Interact 2022 – Session Summaries from our Roving Reporters

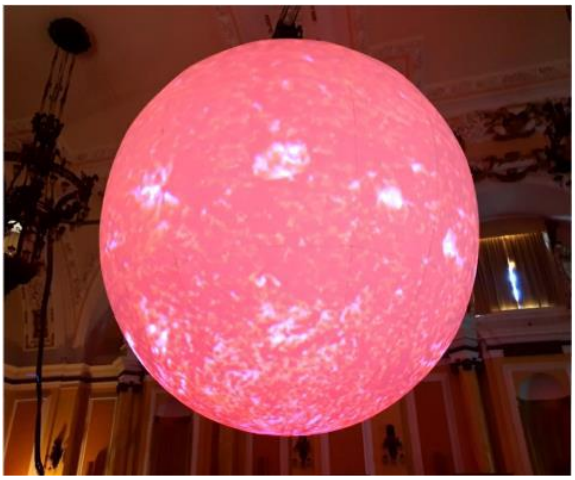
This year we had 6 Interact delegates act as roving reporters – keeping a record of the sessions they attended so that these could be shared with those unable to attend the conference, or unable to attend certain sessions. These have been complied into this report which is organised in a chronological order following the programme of the day.

Massive thanks go to our reporters – Stewart Eyres, Ghada Jameel, Claudia Antolini, Holly Cave, Eliza Hunt and Emmy Amers.

Plenary Session One — Ghada Jameel

The conference started at (10:00 am) with the Welcome words by:

1) interact team.
2) Prof. Robert Walsh & Netty Miles -University of Central Lancashire- The SUN at Cardiff.
3) Wendy Sadler MBE, Cardiff University -Engaging with Underserved Audience in Wales - Science Made Simple.
4) Emma Wride -Astro Cymru -Consequences of Covid in the Classroom.



Then at (10:50 am) there was the plan for the day by:

1) Dr. Olivia Keenan -SEPnet Director of Outreach and Engagement.
2) Dr. Neville Hollingworth -Public Engagement Manger STFC.

Professor Mike Edmunds, President of the Royal Astronomical Society addressed participants on behalf of the RAS, and led a one-minute silence in memory of the Queen.

Dr Chris North (Cardiff University) welcomed everyone to the conference, and reflected on what we have learned about communicating online. For engagement it can extend reach, from purely local to national and potentially global. It can also broaden the offer. But some audiences cannot engage online, for example due to deprivation or disability. He expressed a hope that we could all share our experiences at the meeting.

The SUN at Cardiff

Professor Robert Walsh (University of Central Lancashire) talked about the background to The SUN as a since/art project that first appeared as part of the Blackpool Illuminations. It was the result of a collaboration with the Illuminations artistic director. It consists of a spherical screen onto which is back projected moving image data from the NASA Solar Dynamics Orbiter. 10 weeks of development are shown in 12.5 minutes, with a change of observing band every 2.5 minutes *check times and numbers*. Each colour represents a different observing band, based on a conventional scheme used by NASA, with some tweaks to the pinks where the team have found the imaged features are more visible on the projection.

Robert introduced a video from Alex Rinsler, the collaborating artist. Alex spoke about how the installation was inspired by representations of the sun throughout humanity's existence. For him it was important to stay true to the data, but present it on this huge illuminated orb in a way that anyone could engage with. Then below the globe is further information people can absorb more fully if they wish. This art installation broke down barriers to people's understanding of the science making it accessible to many more people.

Robert explained that the art work had been installed in several locations, and shared a QR code describing the installation. He then introduced the production manager Netty Miles.

Netty pointed out that one element of novelty from previous large-scale representations of astronomical objects the use of a moving back-projection compared to printed, backlit images in other examples. There is a choice of 6 m and 7 m diameter screens, with the smaller screen selected for the Cardiff venue. This allowed clearance for people to walk under the globe, which audiences have found particularly impactful. The supporting structure is supported through ceiling decorations to the building roof. Above the sphere there is a sandwich of a projector, a lens, a UV filter then a novel second lens. One of only six in the world, and the only one in the UK, it ensures moving images are correctly projected onto the globe to faithfully reproduce the proportions and orientation originally seen on the sun.

