Walking with Robots

Public Engagement with Robotics, Animatronics and Artificial Intelligence

Evaluation Report

Final

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Sarah Jenkins

Jenesys Associates Ltd

PO Box 80
Pontyclun
CF72 9WZ

Email: sarah@jenesysassociates.co.uk
Tel: 01443 226549 / 07765 256945

Company No. 5667158

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Executive Summary

Introduction
With support from EPSRC, the Walking with Robots Programme (WWR) provides support for those working in robotics and related research to deliver public engagement events under the theme Robotics, Animatronics and Artificial Intelligence.

In February 2008, WWR ran a three-day workshop in Bristol to enhance the public engagement skills of both existing WWR network members and new researchers and to devise a number of new public engagement activities. Throughout the 12 months following this workshop, WWR provided ongoing support for workshop participants to deliver activities at a number of science festivals and other public engagement events.

Jenesys Associates Ltd was appointed to conduct an independent evaluation of these skills and relationship building activities. This report describes the evaluation findings. It identifies and documents the project's impacts, success factors and challenges, as well as learning points which could be used to inform the planning and implementation of future skills activities in the field of public engagement.

Evaluation Methodology

The evaluation used a mixture of quantitative and qualitative approaches. The evaluator was present during the first and last days of the three-day workshop to interview researchers informally and observe the dynamics of different sessions. Compulsory registration forms were completed by all 37 participants at the start of the workshop. 35 participants completed exit questionnaires at the end of the workshop. The evaluator interviewed 23 participants six-weeks after the workshop and 29 one year later. The evaluator observed six delivery events, where she also obtained audience feedback via 44 informal interviews and 69 audience questionnaires. She also obtained feedback from 28 researchers who took part in the first five delivery events and four science communicators who took part in three of the delivery events. The opinions of public audiences were obtained

Findings: Workshop

31 participants were male and 6 were female. 25 participants were aged under 30, with 25 to 29 (15) being the most common age group, reflecting the fact that workshop had targeted new researchers. A majority of participants (17) were PhD students, another 11 were also graduates.

16 participants had previous experience of science communication activities, with Open Days being the most common type of activity, followed by Public Lectures. 9 participants had heard of WWR prior to being informed about the Workshop. A total of 51 reasons were given for attending the workshop, with the most common being 'networking' or 'meeting people with similar and/or complementary interests'.

Participants appeared to be engaged throughout the workshop. Highest levels of engagement took place during the streamed sessions. There was some repetition of content between the different plenary sessions. Many participants did not know what to expect but were pleased with what they had taken part in. The delivery experience was generally agreed to be a highlight and attracted an estimated audience of 400 of the family visitors to At-Bristol. Their opinions and those of At-Bristol staff were very positive.

Most aspects of the workshop were highly rated. The plenary sessions were rated lowest overall, with main reasons being repetition between the sessions followed by a lack of interactive content.

Participants identified five most successful parts of the workshop: experience of presenting to a public audience; the blog session; networking and contacts; the streamed sessions in general; and the plenary session on grant funding. Fewer least successful aspects were identified. Again they fell into several categories: plenary sessions on the first day; pre-event information; constraints on activities that could be delivered to the public.

Suggestions for improvement include: increase scope for experiencing more than one stream; improve advance information; make plenary sessions more interactive and less repetitive; increase content about funding applications and project development.

23 researchers responded six weeks after the workshop when asked if they had participated in the blog or NSEW 2008 and also which WWR delivery activities they intended to take part in. 23 responses were received. 18 of the respondents had visited the Blog after the workshop. Five respondents had been involved in NSEW 2008. 14 respondents indicated that they wished to take part in delivery activities organised by WWR. 13 respondents, including six who also said they would be taking in part in WWR activities, indicated that they were planning to take part in other activities i.e. not organised by WWR. The only reason given for not intending to take part in any delivery activities was a lack of time caused by research or study pressures.

Findings: Delivery Events

A total of 17 UK-based researchers who had attended the workshop took part in seven delivery activities organised by WWR. The WWR activities at the delivery events attracted a total 8,369 visitors as measured by the numbers of WWR stickers that were handed to visitors.

An observation that was common to all events was the fact that planning and logistical issues were being handled by the WWR coordinator, which enabled the researchers to focus on audience interaction. The shift rotas which were used after the first event ensured there were always sufficient researchers to explain all the activities to visitors. The researchers appeared to work well in teams and were observed sharing ideas for different techniques to engage visitors.

Researchers were observed thinking about wider aspects of the different events, in particular event signage, advertising and floor plans or room layouts.

Researchers were generally very positive about their experiences. The WWR stands were thought to have been popular and attracted large audiences compared to others at the same events and locations. Positive responses from children and adults were appreciated by the researchers. Particular mention was made about the high quality of visitor encounters, which it was felt were aided by the number and variety of different activities that were being offered by WWR.

Individuals had different reasons for participating at the events but all said they generally thought that their individual objectives had been met. A common reason was the opportunity to use the skills they had learnt at the training workshop.

The researchers said they encountered no major logistical or planning issues. They recognised that a significant part of the logistics burden had been borne by the WWR coordinator.

All 17 researchers indicated that they had learned more about public engagement through their participation in the events organised by WWR. 12 said they valued public engagement more highly as a consequence of their experiences. All researchers were able to refer to at least one learning outcome. Their comments demonstrated that they were learning from one another and their interactions with audiences and other exhibitors.

The researchers were pleased with the mix of activities delivered by WWR. Their comments demonstrated that they were analysing the activities. When it took place, the blogging at events was described positively. The researchers who worked alongside science communicators were very positive about this interaction and its impact on audience members.

Findings: After One Year

29 researchers responded to the evaluator's request for information. With the exceptions of two who were based outside the UK, everyone said they could identify at least one impact, with improved communication skills and a new network of contacts being the most common answers. Those researchers who identified the highest number of impacts had all taken part in delivery events organised by WWR. Some researchers identified positive impacts that were not directly related to public engagement.

24 of the researchers had been involved in a total of 44 delivery activities, including the seven events organised by WWR. Only five of the researchers had not taken part in any public engagement activity. They attributed this to work pressures and research deadlines and three of them indicated they may do something in the future.

When asked to reflect on what they now considered to be the most useful elements of the workshop, the researchers gave a variety of answers. Opportunities for public engagement, better communication skills and confidence were respectively the most common.

22 researchers indicated that their colleagues or peers had reacted positively to their participation in public engagement activities with two saying they had expressed interest in attending a similar workshop. Two researchers mentioned that their activities counted towards their professional qualifications, which had helped to create a positive impression amongst peers.

22 researchers were intending to deliver public engagement activities in the near future and 25 indicated that they would like to receive ongoing support from WWR.

Findings: Audiences and Science Communicators Feedback

Audiences were very positive about the WWR activities. Most questionnaire respondents indicated that they found them to be very interesting and very educational. Interview subjects also rated the activities positively. Adults described them using phrases such as 'really good' or 'very informative'. Young people made comments such as 'amazing', 'awesome', 'cool' and 'wow'.

Audience members spent any length of time from a couple of minutes to nearly 45 minutes at the stands. Across all events the average observed dwell time for visitors was five to ten minutes. Almost all audience members who visited the stands took part in several of the activities (often 3 or 4), with over half trying all of them

From interviews and the questionnaire data, it was clear that different activities appealed to different visitors and most said they 'liked everything'. The activities that were mention most frequently as 'most favourite' were the walking robots, Mars Rover and Robot:Nobot. Interview subjects and questionnaire responses indicated that important success factors were the knowledgeable explanations from the researchers and the wide variety and interactive nature of the robotics on display. Very few respondents said they had a 'least favourite' aspect. A few suggested there could have been more interactive or hands-on elements.

Questionnaire respondents and most interview subjects appeared to have grasped the key messages of the project.

Science communicators indicated that participation in the WWR activities was a positive experience for them, the researchers and the audiences alike. They identified the collaboration with other science communicators and researchers and their own learning as particularly successful. The science communicators were very positive about their interaction with the researchers and its positive impact on audience members.

Successes

- Over two-thirds of the 37 participants were aged under 30 indicating that the workshop had successfully targeted new researchers.
- Participants responded extremely positively to the opportunity for performing to a public audience.
- The interactive streamed sessions allowed participants to focus intensively on a particular activity or area of interest.
- Participation in events gave rise to a wide range of learning impacts which demonstrated that the researchers learnt from one another and audiences as well as the WWR team.

Challenges

- Advance information was not clearly understood. Participants would have preferred more information about the exact structure and content of the workshop.
- The plenary sessions were considered to be less interactive and somewhat repetitive which resulted in them being identified as less successful than the streamed groups.
- Some participants looked on the workshop as the entire learning process, not the start of a process that also involved delivery events and other engagement opportunities.
- The full extent of the support and expertise provided by WWR was not clearly understood. Not all researchers took advantage of the support available to help them develop events, materials and activities.

Lessons

- A pre-event survey of participants would enable them to express their expectations to organisers and presenters.
- A pre-meeting of workshop presenters to discuss content could help to minimise duplication in plenary sessions.
- Greater emphasis at the outset of the workshop on the extent and nature of the ongoing support available through WWR could help participants to understand fully what resources and services are available.

Conclusions

The workshop was a success in terms of the number and variety of participants it attracted and the impacts it had on those participants. Participants who also took part in the organised delivery events identified the greatest number of impacts and were also most likely to be planning their own delivery activities. The delivery events were well received by science communicators and enjoyed by the public, who also indicated that they had understood some important messages about robotics.

A number of simple enhancements could have increased the impacts of the workshop. A very effective formula was developed for the delivery events. The number of participants who

benefitted from these events could have been increased if it had been made more explicit at the workshop that they formed part of the training process.

Researchers who used the considerable expertise and resources of WWR were highly complimentary. It provides a unique, focused, accessible source of support and expertise which has motivated and developed the skills and capacity of a significant cohort of researchers.

1 Introduction

With support from EPSRC, the Walking with Robots Programme (WWR) provides support for those working in robotics and related research to deliver public engagement events under the theme Robotics, Animatronics and Artificial Intelligence.

In February 2008, WWR ran a three-day workshop in Bristol to enhance the public engagement skills of both existing WWR network members and new researchers and to devise a number of new public engagement activities. The workshop was funded by a Partnerships for Public Engagement (PPE) grant, EPSRC reference EP/F026080/1.

Throughout the 12 months following this workshop, WWR provided ongoing support for workshop participants to deliver activities at a number of science festivals and other public engagement events.

