender, ethnic and socio-economic diversity in STEM education and careers. The Warwick Commission has again highlighted that this imbalance also exists in access to Culture and the Arts.

The CASE Campaign for Science and Engineering, 'Improving Diversity in STEM' from May 2014 revealed that only "9% of STEM jobs (outside of Medicine) are held by women" and "BME men are 28% less likely to work in STEM than white men".

Many initiatives nominally seek to address this imbalance, but often suffer from institutional centrism, narrow-focus and community disconnectedness.

The Warwick Commission states "The role of cultural organisations as partners in the fundamental place shaping role, building and moulding local communities and identities, remains underdeveloped".

SMASHfestUK – www.smashfestuk.com - is a science and arts festival that has recently completed its pilot run. It was conceived to explore new approaches to widening participation and improving diversity in STEM through the Arts. Key principles include:

- Participatory authorship
- Immersive entertainment
- Narrative led
- Trans-media delivery
- Embedded and delivered in, and by, local communities

The paper will discuss the principles, practice and audited impact of this approach.

SMASHfestUK was funded by: The Wellcome Trust, The Arts Council, Middlesex University, The Physiological Society and L&Q Housing.

Situated citizen science: rhetorical practices of public empowerment in makerspaces and science cafés

Colleen Elizabeth Kelley
Penn State Erie, The Behrend College, USA

This paper conceptualizes science as rhetorical social action, a dialogic discourse situated in, experienced by, and argued through an interface between science and its multiple publics. Cafés and Makerspaces are deconstructed as paradigmatic contemporary places within which these interactive communicative actions facilitate democratized science. A Makerspace is an environment where people leverage resources to strengthen community-based learning, particularly for critical thinking, problem solving, collaboration, and engagement in STEM education (science, technology, engineering, math). Science Cafés are grassroots public science initiatives and events that take place in casual settings including pubs and coffeehouses. Such interpersonal venues facilitate learning and empower the public and scientists to consider each others' perspectives. Science becomes a symbolic construct

as well as a series of mediated controversies, forged through multiple voices which address multiple publics. As a quintessential rhetorical action, science addresses exigencies such as climate change and global health crises and credentials its claims through interactive argument supported by good reasons. The enactment, comprehension and substance of science is communication-based, its truths dialogic, demonstrated by discussion and sanctioned through community values. Forums such as Makerspaces and Science Cafes facilitate democracy by embracing informed opinions about scientific issues as a default attribute of citizenship. Grounded in an ideology that demystifies scientific research, these literal and metaphoric meeting places empower publics to more comfortably and accurately assess science and technology issues, particularly those that impact on enlightened social policy making.

UNIVERSITY
of
GREENWICH

Science in Public 2015

SMASHfestUK…

Who Are We?

- Production company that specialises in science films, writing and public engagement projects
- TV and science
  - Factual Entertainment
  - Documentaries
  - Short form drama
  - Commercials
  - Science films for clients (learned societies, universities etc)

Background

- “9% of STEM jobs (outside of Medicine) are held by women”
- “BME men are 28% less likely to work in STEM than white men”.

The CASE Campaign for Science and Engineering, ‘Improving Diversity in STEM’ from May 2014 revealed that only