The whole assembly packs into 10 flight cases. If the space allows, smoke effects can be added to represent plasma above the sun's surface. The City Hall was not able to make the adjustments to smoke sensors, but other venues have that capability. Ideally a 12 m roof height is required to ensure best clearance below the globe, but they will look at other spaces to see what can be done.

Picking up the narrative, Robert added that the installation is supported by a wider engagement programme, The team worked with Helen Mason and the Sun Space project to offer supporting materials. In addition, Sun Box science experiments are available for use. During public installations,

the opportunity for research students and associates to speak informally about the sun and their research is invaluable. There is also a supporting soundscape, and the installation is available for different venues. Information is available via seethesun.org. Robert acknowledged support from STFC for the project.

Reaching the Under-served

Wendy Sadler addressed approaches to reaching under-served audiences with public engagement. She introduced herself as a science communications lecturer in Cardiff University's School of Physics & Astronomy, but also founder of Science Made Simple. This non-profit social enterprise has been operating since 2002, aiming to inspire the next generation of scientists and engineers, engage the public to know science and act as a bridge between the public and researchers. For the last aim, it provides training for researchers to develop resources or adopt effective approaches. For example, Science Made Simple will be training early career staff at STFC facilities later in the year.

Through the course of her presentation, Wendy raised three questions that need answering to develop public engagement across a broad base of beneficiaries. How do we build meaningful relationships? How do we make role models relevant to members of the public of diverse backgrounds? Do we care enough about reaching those who will never be scientists?

As a case study for reaching the under-served, Wendy spoke about the Our Space, Our Future, an EU project across six countries with a total budget of Euro 19.M. Each country determined their own definition of under-served, which could include factors such as geographic separation from resources and attainment by those in education. The teams in each country built a long-term relationship with their audiences, using multiple engagements to develop a sense of belonging with STEM.

This approach derives from research showing showed multiple engagements are essential. The project also reflected on the Aspires 2 research, which found that even where people believe science is important and science careers are attractive, they often do not see it as for them. Considering science interesting and valuable is not enough to persuade people they can be scientists.

The evaluation of Our Space, Our Future was well funded. Sophie Barlett is engaged in a rigorous process. This will be based around the "possible selves" theory. For example, this builds on the idea that one does not need to be an astronaut to work in the space industry, so that the participants in engagement activities can see "possible selves" where they work in a context that previously had seemed unattainable.

The projects achieve 19 of the 20 planned objectives. It persuaded participants that space science is not just exploration, but includes aspects such as space technology relevant to Earth's environment, for example mapping the incidence of damaging seaweed. It did not persuade everyone, but the evaluation identified some learning for the future. Looking at role models, it was understood that what might seem like an exciting life to the role model could be seen as dangerous and unpleasant by many. Needing to be brave, courageous and leave family behind to pursue a scientific career is not attractive to many. Thus, we need role models to present a more balanced picture of their lives and careers.

Wendy finished with a different example undertaken by Science Made Simple. Often funders are looking at impact in terms of number of people reached and the potential for them to become scientists in the future. But a project with five girls in hospital with significant mental health difficulties demonstrated how important it is to find other channels of engagement for varied reasons. The programme was part of the hospital's educational offering. Staff warned that

engagement might be poor and participants may be disruptive. But the nature of the engagement demonstrated to them that this was for them and valuable to them. This is the sort of engagement traditional funders find hard to justify, but is as important as those over a broad-based audience traditionally served.

Our final plenary speaker was Emma Wride of AstroCymru. They offer astronomy and space workshops to schools, festivals and other public events. They focus a lot of their work in the South Wales Valleys, where Emma comes from and still lives. These are areas scoring high on the Welsh Index of Multiple Deprivation. In schools 50% to 80% of pupils are on free school meals, and AstroCymru work with various units supporting people with low engagement with education and high levels of deprivation.

Emma spoke to three significant activities of AstroCymru. They work with Helen Mason on the Sun Space Art project. In addition, they involve their local communities in the Stardust Hunters project led by Sarah Roberts of Swansea University. This allows students to collect micrometeorites washed down via roofs and gutters into their school yards. These are then analysed as the University. Finally, there is a project to bring 3D cinema to school halls. Many will never have seen 3D movies, and this leads in to art in 3D via mediums such as collage and pop-up pictures. Teachers feedback that these workshops are some of the best as they allow students to have fun while learning a lot.