Jenesys Associates Ltd was appointed to conduct an independent evaluation of these skills and relationship building activities. This evaluation has sought to explore the impacts of the workshop and the subsequent 'delivery' events on the researchers who attended the workshop. In addition, it has looked at the responses of both public audiences and a small group of science communicators who took part in the delivery events.

This report describes the evaluation findings. It identifies and documents the project's impacts, success factors and challenges, as well as lessons which could be used to inform the planning and implementation of future skills activities in the field of public engagement.

The findings are presented in Sections 3, 4, 5 and 6 of this report. Section 3 contains participants' feedback from the workshop and six-weeks afterwards. Section 4 describes their experiences at the delivery events. Section 5 outlines researchers' impacts and opinions as obtained 12 months after the workshop. Section 6 contains feedback from public audiences and science communicators.

2 The Evaluation

2.1 Evaluation Aims

The evaluation aimed to gather information on the following aspects of the project:

1. Who took part in the workshop, and why?
2. What were the participants' impressions of the workshop?
3. How much previous public engagement experience did the researchers have?
4. Did the workshop encourage researchers to engage in more public engagement?
5. Did it introduce researchers to opportunities for public engagement which they did not previously know about?
6. Did it improve the researchers' knowledge of possible partners or sources of support?
7. What were the immediate and longer-term impacts of the workshop on participants?
8. Who were the audiences for the activities at the festivals and events?
9. What was the impact of the activities on audiences?
10. What lessons/good practices are there from this project that would be of use to future practitioners?

2.2 Evaluation Methodology

The evaluation used a mixture of quantitative and qualitative approaches, which involved several strands:

Observation of the workshop. The evaluator was present during the first and last days of the three-day workshop to interview researchers informally and observe the dynamics of different sessions.

Registration questionnaires. Compulsory registration forms were completed by all of the 37 participants at the start of the workshop. These provided data about the researchers' demography, backgrounds, ambitions in public engagement and reasons for taking part.

Exit questionnaires. 35 exit questionnaires were completed by participants at the end of the workshop. These allowed participants to give their immediate impressions and some idea of their plans to deliver activities.

6-week e-survey. The evaluator received responses from 23 participants six-weeks after the workshop. They provided further insight into their opinions about the workshop; reviewed their activities during National Science and Engineering Week (NSEW) 2008; and obtained details of their plans for delivery in the future.

Observation of delivery events. The evaluator was present during six delivery events to observe dynamics and obtain audience and researcher feedback.

Post-event feedback. The evaluator obtained feedback from 28 researchers who took part in the first five delivery events. She also obtained feedback from four science communicators who took part in three of the delivery events. Both groups provided information about the impacts of the events on them and the public audiences.

12-month follow-up. The evaluator interviewed or received e-mail responses from 29 researchers one-year after the workshop. They provided insights into the longer-term impacts of the workshop and obtained details of researchers' future plans and requirements for ongoing support from WWR.

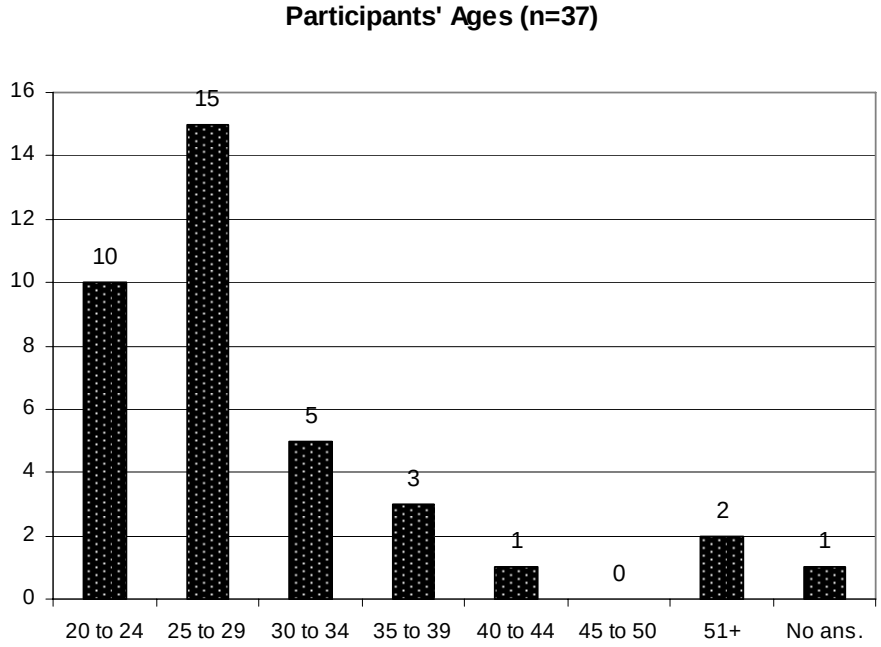
Audience feedback. The opinions of public audiences at delivery events were obtained via informal interviews and audience questionnaires. Informal interviews took place with a total of 44 visitor groups and 69 audience questionnaires were completed. Details of the audience feedback were sent to the relevant participating researchers after the first four events.

3 Findings: Workshop Feedback

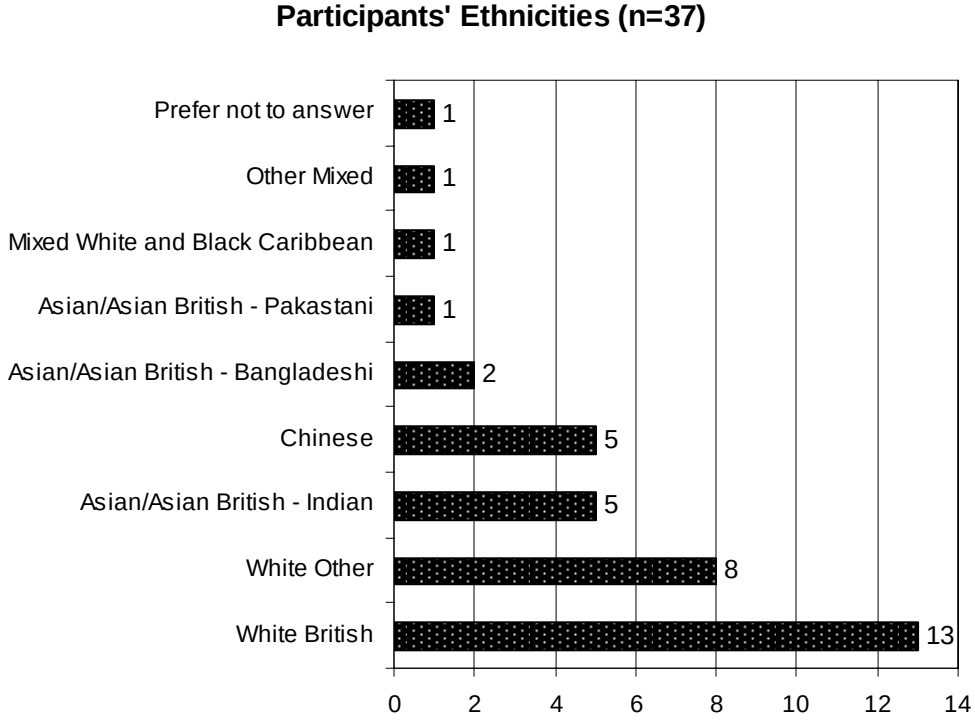
3.1 At the Workshop

3.1.1 Participants' Demographics

31 participants (83.8%) were male and 6 were female. 25 participants (67.6%) were aged under 30, with 25 to 29 (15) being the most common age group, reflecting the fact that workshop had targeted new researchers.



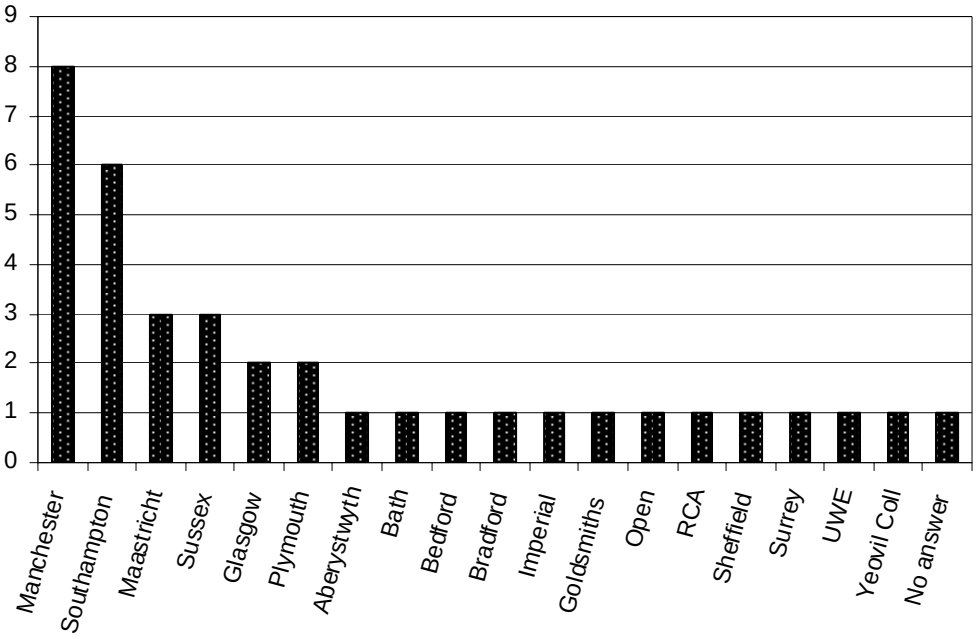
21 participants (56.8%) were White, with White British (13) being the most common ethnicity.