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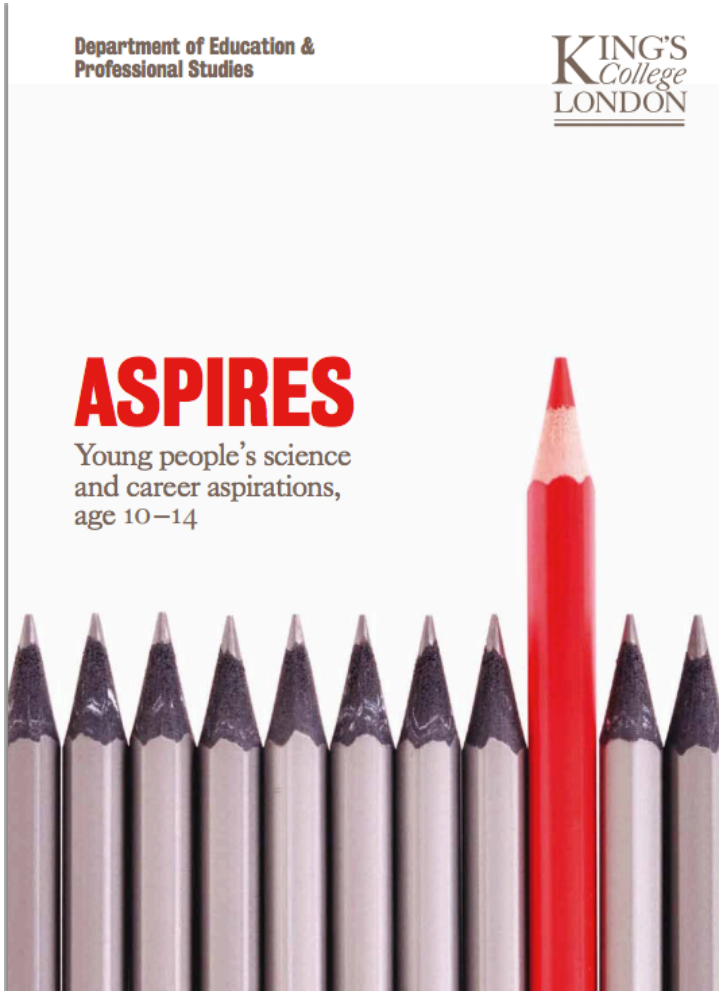
The CASE Campaign for Science and Engineering, ‘Improving Diversity in STEM’ from May 2014 revealed that only



Black students are disadvantaged by multiple inequalities – not a poverty of aspirations.

The factors which hinder students from developing science aspirations are amplified in the case of Black students, due to the multiple inequalities they face.

A student is least likely to see science as 'for me' if she is female, White, has low/very low levels of cultural capital, is in the bottom set and does not have any family members who use science in their jobs.

Diversity of creative talent and participation is essential to the expressive richness and the economic and social prosperity of the ecosystem.

It is a mistake to think that the under-representation of Black and Minority Ethnic (BAME) individuals, women, deaf and disabled people and low-income groups in the Cultural/Creative Industries is purely a social justice issue.

A lack of diversity and under-representation damages our international reputation and trust in the UK as a diverse and tolerant society.

The role of cultural organisations as partners in the fundamental place shaping role, building and moulding local communities and identities, remains underdeveloped

SMASHfestUK

Department for Business Innovation & Skills

ECONOMICS

BIS OCCASIONAL PAPER NO. 4

THE BUSINESS CASE FOR EQUALITY AND DIVERSITY

A survey of the academic literature

JANUARY 2013

Government **Equalities** Office

Putting equality at the heart of government

BRITISH COUNCIL

TRUST PAYS

How international cultural relationships build trust in the UK and underpin the success of the UK economy

www.britishcouncil.org

SMASHfestUK

Perceived Barriers to Engagement

- Cost
- Low science capital: “its not for me”
- Location/accessibility
- Contextuality

Proposals to overcome barriers

- Free at point of access
- Participatory design approach
- Hyper-local model of engagement
- Over-arching narrative linking all activities

SMASHfestUK Principles

- Participatory authorship
- Immersive entertainment
- Narrative led
- Trans-media delivery
- Embedded and delivered in, and by, local communities

SMASHfestUK Practice

- Free but ticketed for audit purposes
- Participatory design created Zombies, Survival-Factor and user generated content
- Location: Deptford, London, SE8
- Asteroid Strike: London

Deptford

Why Deptford?

- Population: Social and Cultural Characteristics
- Estimated growth to 281,945 by 2016.
- In 2001, 21% of the borough's population was under the age of 16, (second largest in inner London).
- Proportion of people aged 16 to 24 will rise by 21% by the year 2016.
- About 34% of the population are of Black and Minority Ethnic origin.
- The proportion of residents of black Caribbean origin is the highest in London.

Why Narrative?