AstrCymru has seen the significant impact of the pandemic on these communities. The impact in deprived areas is demonstrably far higher than elsewhere. Students could not keep up online, not having access to any computers or good internet. Often the only device in the home that could connect online was a parent's phone, and that was not available to them. There were no craft resources at home, and parents did not have the time, social capital or education experience to provide support. Thus, missing classes had a far higher impact for students in these communities. On returning to the classroom, teachers have found students struggle to concentrate and can be disruptive, including being violent. Their social skills have dropped, finding it difficult to take turns while shouting out. They also have lowered resilience, being unable to cope with minor issues. Literacy skills have been lost, and the students are two years behind where they would have been.

The organisation has been taking art materials into schools as part of the engagement programme, resources the schools cannot easily provide. They have experienced students hoarding resources to take away rather than use in class. They are surprised to find they can take them away and use them - a glue stick has inordinate value. The project has shared 800 "goodie bags" of art materials, supported by STFC. Teachers have reflected that the sessions have been fundamental to allow students to engage in hands-on activities. Students have come to want to work in the space industry.

Emma finished by reflecting on her own experience, from being a hairdresser to completing an Astrophysics degree as a mature student. She feels a new project with Pantene, the Power of Hair, has come full circle for her. This aims to address microaggressions and multicultural interactions.

Parallel Session One

Improving Early Career Experiences of Public Engagement

Holly Cave

Led by Sarah Bugby, Loughborough University, and Catherine Regan, UCL

The STFC Public Engagement Early-Career Researcher Forum (the PEER Forum) supports talented scientists and engineers in the early stages of their career to develop their public engagement and outreach goals. This ensures the next generation of STFC scientists and engineers continue to deliver the highest quality of purposeful, audience-driven engagement.

The PEER Forum currently has around 20-25 members from a variety of physical sciences areas. It was launched in 2018 and has a new cohort every year.

It provides:

- A community of peers passionate about public engagement
- Tailored training and workshops
- Practical advice and support for planning and delivering public engagement
- A voice in the UKRI e.g., *Shaping the Early-Career Experiences in Public Engagement* report

But how can we best support these early-career ECRs? The UKRI report can help us understand that.

Understanding what ECRs think and feel about public engagement

There was a gap in understanding about the experiences of this group, so Dr Charlotte Thorley set out to find out more via a survey.

This research found a prevailing attitude that "it takes a village to make PE happen":

- Many ways to do engagement
- Many tasks that contribute
- First steps can be small but impactful
- Reporting structures provide a framework
- Not everyone needs to deliver, but they do need to be supportive
- Not everyone needs to do every type of PE (e.g., social media isn't for everyone)
- Mentoring and training make a difference

This research also found that PE can be a rewarding part of the research culture, but ECRs need to feel enabled to do it (in terms of funding, time allocation, peer, manager and colleague recognition and approval etc).

The workshop asked attendees, in small groups, to think about what they make of these findings and what actions they would like to see as a result. People were generally unsurprised by the findings. It was felt that action depended largely on the research area.

The report's recommendations

For employers:

1. Be explicit about where PE fits into workload
2. Ensure that all managers are aware of when and where their staff might be taking on PE and how the organisation expects this to be managed
3. Draw a distinction between the PE work that is integral to a particular project or work strand, and that which is more general
4. Review your appraisal and promotions processes to examine the role of PE
5. Explore models for creating dedicated time and budgets for PE work
6. Reward all the different contributions staff might make.

For funders:

1. Build more transparency into research funding structures and procedures
2. Shape funding structures that allow workload allocation to PE
3. Request, and support others to be interested in, information on the quality of PE work that ECRs are doing
4. Set clear standards of what quality engagement might look like through sharing stories of success
5. Create and support programmes for peer shadowing/mentoring and training.

For ECRs (a manifesto):

1. I don't need to do, or be interested in, PE, but I can still contribute to a supportive culture
2. I won't say yes to everything. I will do fewer things, but better
3. I won't assume I'm the first person to be doing this
4. I will ask for help
5. I will share my experiences
6. I will lift others up
7. I will be sensible about my capacity
8. I will be clever about my capacity
9. I will choose to get involved in things that are beneficial to me
10. I will think about the impacts of my activity before I start
11. I won't make assumptions about the people I'm engaging.