3.1.2 Participants' Backgrounds

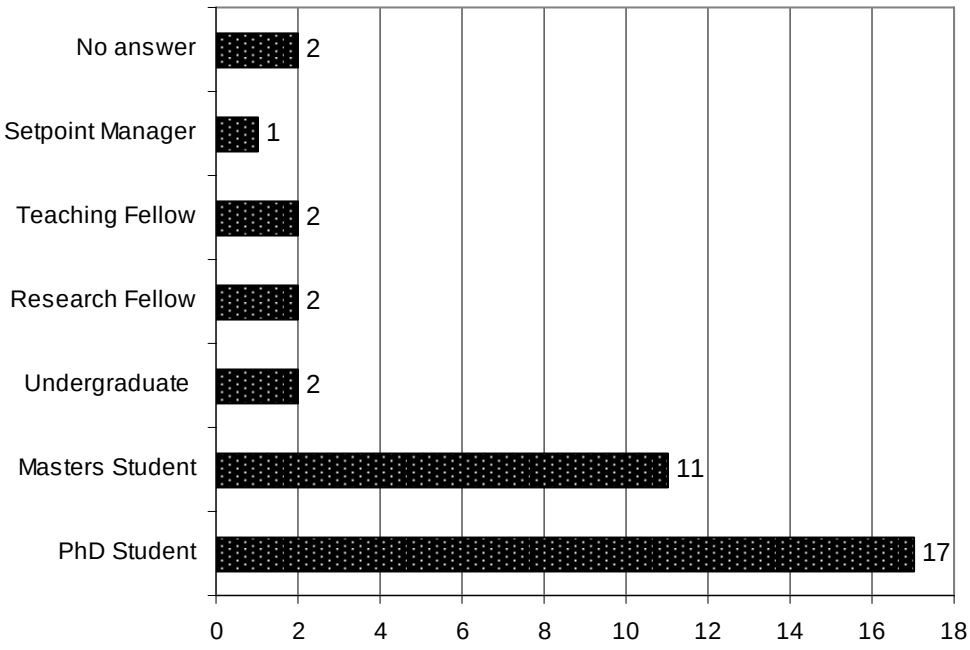
One participant did not name an organisation and the remaining 36 participants came from 18 organisations, including 16 universities. Manchester University was the best represented with 8 participants, followed by Southampton University with 6. With the exception of three participants who travelled from the Netherlands, all came from within the UK.

Participants by Organisation (n=37)



A majority of participants (17) were PhD students, another 11 were also graduates. Two participants did not answer this question.

Participants by Position (n=37)



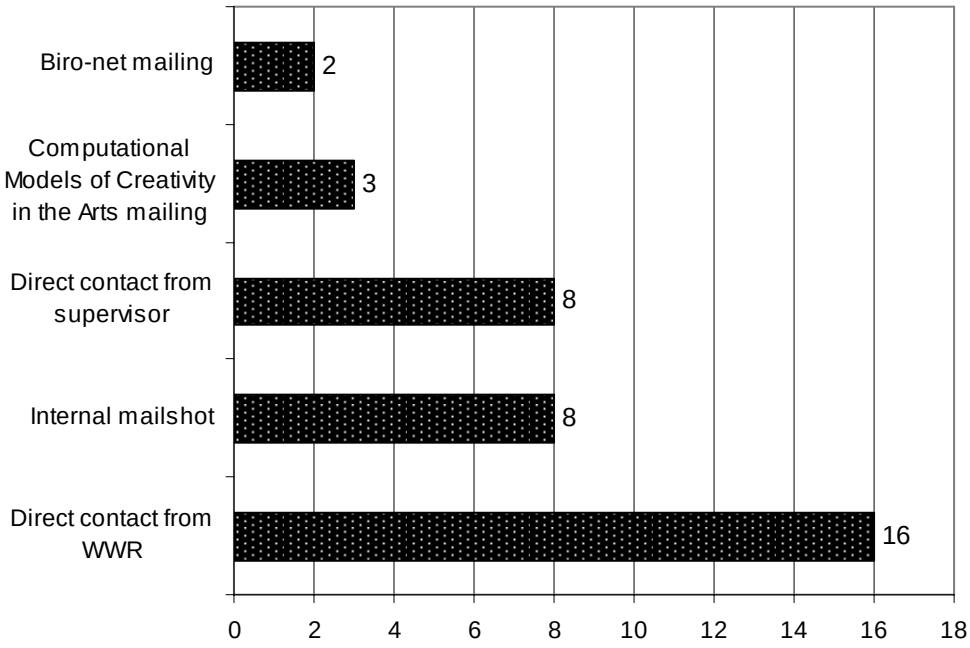
The participants represented a range of relevant ***scientific disciplines***. 12 specifically mentioned robotics or robots and 8 mentioned artificial intelligence. 7 participants said their research was wholly or partly funded by EPSRC.

16 participants (43.2%) had ***previous experience of science communication activities***, with Open Days being the most common type of activity, followed by Public Lectures. 3 had participated in National Science and Engineering Week and none had participated in BA activities.

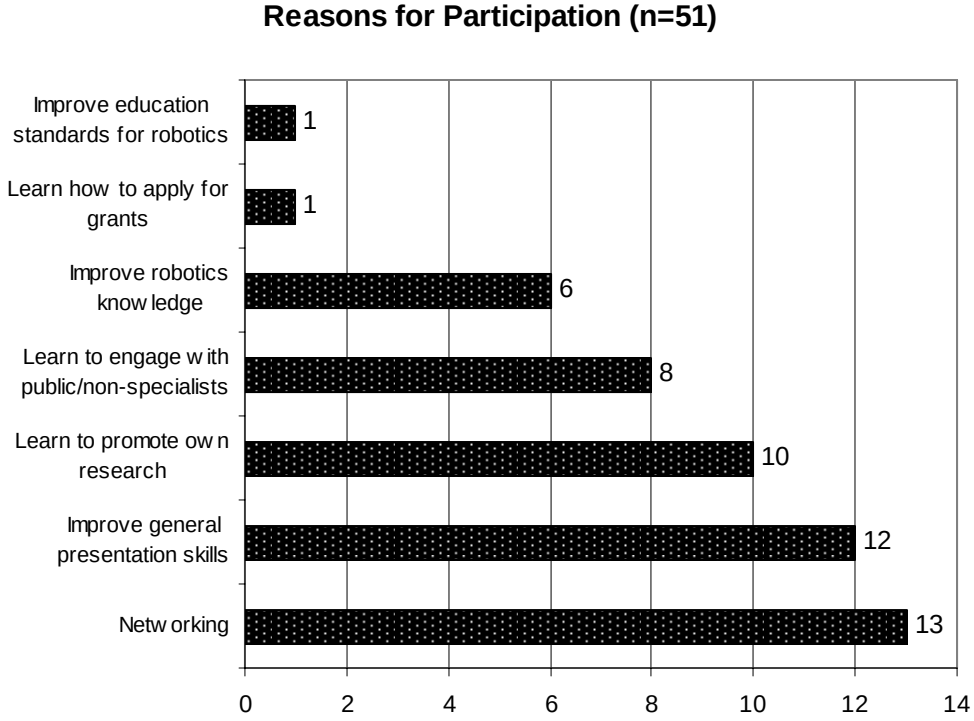
3.1.3 Reasons for Participating in the Workshop

9 participants (24.3%) had heard of WWR prior to being informed about the Workshop. 16 participants (43.2%) were informed directly by the organisers about the workshop.

How Participants Heard About the Workshop (n=37)



Participants were asked why they decided to attend the workshop. A total of 51 reasons were given, with the most common (13) being ‘networking’ or ‘meeting people with similar and/or complementary interests’. This was followed by ‘generally improving presentation skills’ (12) and ‘learning how to promote my own research’ (10). 8 participants specifically mentioned wanting to learn how to communicate with the public or non-specialist audiences. 6 wanted to improve their knowledge of robotics. The graph overleaf summarises these responses.



3.1.4 Evaluator's Observations

37 people took part in the workshop, which comprised plenary and streamed sessions. The plenary sessions communicated information about public engagement and all took place on the first day, with streamed working sessions taking up most of the second and third days. The third day culminated in delivery of public engagement activities in a hands-on exhibition area of the At-Bristol science centre.

The streamed sessions were titled:

- Talks, presentations and shows
- New media
- Demonstrations and make-and-take activities
- Discussion and debate events

Participants appeared to be engaged throughout the workshop. Highest levels of engagement took place during the streamed sessions, when successful team-working was also observed. The public engagement terminology used by presenters sometimes caused confusion and required further explanation, e.g. the definitions of debate and dialogue. This did not appear to affect engagement levels adversely, although it sometimes distracted from the focus of sessions and lead to lengthy discussions about definitions, which took significant time to conclude.

There was some repetition of content between the different plenary sessions. Fortunately, the presenters also appeared to be working as a very effective team and were keen to share opinions and experiences with one another. As a result of their collaboration and the streaming of activities, duplication of content was avoided after the first day.

The public performances of activities developed during the workshop attracted an estimated audience of 400 of the visitors to At-Bristol, who were mainly family groups. Their opinions and those of At-Bristol staff were very positive. Not all the activities met with instant success and a number of the workshop participants were seen enthusiastically modifying their activities to enhance their audience engagement and impact. All the participants were encouraged to reflect

on the activities, with almost all of them demonstrating a good understanding of what was needed to attract and engage the public.

3.1.5 Participants' Comments

The evaluator was able to speak to participants between sessions in order to gain their views of the workshop. It was evident that all had generally positive views about their experiences.

A common theme was **expectations**. It was clear that many participants did not know what to expect but were pleased with what had taken place. It is possible that their apparent uncertainty could be attributed in some part to the unusual, very hands-on nature of the workshop, which is not often replicated elsewhere. Typical comments included:

"Not what I thought it would be – but it's great."

"This isn't what I expected but I am really pleased with its potential."

"Informative and educational despite not being what we expected."

When asked what they expected, participants had a wide range of ideas including:

"More about robotics."

"I thought we'd actually write a practice grant proposal."

"Expected more about grant funding and rationale of funders."

"Needs to be clearer about whether you work on your individual interests or the outcome of a group discussion."

Any critical comments were most common about **the plenary sessions.** Typical comments included:

"Too much talking on the first day. A lot of it was repetitive."

"There should have been more activities for us to do on day 1. It got boring."

"The plenary sessions should have been split up around the three days. It would have helped concentration levels and reduced the feeling of repetition of content."

The **on-floor experience** was generally agreed to be a highlight. Examples of related feedback:

"Performing to a public audience was absolutely fantastic. Where else would you get the opportunity?"

"Pulling off the demonstration was amazing. I could not have done it without the workshop."

"I loved working with the kids on the floor – they were fantastic."

Public engagement **terminology and jargon** required some interpretation. The specific meaning of everyday words was particularly challenging:

"We spent ages agreeing what was meant by terms like debate and dialogue, which meant we took a while to focus on what we should have been doing."

"Some presenters used terms without explaining them. Most of us are new to public engagement and need the terms to be explained."

"I feel like I am learning a new language."

3.1.6 Public Audience Comments

The audience for the activities was family groups, most with children aged under 10. They all reacted positively, particularly to the fact that those delivering the activities were researchers or scientists. Examples of their comments included:

"It is fantastic for children to meet real scientists."

"Are they really only learning to do this? They are fantastic."