Because: “WHAT IF?”

WHAT IF – you go back to what inspired you as a child?

WHAT IF – you let your imagination run riot?

WHAT IF – formative sci-fi experiences shape your future outcomes?

WHAT IF?

The Physiological Society

LOTTERY FUNDED

Supported using public funding by ARTS COUNCIL ENGLAND

Middlesex University London

The Refinery

wellcome trust

L&Q creating places where people want to live

CIS SECURITY

lomography

SMASHfestUK

"Both scientific research and science fiction begin with the same two words: 'What if?'"

University of Minnesota,

physics professor James Kakalios

Inspiration

Maggie Aderin-Pocock: 'The Clangers inspired me to become a space scientist'

Hyperlocal Ownership

SMASHfestUK

Partners/Supporters/Sponsors

- The Stephen Lawrence Charitable Trust
- The British Library
- The Royal Institution

wellcome trust

Middlesex University London

The Refinery

engineers without borders uk

The Physiological Society

The Academy of Medical Sciences

SOCIETY OF Biology

the Albany

Royal Holloway University of London

DEPTFORD GREEN

ART ALERT

Institution of MECHANICAL ENGINEERS

ARTICIPATE MEDIA

ROYAL CENTRAL SCHOOL OF SPEECH & DRAMA
UNIVERSITY OF LONDON

moonshot

Royal College of Art

C4CC
CENTRE FOR CREATIVE COLLABORATION

Supporting Ideas, Collaboration & Innovation

Lewisham

redloop
the mdx design and innovation centre

Studio PSK

SMASHfestUK

The Event

- 10 days
- Over 60 events
- Two main venues (Albany Theatre and the Deptford Lounge)
- Ticketed reach – around 750*
- Unticketed festival attendance, est 2000
- Footfall reach/exposure, est 2000 (Deptford market and Deptford Lounge data)
- Online reach 10,000+
- Schools outreach programme 1000+ students in 6 schools.

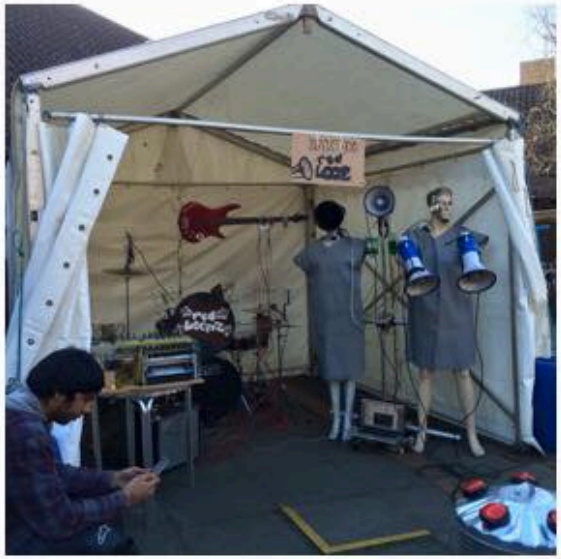
The Story

- An asteroid is heading for Planet Earth, specifically, Deptford.
- Prior to “the big one” smaller objects shower the Earth
- Damage to water infrastructure results in the emergence of a hitherto unknown disease
- Disease has “zombie-like” symptoms
- Fictional organisation STEM needs recruits to help fight these multiple threats
- Understanding survival physiology will increase your chances of getting through the threat alive

How events segued with storyline

- Top Ten Survival Tips
- Patient Zero
- Survival Supermarket Sweep
- Trauma
- The Survival Village at the End of the World
- The Moment of Impact Show
- Survival Factor
- The End of the World Cabaret

What was on at SMASHfestUK?



SMASHfestUK

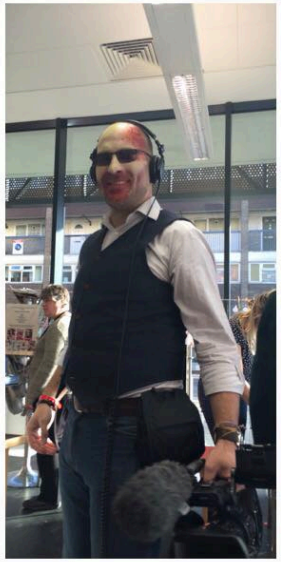
What was on at SMASHfestUK?