Attendees at the event were asked to discuss the best way of getting these findings out there to effect change. There was much resulting discussion about the meaning of impact and how that is measured.

Improving Early Career Experiences of Public Engagement

Ghada Jameel

Led by Sarah Bugby, Loughborough University, and Catherine Regan, UCL

The speakers talked about the role of the STFC Public Engagement Early - Career Researcher Forum (the 'PEER Forum') supports talented scientists and engineers in the early stages of their careers to develop their public engagement and outreach goals. This ensures the next generation of STFC scientists and engineers continue to deliver the highest quality of purposeful, audience-driven public engagement. This includes many Science Areas for instance: Technology and Instrumentation, Nuclear physics, Planetary Science, Medicine, Astronomy, Scientific Computing, and Particle Physics. The PEER Forum provides: A community of peers passionate about public engagement Tailored training and workshops Practical advice and support for planning and delivering public engagement A voice in the UKRI e.g. shaping the Early Career Experiences in Public Engagement report.
Then they spoke about (EARLY CAREER SCIENTIST AND ENGINEER EXPERIENCES OF PUBLIC ENGAGEMENT. By Dr. Charlotte Thorley) and they mentioned the Early career scientist and engineer respondents were ...

- Primarily astronomy related.
- British, with English as a first language.
- Mostly men, although a disproportionate number of women responded compared to the number of women holding relevant qualifications.
- Mostly between 21 and 30.
- Mostly Postgraduate students or researcher/lecturer roles, although responses came from technical and professional staff and apprentices.

It takes a village to make PE happen

- Many ways to do engagement.
- Many tasks that contribute.
- First steps can be small but impactful.
- Reporting structures provide a framework.
- Not everyone needs to deliver but they do need to be supportive.
- Not everyone needs to do every type of PE (e.g. social media).
- Mentoring and training make a difference.

PE can be a rewarding part of the research culture

- Shared activities.
- Presentation and communication skills.
- Improved understanding of their own work and that of their colleagues.
- Something time limited and achievable.
- Giving back to the public.
- Bringing their whole selves to their job.
- Contributing to diversity and inclusion in research.

But ECSEs need to feel enabled to do PE
"The effects of outreach are sketchy at best. Good quality outreach doesn't get more money or better opportunities. So anything can be put on a form to tick a box. There's no benefit to a thoughtful approach". "I'm keen on public engagement, and my team is too, but the benefits are limited when you apply for your next job". So ECSEs need to feel enabled to do PE

- Funding.
- Time allocation.
- Annual review.
- Internal and external reporting.
- Colleague and manager support and approval.
- Peer recognition.
- Evidence of value.

Then the speakers ask: What do you make of these findings? What actions would you like to see as a result? For the next three categories?
For employers:
1. Be explicit about where public engagement fits into the workload.
2. Ensure that all managers are aware of when and where their staff might be taking on public engagement, and how your organization expects this to be managed.
3. Draw a distinction between the public engagement work that is integral to a particular project or work strand, and that which is more generic in nature.
4. Review your appraisal and promotions processes to examine the role of public engagement within these.
5. Explore models for creating dedicated time and budgets for public engagement work that is not intrinsically part of an individual's day-to-day work.
6. Reward all the different contributions staff might make to public engagement, not just presenting .

For funders:
1. Build more transparency into research funding structures and procedures.
2. Shape funding structures that enable workload allocation to public engagement.
3. Request, and support others to be interested in, information on the quality of the engagement work that ECSEs are doing.
4. Set clear standards of what high-quality engagement might look like through sharing stories of success.
5. Create and support a program of peer shadowing and/or mentoring for ECSES.
6. Create and support a program of expert mentoring for ECSES.
7. Create and support a program of training for those managing ECSES .

For ECSES (A manifesto):
1. I don't need to do or be interested in public engagement, but I can still contribute to a supportive culture.
2. I won't say yes to everything. I will do fewer things, but better.
3. I won't assume I am the first person to be doing this.
4. I will ask for help!
5. I will share my experiences.
6. I will lift others up.
7. I will be sensible about my capacity.
8. I will be clever about my capacity.
9. I will choose to get involved in things that are beneficial to me.
10. I will think about the impacts of my activity before I start.
11. I won't make assumptions about the people I'm engaging.