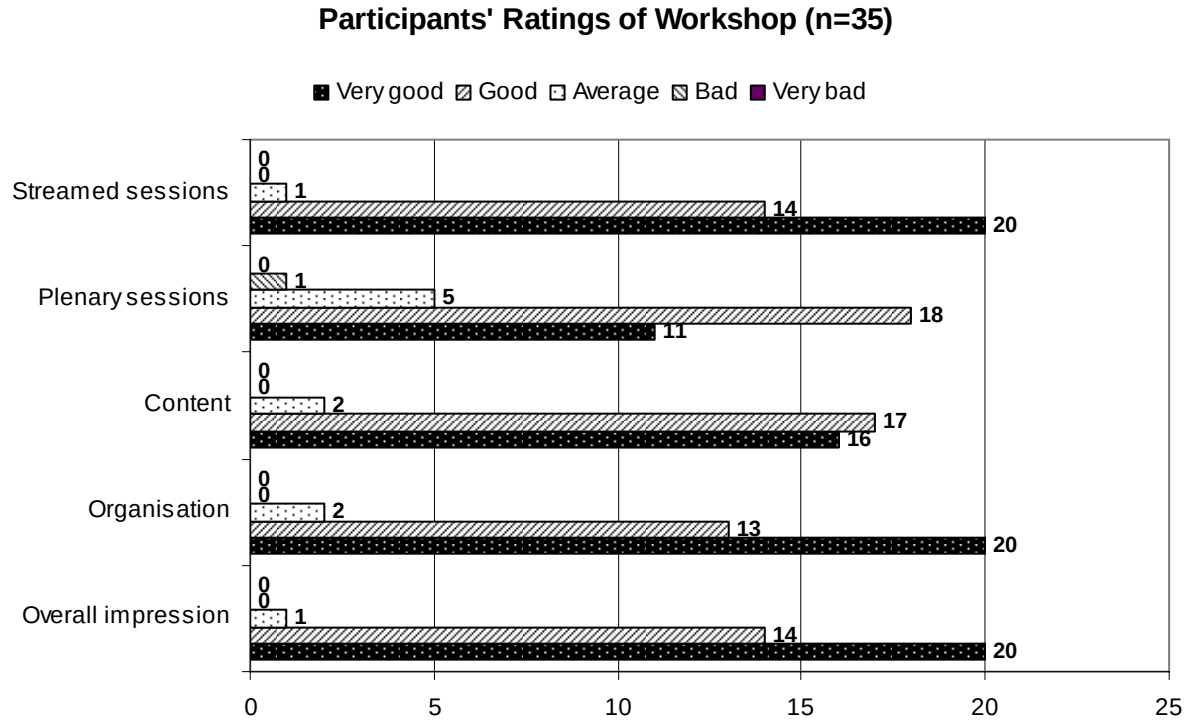
"My kids loved the walking robot. They could have spent all afternoon with it."

"It was great to have so many different things for the children to do on the same theme. Hopefully having done lots of different things will reinforce what they learnt."

"Having real scientists gives it real credibility. I can't believe they are only learning to do this."

3.1.7 Participants' Ratings of the Workshop

Most aspects of the workshop were highly rated. The plenary sessions were rated lowest overall, with main reasons being repetition between the sessions followed by a lack of interactive content.



3.1.8 Most Successful Aspects

Participants were asked to identify what they believed were the most successful parts of the workshop. Their responses fell into five categories: experience of presenting to a public audience; the blog session; networking and contacts; the streamed sessions in general; and the plenary session on grant funding.

Experience of a public audience

Comments about the public activities were very positive, with most emphasising the unique nature of the opportunity and a sense of enjoyment and or achievement. Examples of those comments include:

"It exposed me to thinking about talking to young people."

"I think I succeeded in attracting the kids with the short presentations and hope they

enjoyed it."

"Pulling off the demonstration and walking around as a robot was a great feeling."

"Managing to put complex research in kids' words."

"We had a unique chance to talk to general public."

"Presenting in a different venue to usual i.e. more informal."

Blog reporting

Participants in the 'New Media' stream created a blog for the workshop. This gave them an opportunity to see what was happening in all the other streams at the same time as learning and developing their written communication skills. Other participants also valued the blog as it provided them with information about all the streams. Comments included:

"Working as a journalist. Doing something I never encounter as a researcher."

"The hands-on aspect of the new media team."

"Being able to grasp what everyone was doing through the new media group."

"Realising that science communication can be just as effective across the Internet."

"Knowing how to set up a blog will help me create a research blog."

Networking/contacts

The contacts made during the workshop were highlighted as a success by participants in all four streams. Their comments mentioned both fellow participants and presenters.

"Getting to meet people in the same field."

"Getting ideas for future activity. Networking with other researchers."

"Networking, meeting like-minded people."

"Meeting experienced people."

Streamed sessions

The streamed sessions were praised for their interactive nature and the quality of team working that they involved.

"Streamed sessions, where we actually got to do something, not just listen."

"Talks and team work in the streamed session."

"Working in streams – where we got team spirit."

"Developing and practising my presentation skills in a critical but supportive group."

Grant funding

Comments about the session on grant funding praised its practical nature.

"Grant writing and pitching a bid.

"The grant funding session helped me think about how I present my work to peers and the public."

3.1.9 Least Successful Aspects

Participants also described least successful aspects of the workshop, although these were fewer than the most successful aspects. Again they fell into several categories: plenary sessions on the first day; pre-event information; constraints on activities that could be delivered to the public.

First day plenary sessions

The plenary sessions were criticised for being repetitive and less interesting than the streamed activities. Typical comments included:

> *"First day lectures perhaps too repetitive."*
>
> *"Plenary sessions were boring and had repetitive examples."*
>
> *"Not one single mention of History and Philosophy of science in plenary. Therefore an assumption that scientists are the only experts on science."*
>
> *"The plenary sessions on first day. They were so boring and vague."*

Pre-event information

Participants indicated that they would have preferred more detailed information prior to the workshop, in particular the exact details of the content and information about membership of the different streams. Examples of comments included:

> *"Advance information regarding what was going to be done needed to be more detailed."*
>
> *"Pre-event communications and clarification could be improved (but it was great in the end)."*
>
> *"I came prepared to do something different."*
>
> *"We could not get advance information about which group we are in and we could not prepare."*

Constraints on delivery activities

Participants expressed disappointment that they could not always deliver the activities that they hoped to. Space and time restrictions were mentioned along with the fact that there was no scope for activities that were not hands-on (e.g. talks) to be presented to the public.

> *"I couldn't do the things for which I was trained in the stream."*
>
> *"I didn't get to do the project that I wanted to do on the exhibition floor."*
>
> *"I really wish that we would have had more time for demonstrations."*
>
> *"Many constraints for demos - mainly space."*
>
> *"The talks and shows group did not have everyone going in front of the public*

3.1.10 Suggested Improvements

Suggestions for improvement can be categorised as follows: increase scope for experiencing more than one stream; improve advance information; make plenary sessions more interactive and less repetitive; increase content about funding applications and project development. Example comments for each category appear below.

Inter-steam sharing

> *"Allow involvement in more than one stream."*
>
> *"I would have liked more exposure to the work the other streams were doing either during the course or as a training pack received afterwards."*
>
> *"Possibly mix up streams to increase variety of learning although this is not an easy task."*

"Different groups were working separately and the communication between them was not good enough – improve it."

Pre-workshop information

"Give clearer prior information about content of streams and objectives."

"Improve clarity of content in prior marketing. Would perhaps increase numbers."

"Give more information about workshop before we come here. For example other websites, style of workshop."

Plenary sessions

"Try to change the first day (more activities/things to do), other 2 days are excellent."

"Increase number of activities. Decrease lectures."

"Squeeze long sessions into short ones. First day sessions were very lengthy and overlapped in terms of content."

Project development and funding

"Allow a bit more project development/preparation for actual funding bids."

"Focus on bid writing and developing projects for funding."

"Actually help me write a grant proposal."

3.2 Feedback Six weeks after the Workshop

Six weeks after the workshop all participants were contacted to find out if they had participated in the blog or NSEW 2008 and also which delivery activities organised by WWR that they intended to take part in. 23 responses were received.

3.2.1 Workshop Blog

18 of the respondents had visited the Blog after the workshop. All indicated that they thought it provided a reasonable account of the workshop, although it was generally felt that it was unlikely to be used as a forum for participants to continue to network with one another. Two respondents said they were using Facebook to maintain contact with a small group of individuals with whom they had most in common. Others had either contacted individuals directly by email or had not needed to contact anyone from the workshop.

3.2.2 Science and Engineering Week 2008

Five respondents had been involved in NSEW 2008, with others citing pressure of work, being out of the country and not knowing local organisers as their reasons for not being involved. Of the five who had taken part, three had delivered multiple activities and two were observers. All indicated that they had found the experience to be very rewarding. Two of those who delivered multiple activities said they regularly took part in NSEW.

3.2.3 Plans for Delivery

14 respondents indicated that they wished to take part in delivery activities organised by WWR, which at the time were planned for Royal Bath and West Show (28-31 May), Cheltenham Science Festival (4-8 June) and Royal International Air Tattoo (12-13 June). 13 respondents, including six who also said they would be taking in part in WWR activities, indicated that they were planning to take part in other activities i.e. not organised by WWR. Of these, two were

dependent on the successful outcome of funding applications to EPSRC. A further five described specific activities that they would be taking part in, including University out reach programmes and science fairs. The remainder said they were hoping to do some activities but did not yet have any specific plans. The only reason given for not intending to take part in any delivery activities was a lack of time caused by research or study pressures.

4 Findings: Participants' Experiences of WWR Delivery Events

A total of 17 UK-based researchers who had attended the workshop took part in seven delivery activities organised by WWR. These took place at a number of different locations around the UK. The six events marked with an asterisk * were observed by the evaluator. The delivery activities took place at:

- * Imagineering Fair, Royal Bath & West Show, Somerset on Friday 30 May 2008 (www.imagineeringweb.co.uk) – 4 day event
- * DiscoverZone at Cheltenham Science Festival on Thursday 5 June 2008 (http://cheltenhamfestivals.com/science/) – 5 day event
- * Science Explosion at the BA Festival of Science, Liverpool on Sunday 7 September 2008 (www.britishscienceassociation.org/web/BritishScienceFestival) – 2 day event
- * Hands-on Exhibition at the BA Festival on Monday 8 September 2008 (www.britishscienceassociation.org/web/BritishScienceFestival) – 4 day event
- * Imagineering Fair, Ricoh Arena Coventry on Saturday 11 October 2008 (www.imagineeringweb.co.uk) – 2 day event
- Bright Sparks at Brighton Science Festival on Saturday 21 and Sunday 22 February 2009 (www.brightonscience.com/programme/brightsparks) – 2 day event
- * Big Science Saturday at Brighton Science Festival on Saturday 28 February 2009 (www.brightonscience.com/programme/bss) – 1 day event

With the exception of Big Science Saturday at the Brighton Festival, the events were visited by family audiences and school groups. Big Science Saturday targeted adults specifically.