SURVIVAL SUPERMARKET SWEEP

Cat

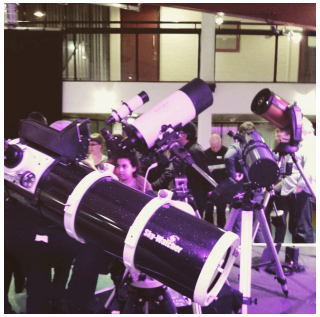
Red wine	595
Digestive Bisc	1972
Pancakes (50	1136
Ketchup	515
Tomatoes (tin	88
Jam (450g)	1000
Porridge oats (	3630
Fruit (tinned, 4	156
Corned Beef (	780.5
Peanut butter	2650.5
Totals	**12522**
Days You Survive For	**6**
Additional Water	**6**

You've certainly had a busy day. So far you've escaped being hit by a meteorite, avoided catching any nasty space diseases AND done a little shopping. Admit it, you've been preparing for this haven't you? Food quality score based on RDA (Recommended Daily Intake) and micronutrients = 5



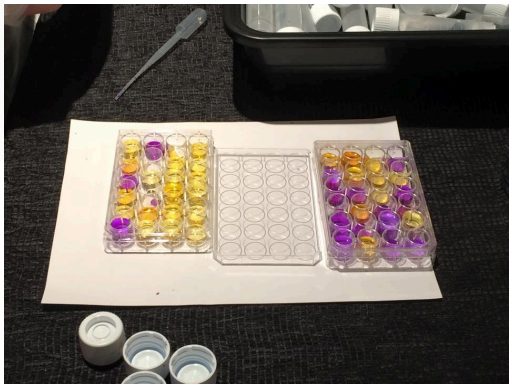
SMASHfestUK

What was on at SMASHfestUK?



SMASHfestUK

What was on at SMASHfestUK?



SMASHfestUK

What was on at SMASHfestUK?

SMASHfestUK

Unperceived Barriers

- Many users of the Deptford Lounge library/community space didn't know of the existence of the Albany Theatre, a local community theatre space just 150m away.

- Ticketing processes, even if the price was free were a barrier to engagement.

Quotes

- *When…I announced the next event happening in ten minutes, one child looked so excitedly and was pulling his father along. He smiled and looked at me and said, "He's never been to so much theatre before!" which I thought was lovely*. Cat McGahey

- *The event had a lively feel that fitted well with the community context. The overall theming worked well and allowed a lot of flexibility in the choice of activities and subject matter. The event was well attended and the audience were enthusiastic.* Howie Watkins – performance biologist

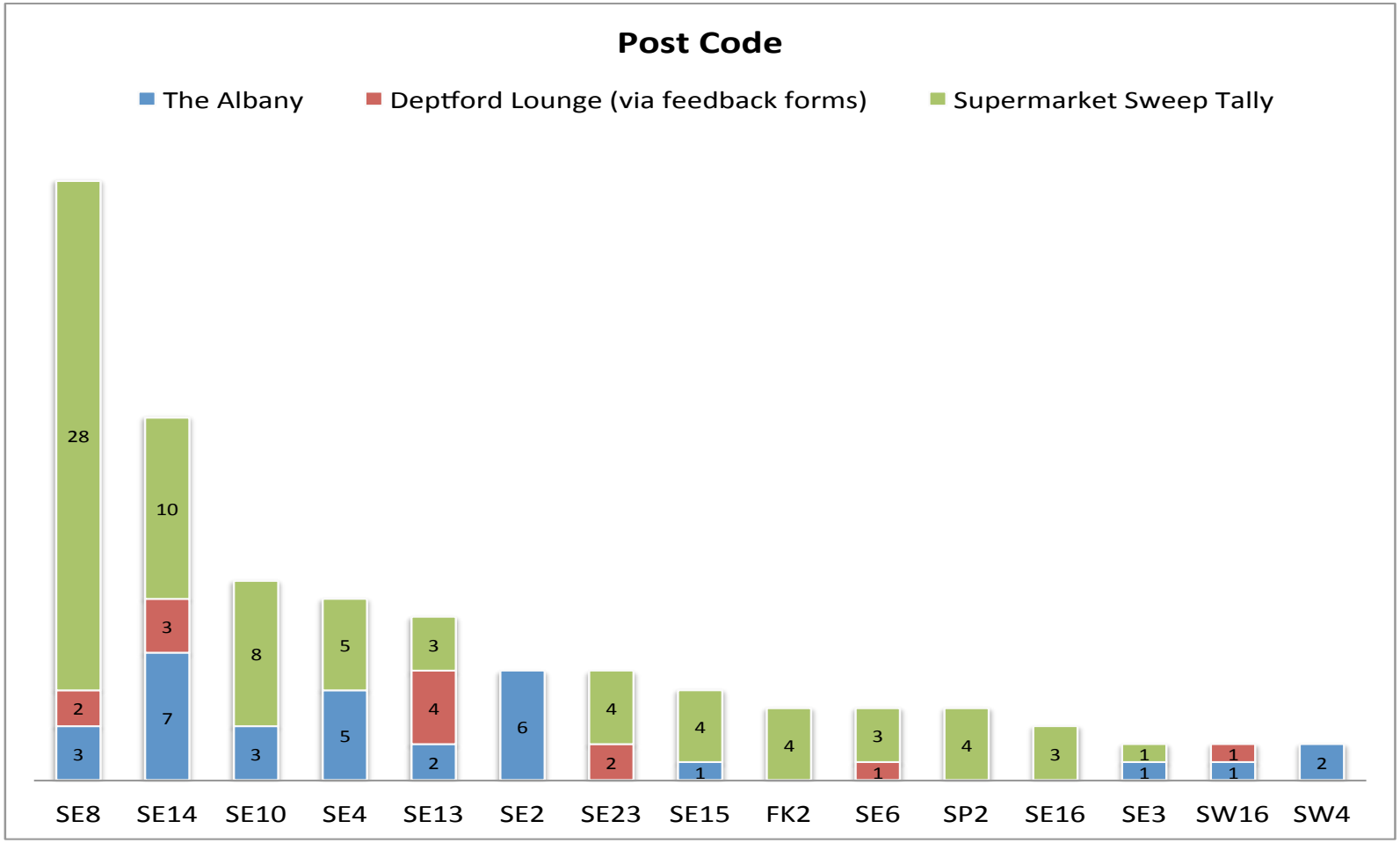
- *Both shows were a lot of fun. Lovely audiences for both and really enjoyed myself… Had a few parents tell us after the show that both they and their children had enjoyed.* Tiernan Douieb, stand-up comedian

- *I got lots of laughs so I guess that was good! I also got a few positive tweets after the careers event.* Sheila Kanani (Royal Astronomical Society)