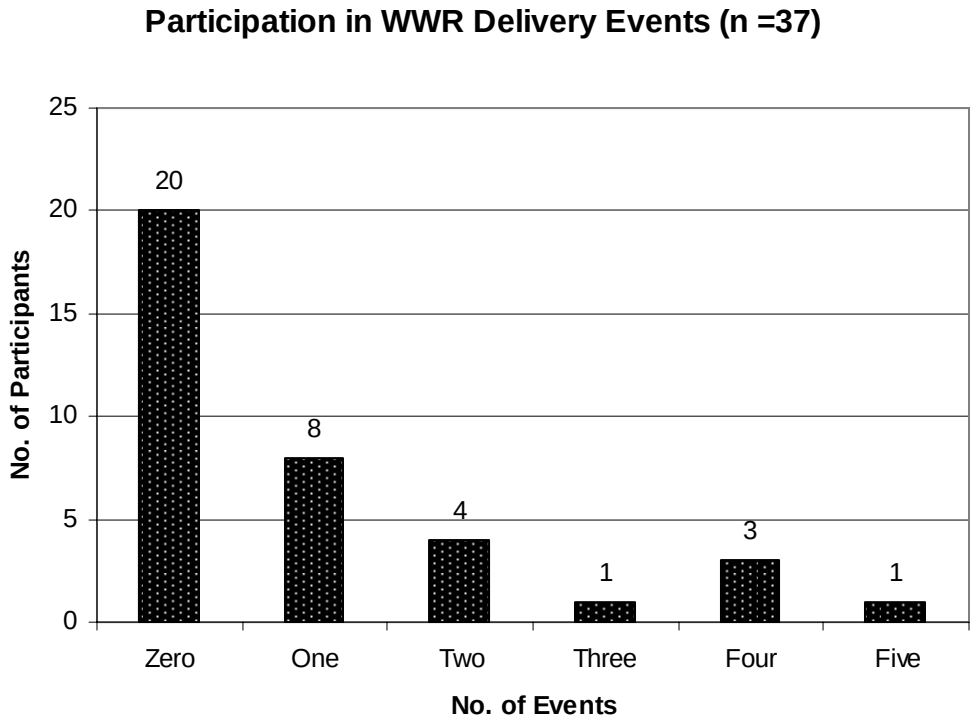
The WWR Co-ordinator attended all the events, booked stands and accommodation and sent out comprehensive briefings ahead of each one. She also provided many of the activities that were delivered and WWR delivered a minimum of four different engagement activities at every event. With the exception of Brighton Science Festival, which WWR attended at the researchers' request, the WWR Co-ordinator identified the events where the activities would be delivered.

The WWR activities at the delivery events attracted a total 8,369 visitors as measured by the numbers of WWR stickers that were handed out. At all events, workshop participants constituted all or the majority of those who were delivering activities. The visitor numbers are summarised in the table overleaf. Across all events the average observed dwell time for visitors was five to ten minutes, with some as long as 45 minutes.

Delivery Event	No. of Workshop Participants	Total no. of WWR 'Deliverers'	No. of Days	WWR Stickers	Official estimate of visitors
At-Bristol	37	37	0.5	400	400
Royal Bath and West Show	6	7	4	1008	21000
Cheltenham Science Festival	9	13	5	3019	10000
BA Festival of Science - (National Museum)	14	14	2	755	9668
BA Festival of Science - (Schools Programme)			4	1135	3700
Imagineering at Ricoh	4	4	2	911	5500
Brighton Science Festival - Family Fun Day	3	6	2	755	2047
Brighton Science Festival - Big Science Saturday	5	8	1	386	488
		TOTAL	20.5	8369	52803

4.1 Participation Rates

17 researchers who had attended the workshop took part in between one and five delivery events each, with nine taking part in two or more events, as shown in the following graph.



4.2 Evaluator's Observations of Delivery Events

An observation that was common to all events was the fact that planning and logistical issues were being handled by the WWR coordinator, which enabled the researchers to focus on audience interaction. The coordinator was constantly thinking about ways to enhance the impact of the stand and individual activities. It was noticeable that many of the researchers recognised this and began thinking about and suggesting enhancements themselves. They were observed discussing the layouts of the stands and their impact on visitor appeal.

The researchers also recognised different audiences without prompting and were observed adapting and trying different techniques to engage teenagers and adults in particular. The shift rotas which were used after the first event ensured there were always sufficient researchers to explain all the activities to visitors. The researchers were flexible and nearly all of them took the opportunity to present every activity. They appeared to work well in teams and were observed sharing ideas for different techniques to engage visitors.

Some researchers were occasionally at first reluctant to move 'outside' a designated stand 'area' stand in order to engage visitors proactively. However their initial reluctance reduced when they gained confidence from copying the WWR coordinator and more experienced members of the team.

Researchers were observed thinking beyond the WWR activities. They took time in quieter periods to talk to staff on other stands and were overheard to be sharing experiences and learning points. They were observed thinking about wider aspects of the different events, in particular event signage, advertising and floor plans or room layouts.

At the first delivery event, the WWR coordinator was present throughout. She was frequently pressed for information about pastoral issues, such as meals and other things that the researchers could have found out for themselves. This caused unnecessary pressure for the coordinator and was not repeated at subsequent events where she took part in the shift rota.

4.3 Researchers' Feedback

4.3.1 Overall Opinions

When asked their overall opinions about their experiences at the different events, researchers were generally very positive. The WWR stands were thought to have been popular and attracted large audiences compared to others at the same events and locations. It was suggested that activities which explain the technology and robotics were more engaging than 'play' activities. Positive responses from children and adults were appreciated by the researchers. Particular mention was made about the high quality of visitor encounters, which it was felt were aided by the number and variety of different activities that were being offered by WWR. This was believed to have enhanced the experiences of both researchers and exhibition visitors.

Individuals had different reasons for participating at the events but all said they generally thought that their individual objectives had been met. A common reason was the opportunity to use the skills they had learnt at the training workshop, other reasons included:

> *"A chance to give something useful back after the training course."*
>
> *"An opportunity to counteract negative media coverage of robots and robotics."*
>
> *"A more sociable and less tedious way than doing it on my own."*

The researchers' comments indicated that they had thought objectively and analytically about the different audiences, locations and engagement activities. The following quotes are examples that illustrate this:

"The show attracted family audiences and those who would not normally encounter science, which meant I had to think hard about how to pitch my communications."

"It would have been good to see more teenagers. However I now realise that family audiences usually consist of adults and younger children."

"The fact we had lots of different activities meant that visitors were able to experience a different type and wider range of science to that displayed by many of the other stands."

"Activities designed for children also appealed to adults. This was surprising and good as it gave us the chance to explain the science at a more detailed level."

"It was disappointing that students aged 13-16 appeared to show less interest than younger kids, but talking to other stands this is usual."

"I was surprised at the numbers of girls who were attracted by the robots."

"It was helpful to have a clearer idea about behaviour with children e.g. is it OK to place a sticker on a child yourself?"

There were a number of comments about disappointing visitor numbers at the BA Festival, particularly at the Hands-on exhibition. These were mirrored by feedback from other exhibitors at these events. The WWR researchers questioned the logic of organising schools visits during the first week of the school year, which, along with the focus on talks for the school groups, they thought had restricted visitor numbers. They suggested that a visit to the exhibition should be programmed for all school groups, allowing them sufficient time to experience the exhibits in full. Their thoughts demonstrate how actively the researchers were thinking about public engagement more generally.

4.3.2 Organisation and Logistics

The researchers said they encountered no major logistical or planning issues. References were made to the need for advance planning; how events have a habit of creeping up on you; and the fact that having pre-prepared materials was a real bonus. For some researchers who were intending to bring their own activities to events, work pressures meant that they were not as prepared as they would like to have been.

Researchers recognised that a significant part of the logistics burden had been borne by the WWR coordinator. Her contribution was highly appreciated in dealing with issues ranging from accommodation and transport, to planning stand layouts, providing materials and preparing activities.

At the early events, many researchers said they found them very tiring. They thought they should have organised shifts better and shared activities to help them experience the full range of the activities on the stand. These changes were implemented for later events, where the shift rotas were praised for helping to maintain energy levels.

Several researchers commented on the relatively high expense of accommodation and meals in Cheltenham. They indicated that it would have been useful to know this in advance. This issue was addressed at later events where accommodation costs were charged directly to WWR and meal allowances were provided.

4.3.3 Learning and Development

All 17 researchers indicated that they had learned more about public engagement through their participation in the events organised by WWR. 12 said they valued public engagement more highly as a consequence of their experiences. All researchers were able to refer to at least one learning outcome. Their comments demonstrate that they were learning from one another and their interactions with audiences and other exhibitors. They identified a range of learning outcomes, including:

"Knowledge that I can communicate to the public."

"I learnt new approaches to communicating with the public."

"Experience of a wide range of public engagement activities."

"Greater understanding of the various tasks that are needed to plan and deliver successful public engagement."

"That we need to entice the younger generations more towards electronic engineering to give a real boost to robotics in the future."

"I learnt how to sell my ideas and develop a good public relationship."

"I was provided with suggestions and ideas about the publics' expectations from scientists."

"The excitement of STEM needs to be communicated to students and adults outside the classroom."

"I learnt more about how to engage with the public from my fellow WWR team members; we swapped of skills and techniques just by working together and listening."

"Having time off allowed us to focus more sharply on visitors and the activities when we were actually on the stand."

"I have clearer ideas about future activities based on my own research."

"Having a story around science helps in communicating and relating it to audiences."

"The need to communicate on an individual level in response to the understanding and interests of individual audience members."

"The ability to discuss with adult members of the public some topics that could be further developed in research."

"The need to think more about how to engage audiences in the 13 to16 age group and the understanding that this is a difficult goal."

4.3.4 Activities

The researchers were pleased with the mix of activities delivered by WWR. Their comments demonstrated that they were analysing the activities. They highlighted Robot:Nobot and 'make and take' robotic hands for encouraging visitors to spend longer times (sometimes over 30 minutes) at stands. The former was noticed to have encouraged debate between visitors and researchers and amongst groups of visitors. The walking robots were praised for their ability to move 'into audiences' and draw new visitors to the stand. The Roomba vacuum cleaner robot was thought to have been particularly successful at initiating interest from adults.

None of the activities were thought to have been unsuccessful. It was suggested that some sort of competition, e.g. a robot race, could have increased visitor appeal. It was noticed that other stands offering this type of activity appeared to attract greater numbers of older children, whereas it was thought that most WWR activities had greatest appeal for younger children (under12s) and adults.