Results

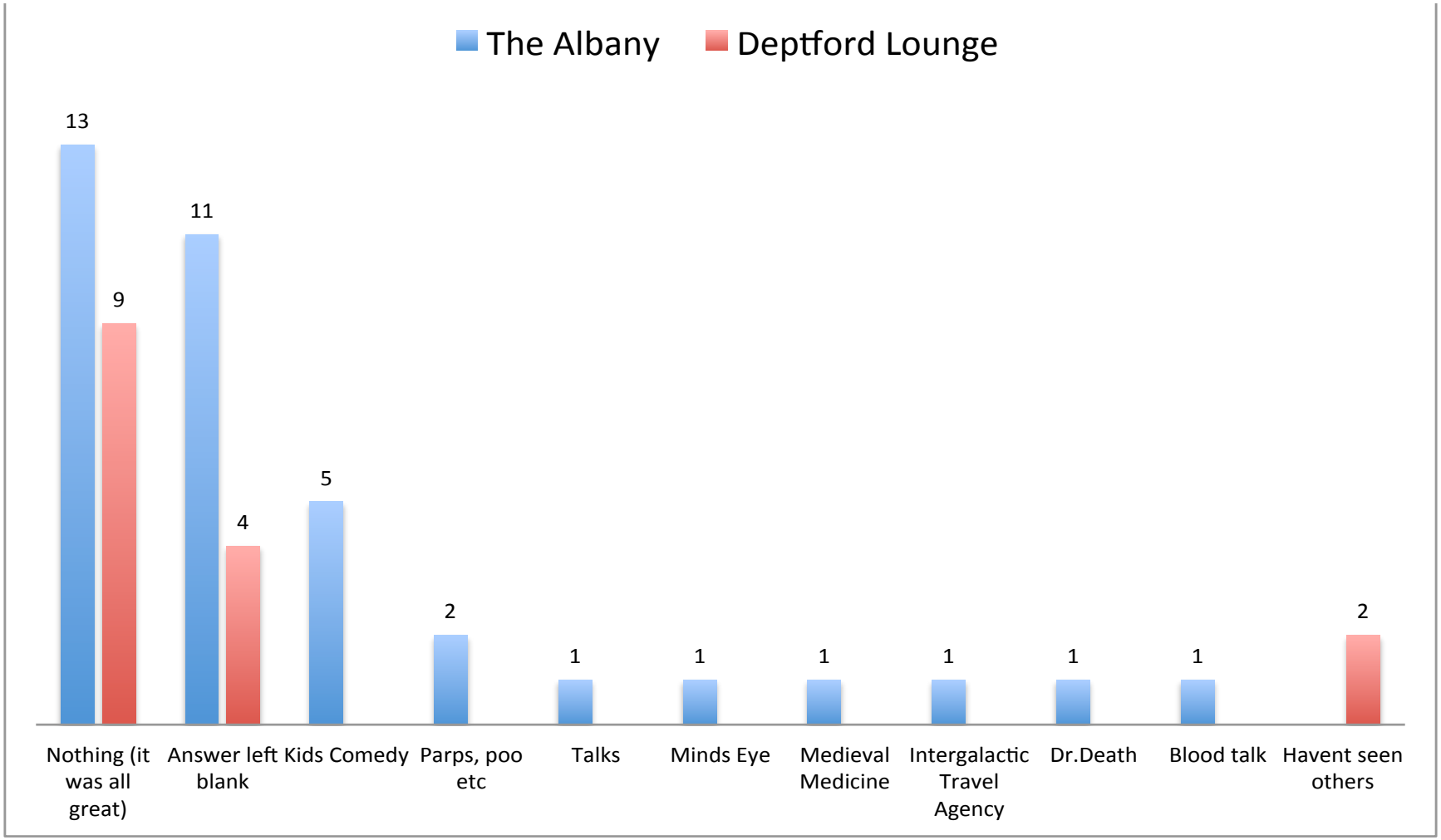
- New audiences reached
- Progression in learning
- Narrative a successful form of engagement
- Encouragement to return to Deptford by funders, local business and local authority.

Where did our visitors come from?



In addition each of the following postcodes had one response: CR2, DA5, E6, EH41, EH8, ES8, N3, NW9, RM2, RM25, SE1, SE12, SE18, SE24, SE28, SE32, SE45, SE5, SE9, SW16, SW9, TN14, TR1.

We asked ‘what didn’t you enjoy’?



Why did it work?

- Story -→ global threat -→ Horror (popular)
- But what's it got to do with me?
- In your community (the above)
- Story – natural multi-disciplinarity and interconnectedness

Learning outcomes

- “hard to reach” audiences are not “hard to reach” but you have to go to them, don’t expect them to come to you.

- Local communities such as Deptford are disenfranchised by centralised organisations taking swathes of funding that do not engage these audiences.

- It’s time to see more big institutions “popping up” in local communities.

- It’s NOT about the building, its about the space.

Barriers to SMASHfestUK development

- Funding
- Funding
- FUNDING

2016
SMASHfestUK