Opportunities to meet with and observe exhibitors on other stands were identified as being useful in terms of helping researchers to think critically about their own activities.

When it took place, the blogging at events was described positively. It was thought to have provided an additional opportunity for researcher learning and it also enabled people who could not visit the exhibits to experience WWR. Researchers said they would like to know if the WWR website received more visitors during or immediately after these events.

Researchers were agreed that the WWR bookmarks were not popular; they suggested postcards, such as those used by the Heart Robot project or featuring the Robot:Nobot pictures may have been more successful.

The inclusion of the Heart Robot activity at two events provided another dimension to the WWR activities and also provided the Heart Robot co-ordinator, who had participated in the training workshop, with opportunities to implement some of his learning about science communication.

4.3.5 Interaction with Science Communicators

The researchers who worked alongside science communicators were very positive about this interaction and its positive impact on audience members. Specific comments included:

"Being one of the roboticists I was explaining things very technically, whereas the science communicators were explaining things with a much more lay-person attitude."

"I also thought that the fact that there were a lot of females in the group showed that robotics are not the domain of men and that attracted more people."

"All the science communicators were brilliant and I believe that they promoted robotics better than us by demonstrating in a non-technical, lucid style."

"Within first couple of hours, they learnt the technical details of the robots involved in the demonstration and did an excellent job."

"Excellent - they bought a real enthusiasm to the festival and their interest in both robotics and public engagement was clear."

"They shared their previous experiences, which was useful. Just watching how they communicated was good as well. Also, discussed their masters project, interesting to hear different approaches to science communication such as a play."

4.3.6 Highlights

The researchers identified a number of highlights from their experiences, most of which reflect their success in engaging and inspiring audiences:

"At the end of his visit, one boy said to me he wanted to be a robotics researcher when he grew up!"

"One girl said it was really cool and we were really cool because we were real scientists not like the other stands."

"Very positive feedback from audiences has motivated me to participate in future events."

"Kids saying they wanted to grow up and go on to higher education."

"The first time where I showed this [my project] with WWR, and it received a lot of positive reaction."

"Robot Or Nobot, and arguing with people that washing machines and alarm clocks are robots!"

"Repeat visitors in the under 12 age group coming to our stall and spending at least 20 minutes clarifying their doubts and understanding better about the robots. Sometimes they question us about the concepts and suggest us different ways of implementing a concept."

"People's reactions when they discover that the people on the stand are actually robotics experts. The fact that we're (relatively) normal and happy to talk about our work seems to always come as a pleasant surprise."

"I found unexpectedly found myself being asked to give a complete defence of my PhD in front of 20 or so members of the public, it turned out to be a heck of a lot of fun."

5 Findings: Researchers' Feedback after One Year

In February 2009, the evaluator contacted all 37 researchers who had attended the workshop one year earlier. 29 responded via phone or email to her request for information.

5.1 Impacts of participating in the workshop

With the exceptions of two researchers, who are based in the Netherlands and said they had not found any public engagement opportunities to follow-up the workshop, everyone of the 29 respondents said they could identify at least one impact, with improved communication skills and a new network of contacts being the most common answers. Other responses ranged from greater awareness of science coverage in the media, to having devised and delivered their own public engagement projects, including training and development workshops for colleagues.

Those researchers who identified the highest number of impacts (up to 4) had all taken part in delivery events organised by WWR. The following quotes demonstrate the variety of impacts directly related to public engagement:

"It has made me consider the public's perception of my own research and whether or not consider science communication should be something I consider as a career."

"I have been looking at the possibility of applying for funding from a place mentioned in the initial 3 day course."

"I have helped a colleague to deliver a talk in high school about digital anatomy."

"I co-organised a workshop for some colleagues to develop and deliver some activities for schools."

"I am helping my project organisers prepare information to communicate our research to the public."

"I got contacts, ideas and the courage to attempt to organize things myself

"The workshop enabled me to network with early career researchers with similar passions and interests."

"My views about public engagement and science festivals have ultimately been changed because of the WWR workshop. Because I thought people knew about robotics as I do. But, very soon I realised its wrong and understood that we need to communicate to them about robotics."

"I came across people with different ideas and got new networks and friends in the same field/ with similar interests. Above all, as a non-native speaker of English, I have significantly developed my communications skills in talking, listening and responding."

"The workshop, for me, was a springboard into more general volunteering with WWR, which has the knock-on effect of meeting people and gaining contacts and ideas."

"I have used the idea of making something to teach [children] about how to use the toy I make and let them learn about the field of entertainment robotics."

Some researchers identified positive impacts that were not directly related to public engagement:

"It changed my way of preparing for my tutoring. I modified my presentation style to be more illustrative in order to bring over messages to my students."

"It gave me better ways to communicate my research to peers in conferences and inside my research group."

"It gave me the tools to keep a personal blog about my research, which colleagues can consult and offer opinions about my work."

5.2 Involvement in public engagement activities

24 of the researchers who responded one year after the workshop had been involved in a total of 44 delivery activities, including the seven events organised by WWR. 16 of the respondents had taken part in delivery events organised by WWR. Some of these and others who had not taken part in WWR events had been involved in a wide variety of other activities including University Open Days, music and science festivals, NSEW and blogs. Only five of the researchers had not taken part in any public engagement activity. They attributed this to work pressures and research deadlines and three of them indicated they may do something in the future. As with impacts, the highest numbers of delivery activities (both WWR and other) were described by researchers who had taken part in WWR events.

5.3 Most useful elements of the workshop

When asked to reflect on what they now considered to be the most useful elements of the workshop, the researchers gave a variety of answers. Opportunities for public engagement, better communication skills and confidence were respectively the most common. Some responses highlighted specific workshop sessions and are demonstrated by the following quotes:

"I found the 'new media' aspects of the workshop to be very useful in allowing me to set up my own blog, the practical 'hands on' public. Engagement component also gave me the confidence to take part in other events."

"I was in the Talks/Presentations/Shows group, and that has had a general, positive effect on my life. I have taken the skills out from that group and applied them to all aspects of my life, improving confidence and my ability to talk about and show my projects."

"The Make session enabled me to learn how to approach and talk to children who are the main users of my projects in my research."

Other responses referred to more generic aspects of the workshop.

"The team working, which has happened everyday since during my research."

"How to develop a strategy to approach and attract people to scientific subjects."

"Making contacts with people who were positive about promoting science accurately to the public."

"Gaining experience. I used the experience to organise my own activity for NSEW."

"Understanding and skills to make my research applicable and interesting to the public."

5.4 Interaction with the WWR organisers

Only three respondents said they had had no ongoing contact with WWR, which they said was due to their own lack of engagement. Everyone else praised the organisers for their professionalism and diligence, although 10 researchers said that interaction had been less than they would have liked due to their own work commitments. Several said that they hoped this would change when they had completed their PhDs and had more time for public engagement activities. Their comments included:

"Brilliant, always very helpful and knowledgeable."

"I've always found them to be well organised and immensely helpful, supporting me not only in my WWR public engagement activities but also in my own public engagement ideas."

"Excellent organisation of the events – it makes participation easy."

"Always there to answer my questions with patience and knowledge."

5.5 Reaction of colleagues or peers

22 researchers indicated that their colleagues or peers had reacted positively to their participation in public engagement activities with two saying they had expressed interest in attending a similar workshop. Three said their colleagues did not really understand public engagement and thought it was a waste of time. Four said their colleagues were not aware of their involvement. Two researchers mentioned that their activities counted towards their IET professional qualifications, which had helped to create a positive impression amongst peers.

"My colleagues are pleased and surprised to see what I've been doing with WWR and some people even expressed their interests to do similar activities with WWR."

"The Institution of Engineering and Technology (IET) recognises the importance of engineers doing public engagement activities and strongly recommend us to do so. Above all, when applying for a Chartered Engineer status, the IET acknowledges the public engagement activities by awarding points."

"Very positive - despite my relatively junior academic status I've already been selected to help organise a number of academic conferences and I've been able to successfully advocate for the addition of public engagement components to previously closed events."

5.6 Future plans for public engagement

22 researchers said they were intending to deliver public engagement activities in the near future, with three saying they had no plans and three saying they were not sure, all cited time or work constraints. Seven indicated that their plans included more events organised by WWR. Of the 22 researchers who are planning future activities, all but four described specific activities. Examples included:

"I intend to participate in the future with WWR. I would like to build a robot with a custom application and would like to demonstrate to the public."

"I'll be organising a public exhibition at Interspeech 09 a previously closed international conference bringing together all of the world's leading experts in speech science research."

"Through NSEW 2009, going to four schools and continued visits to a school in Manchester."

"Surrey Space Centre tours that I give as part of UCAS and Open Days."

"Most likely through WWR, so I will wait until the next events are announced."

5.7 Ongoing assistance from WWR

25 researchers indicated that they would like to receive ongoing support from WWR. Those who did not request on-going support also had no specific plan to deliver activities. General advice, event organisation and event information were mentioned most frequently as the type of support needed. Others wanted more information about funding sources and introductions to public engagement organisers and a few just want to remain on the mailing list. Examples of the support they require are:

"It is very essential to maintain a network like WWR to facilitate us by providing suitable stall arrangements and registrations for events. It would be great and helpful if WWR can do the same in future."

“Advice when organizing events – I can’t think where else I can get this.”

“Event locations and contacts that are local as well as national.”

“Funding contacts and information.”

“Advice on materials and designing activities.”

“Information about more opportunities to present to the public.”

6 Findings: Audiences and Science Communicators Feedback

6.1 Audiences’ Responses

6.1.1 Evaluator’s Observations of Audiences

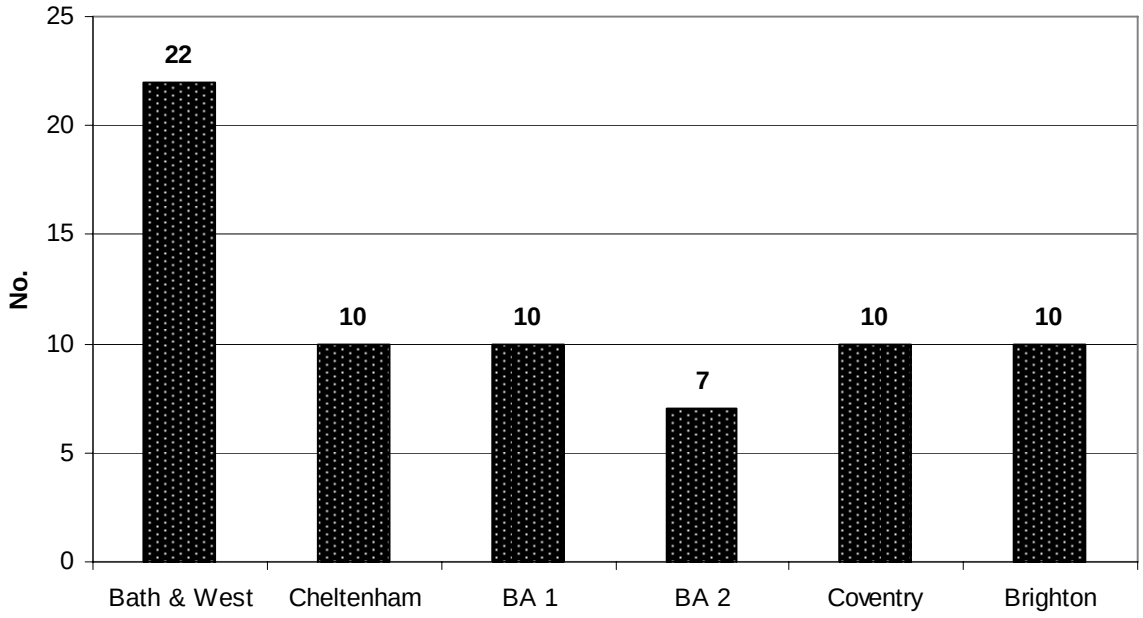
The evaluator made a number of observations of audience reactions to the WWR activities. They are summarised here:

- The WWR branding was eye-catching and attractive. It was reinforced by the presenter’s branded t-shirts.
- Several visitors wanted to know how the robots were built and designed.
- Visitors spent any length of time from a couple of minutes to nearly 45 minutes at the stands. Longer visits by adults usually involved detailed discussions with at least one of the researchers. Longer visits by children usually involved completion of all the activities. Across all events the average observed dwell time for visitors was five to ten minutes.
- Almost all audience members who visited the stands took part in several of the activities, with over half trying all of them
- The display panels about the Mars Rover were very detailed and difficult for audiences to read in a busy festival environment.
- Table top activities attracted more visitors when the presenters were stood-up and not seated behind them.
- All the activities were successful at initiating discussions between the researchers and audience members.
- The impact of the activities was greatly increased when the researchers were present to facilitate. Visitors looked only briefly then walked off when researchers took their breaks and there were insufficient people to explain all the activities.
- When they were present, the ‘Walking’ robots, the Roomba and the Butterflies extended the effective area of the WWR stands and proved useful at attracting visitors, particularly from around corners in awkwardly shaped rooms.

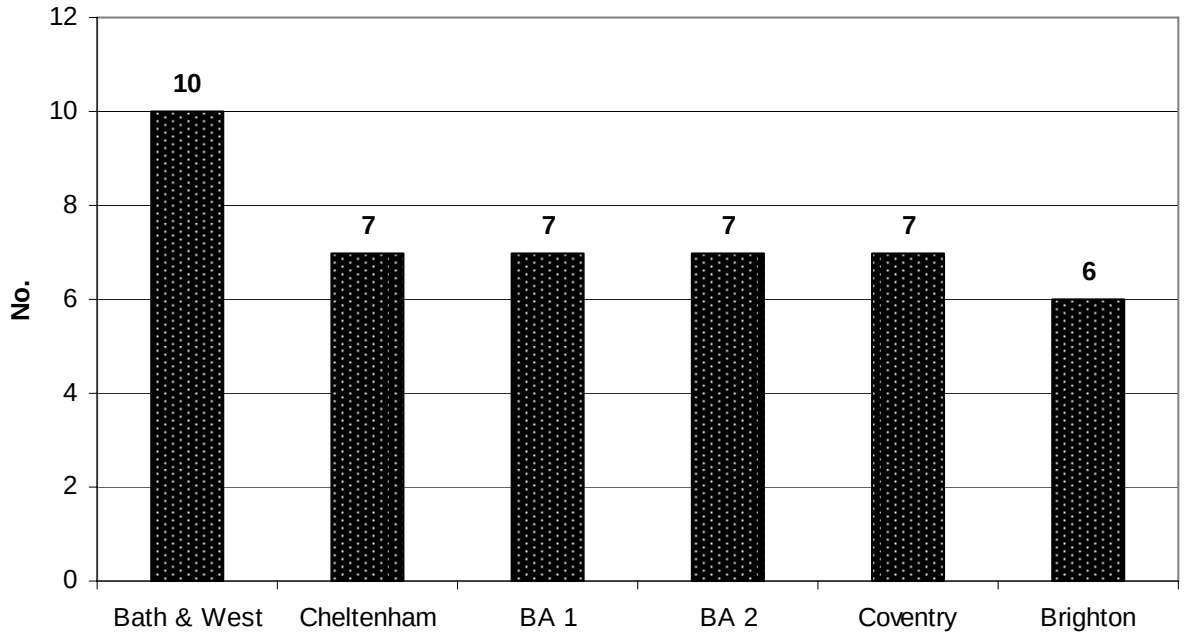
6.1.2 Audience Metrics

A total of 44 informal audience interviews and 69 audience questionnaires were completed at six different venues, against targets of 60 questionnaires and 30 interviews. Analyses by event are shown below.

Completed Questionnaires by Event (n=69)

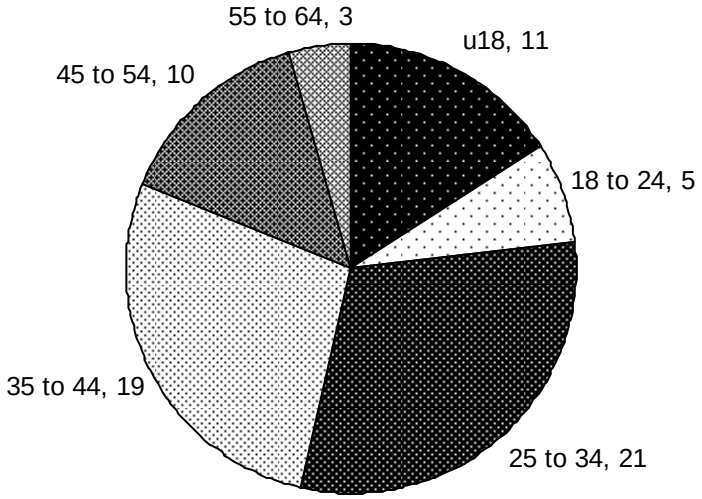


Informal Interviews by Event (n=44)



Questionnaire respondents were asked for their ages, which are shown in the following graph. Most of the questionnaires were completed by adults. To provide balance, the evaluator focused on young people for the interviews.

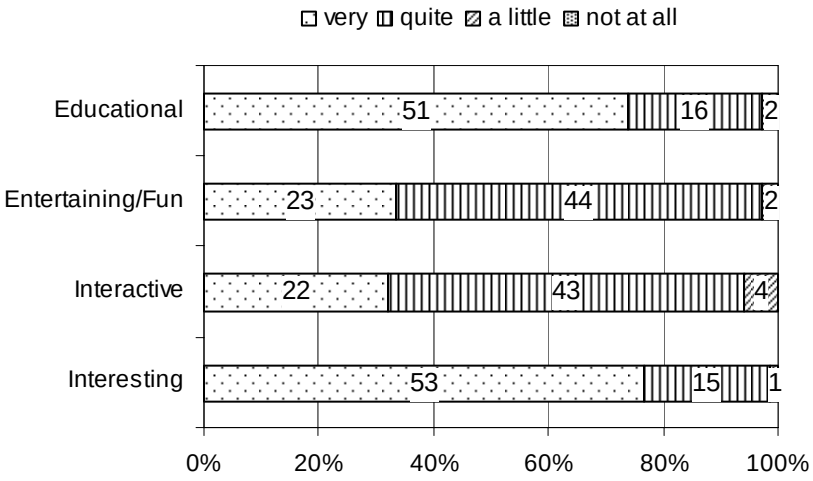
Questionnaire Respondents ages (n=69)



6.1.3 Audience Opinions of WWR Activities

Audiences were very positive about the WWR activities. Most questionnaire respondents indicated that they found them to be very interesting and very educational. There was less certainty about whether they were entertaining/fun or interactive, although the results were positive overall.

Audience opinions of the Stands (n=32)



Interview subjects also rated the activities positively. Adults described them using phrases such as ‘really good’ or ‘very informative’. Young people made comments such as ‘amazing’, ‘awesome’, ‘cool’ and ‘wow’. Comments included:

> *“Really good to hear positive things about robots”* (adult female)
>
> *“Staff are very easy to talk to, very personable and don't talk above your head”* (adult male)
>
> *“There was a lot to do and the staff were great”* (child female)
>
> *“My children did not want to leave”* (adult female)
>
> *“I liked the explanation [of Mars Rover] it was very clear”* (child female)
>
> *“There was too much writing on some of the space panels, but the activities were really, really good”* (child female)
>
> *“It was really clever to see how the robots swarmed. They explained it well.”* (child male)
>
> *“It was interesting to see the [walking] robots and to learn how they had been built. My kids did not want to leave.”* (adult female)
>
> *“The best stand here. Not patronising or too simplistic.”* (adult male)
>
> *‘We did Robot:Nobot. It was good fun. We all had different ideas, but the explainer said none of them were really wrong. We leant lots.”* (child female)
>
> *“Good to hear about real-life uses of robots. Its amazing where this could go in the way robots may help us.”* (child male)
>
> *“There were lost of different things to do, which I really liked.”* (child female)
>
> *“The variety of different things we could do meant we spent longer here than at any other stand.”* (adult female)
>
> *“I loved the people. They weren’t old like the others. I wanted to be a vet, now I’d think about working with robots.”* (child female)

6.1.4 Favourite and least favourite activities

From interviews and the questionnaire data, it was clear that different activities appealed to different visitors and most said they ‘liked everything’. The activities that were mentioned most frequently as ‘most favourite’ were the walking robots, Mars Rover and Robot:Nobot.

Interviews and questionnaire responses indicated that important success factors were the knowledgeable explanations from the researchers and the wide variety and interactive nature of the robotics on display, which made WWR interesting to many people and accessible independent of their level of science knowledge. At very busy venues a few visitors said that the researchers needed to speak more loudly to overcome background noise from other stands.

Interview subjects ranged from young children to retired people. All felt that the science was explained to them in a simple yet non-patronising way, which is an extremely positive outcome.

Very few respondents said they had a ‘least favourite’ aspect. A few suggested there could have been more interactive or hands-on elements. Many younger interview subjects described how they had enjoyed controlling the robots or influencing their movement. A few said that the robots could have responded ‘more quickly’. Several adults suggested that the walking robots should have torsos and arms to improve their attractiveness to children. Another suggestion at venues where the Mars Rover was positioned on the floor was to have it on a table top thereby increasing its appeal to older children and making it easier to see.

6.1.5 Messages

Questionnaire respondents and most interview subjects appeared to have grasped the key messages of the project. Some younger interview subjects were unable to articulate what they had learned, although they described how they had enjoyed controlling the robots. Responses to the questions 'What did you learn from the activity?' included:

> *"The idea that there are bouncing robots"* (adult male)
>
> *"About robots and some of their uses"* (child male)
>
> *"That some robots are made in England."* (child female)
>
> *"How robots may help us in the future and already help us now."* (adult male)
>
> *"That robots can react to humans."* (child female)
>
> *"That robots can sense you and respond."* (child male)
>
> *"We learnt about the research on robots that is being done in this country, which was very interesting and not something that we would have discovered elsewhere."* (adult female)
>
> *"I am sure we will carry on talking about what is and is not a robot. I learnt lots of new ideas about this."* (child female)
>
> *"I learnt how something very simple done by one robot becomes complicated, in a good way, when some by many robots."* (child female)
>
> *"How robots are used in space."* (child male)
>
> *"I did not know there were so many different types of robot. They were really cool."* (child male)
>
> *"Things that don't look like robots can be robots."* (child female)
>
> *"There is a link between some robots and how things happen in nature. I didn't know this before."* (child male)
>
> *"That I could be like them and work with robots."* (child female)
>
> *"The extent to which robotics research is progressing in the UK."* (adult male)

6.2 Science Communicators Responses

6.2.1 Overall opinions

The four science communicators who provided feedback indicated that participation in the WWR activities was a positive experience for them, the researchers and the audiences alike. They identified the collaboration with other science communicators and researchers and their own learning as particularly successful. Their opinions are demonstrated by the following comments.

> *"I got a lot out of working cooperatively with other science communicators on an actual project. It was also interesting working with the roboticists, who had a different view on the way things should be."*
>
> *"I gained confidence in public engagement around topics I would not consider myself an 'expert' in, I met some interesting people and learnt a lot about robotics."*
>
> *"Being able to communicate science to the general public and interacting with not only a non-scientific public, but also with the scientists themselves and helping them deliver their work."*

6.2.2 Most and least successful aspects

The communicators identified the Roomba as a great way to start a conversation with adults about the current and future use of domestic robots. Otherwise, the communicators said it was the general interactive and entertaining nature of the activities which made it easy to engage audiences in discussions about the underlying science. The fact that audience members of all ages could interact with the robots first-hand encouraged questions. This was regarded by the communicators as a successful outcome.

Least successful was the robots running out of power or batteries and stopping as a result. The communicators also found the swarming e-pucks less engaging than they thought they would be - the communicators felt that audience members struggled to relate to them. There was some suggestion that this may have in part been due to their location within the display area at Brighton Science Festival, where the e-pucks were located in a corner that was difficult for the explainers to access.

6.2.3 Interaction with researchers

The science communicators were very positive about their interaction with the researchers and the impact of this collaboration on audience members. Specific comments included:

> *"I think this sort of activity should be done more often, as it enables interaction between scientists and science communicators, and encourages learning from both parties.*
>
> *"I think it wouldn't work without them [the researchers] - everyone was interested to meet the roboticists."*
>
> *"They [the researchers] could discuss with the audience about deeper concerns or technical issues. And I could also be involved in these discussions and communicate these ideas with others."*
>
> *"I think involving science communicators in this project was very positive. We understood the science and interpreted it closer to the views of the audience. A couple of people from the audience mentioned that it was helpful for them as well."*

7 Sucesses, Challenges and Lessons

This conclusions section is divided into successes, challenges and lessons for the workshop and post-workshop elements of the project.

7.1 Successes

7.1.1 Workshop

- The workshop attracted 37 participants from organisations throughout the UK.
- Over two-thirds of participants were aged under 30 indicating that the workshop had successfully targeted new researchers.
- Fewer than half of participants (16) had previous experience of public engagement and others had taken part in Open days and NSEW, meaning that researchers with a wide range of experiences took part in the workshop
- Only nine participants had previously heard of WWR indicating that the workshop had helped to raise awareness of the project amongst researchers.
- Engagement levels were high throughout the workshop and participants responded extremely positively to the opportunity for performing to a public audience.
- The interactive streamed sessions were the scenes of some very effective team working and allowed participants to focus intensively on a particular activity or area of interest.

- The public performances engaged family audiences who were very complimentary about what they saw.
- Participants arrived with a wide variety of expectations which were met successfully.
- The workshop Blog attracted a global audience. The involvement of recognised 'bloggers' in the delivery of the 'New Media' stream helped to raise awareness and attract visitors.

7.1.2 Post–workshop

- 24 workshop participants took part in a variety of public engagement opportunities, including those organised by WWR.
- The 17 researchers who took part in activities organised by WWR indicated that the experience had extended their learning opportunities and network of contacts.
- Researchers who took part in WWR activities demonstrated that they were learning about team working, event organisation and logistics in addition to delivery.
- Participation in events gave rise to a wide range of learning impacts which demonstrated that the researchers learnt from one another and audiences as well as the WWR team.
- Researchers demonstrated that they were able to think critically about activities, messages and audiences.
- Researchers identified a number of memorable highlights, which demonstrate how successfully they engaged and motivated audiences.
- The involvement of science communicators in some events was a success, with the researchers, communicators and audiences all benefitting.
- Audiences responded favourably to the WWR activities, with evidence that they had enjoyed their interaction, been inspired and understood key messages about robotics research.
- A majority of researchers' colleagues and peers reacted positively to their involvement in public engagement.
- Researchers who took part in WWR events were most likely to describe a higher number of learning impacts one-year on. They were also most likely to have taken part in a wide range of public engagement activities.
- Researchers were able to articulate impacts and the most useful aspects of the workshop after one year later.
- Researchers have plans to continue in the field of public engagement. They would like WWR to continue to support them.

7.2 Challenges

7.2.1 Workshop

- Advance information was not clearly understood. Participants would have preferred more information about the exact structure and content of the workshop.
- The plenary sessions were considered to be less interactive and somewhat repetitive which resulted in them being identified as less successful than the streamed groups.
- It was not always possible for participants to work in their first choice stream, meaning some were disappointed.
- Only one of the streams (New Media) allowed participants to experience all aspects of the workshop. This gave rise to participants in other streams requesting the same experience.

- There were some constraints on the activities that could be delivered to the public which meant that participants could not always deliver what they had planned and prepared (e.g. the family nature of the audience meant it was not possible to deliver activities developed specifically for adults)
- Some participants looked on the workshop as the entire learning process, not the start of a process that also involved delivery events and other engagement opportunities.
- Some of public engagement jargon acted as a barrier to progress.
- The opening times of the venue restricted the available working time, which may have contributed to participants saying some elements of the workshop were rushed. It also restricted the time available for formal sharing of experiences.

7.2.2 Post-workshop

- The full extent of the support and expertise provided by WWR was not clearly understood. Not all researchers took advantage of the support available to help them develop events, materials and activities.
- At early delivery events, researchers expected the WWR coordinator to take responsibility for all aspects of their participation including things that did not require expert knowledge such as meals etc.
- It was not always possible for researchers to attend WWR events due to work or other time pressures.
- Overseas researchers found it difficult to identify delivery opportunities or networks in their own country.
- Researchers were not particularly minded to take part in NSEW activities. The timing was inconvenient or they were not easily able to access local science communication networks and organisations.

7.3 Lessons

7.3.1 Workshop

- More detailed advance information about content would help in managing participants' expectations.
- A pre-event survey of participants would enable them to express their expectations to organisers and presenters.
- A pre-meeting of workshop presenters to discuss content could help to minimise duplication in plenary sessions.
- Greater emphasis at the outset of the workshop on the extent and nature of the ongoing support available through WWR could help participants to understand fully what resources and services are available.
- Time should be built into the programme for sharing of the content of streamed sessions, enabling a wide a learning experience as possible for participants. Allowing everyone an opportunity to blog and end of day briefing sessions would help everyone to share their experiences more fully.
- The public delivery sessions were a great success and should be retained in any future activities.
- Sessions on operational and logistical planning and what to do when things go wrong would help those intending to plan and deliver their own events.
- If possible, public delivery opportunities should be included which allow delivery of talks and activities aimed at adults.

7.3.2 Post-workshop

- Clearer boundaries and definition of the WWR coordinator's role would ensure her time is not wasted by trivial requests and she remains focused on delivery.
- The introduction of rota systems maintained high performance levels and should be retained.
- Increased emphasis during the workshop on the expectation that researchers will take part in delivery may increase the numbers who take part in events organised by WWR.
- Opportunities for involvement in organising WWR events may provide opportunities for those who are more interested in organising activities than direct support.
- The involvement of researchers in audience evaluation would enhance their experiences and increase the quality and quantity of evaluation information gathered by WWR.
- A workshop session focused on using local networks could help increase involvement in locally-organised activities such as NSEW.

8 Conclusions

The workshop was a success in terms of the number and variety of participants it attracted and the impacts it had on those participants. The intensive atmosphere and opportunity to deliver to the public were particular highlights. Participants who also took part in the organised delivery events identified the greatest number of impacts and were also most likely to be planning their own delivery activities. They had also gained an insight into logistical and planning issues and had demonstrated that they were learning from one another as well as science communicators and audience members. The delivery events were well received by science communicators and enjoyed by the public, who also indicated that they had understood some important messages about robotics.

A number of simple features could have enhanced the impacts of the workshop. Among them, obtaining more advance information from participants and holding a pre-event briefing with all presenters. Using a venue that could accommodate a longer working day and a greater variety of public delivery formats would also be beneficial.

A very effective formula was developed for the delivery events. The number of participants who benefitted from these events could have been increased if it had been made more explicit at the workshop that they formed part of the training process. Additionally, the fact that a number of the workshop participants were writing up their theses limited their opportunities for participation. Extending the delivery period by six months could have enabled them to take part.

Researchers who used the considerable expertise and resources of WWR were highly complimentary. Greater emphasis should be placed at the workshop on the full extent of that expertise and resources to maximise participants' understanding and use of the services that are available.

Researchers want WWR to continue. It provides a unique, focused, accessible source of support and expertise which has motivated and developed the skills and capacity of a significant cohort of researchers. Those researchers have delivered activities which have successfully engaged public audiences.