Finally the Table discussions were: Employer, Funder, Manifesto Any recommendations for sharing? What formats would this be useful?
The audience divided into separate groups to discuss these topics.

Improving Early Career Experiences of Public Engagement

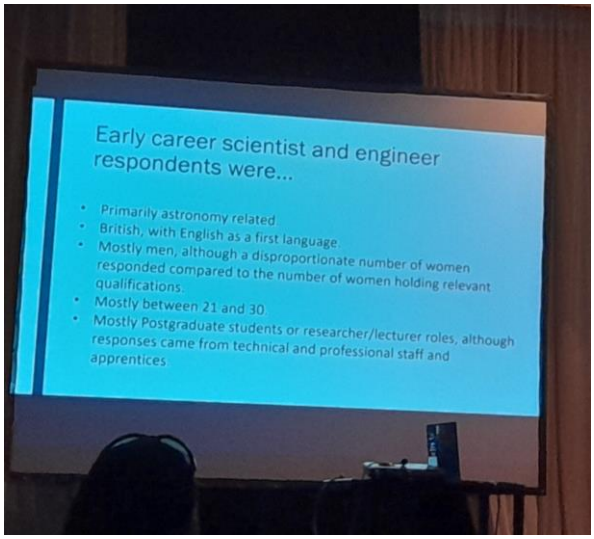
Emmy Amers

Led by Sarah Bugby, Loughborough University, and Catherine Regan, UCL

Sarah Rugby and Catherine regan PEER
25 members
Science areas - forums purpose o come together and hare experiences
Forum launched 2018
Yearly membership rotation
Diff op to meet discuss and share ideas, largely online now in person

2017 report shared findings
Peace of research do use on early experience of outreach researchers

Dr Charlotte Thorley - stfc funded research
Most men, British,
Disproportionate representative of women
Early career engagement



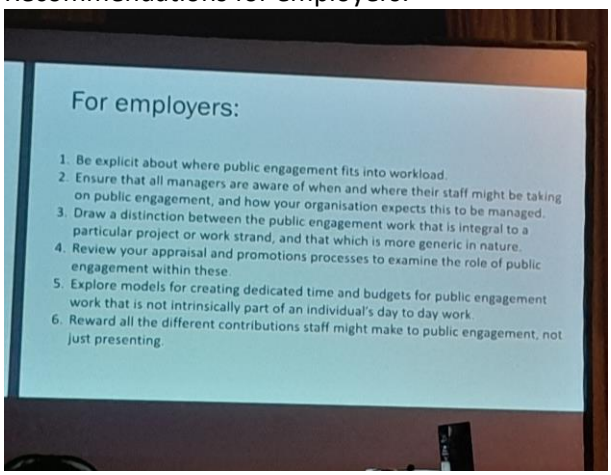
Role of public engagement,
Recognise there ar different ways for engagement
Pathway to a career through different means, public speaking, workshops, online
Examples no rewards of involvement in public engagement
Good on CV good o comms skills, good way
to articulate research
Altruistic
Improving diversity
Perception of science from. Public perspective

How to justify public engagement,
Take time from studies
Have to track time against cost codes
Difficult to juggle
Is it valued? If not brought up in performance reviews, institution or funders not recognise

Internal/external reporting
Evidence of value (see photo of slide why public engagement important)

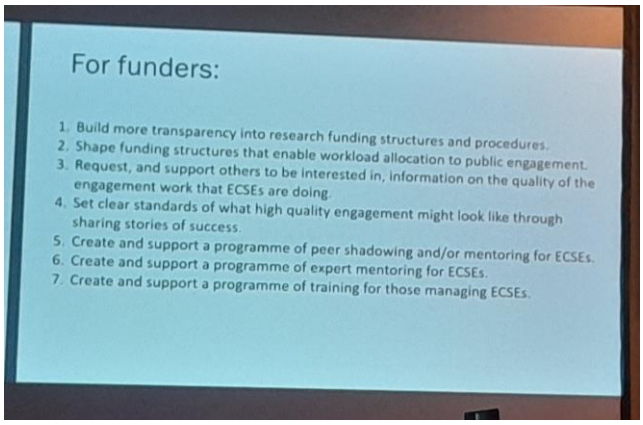
Outcomes from the report

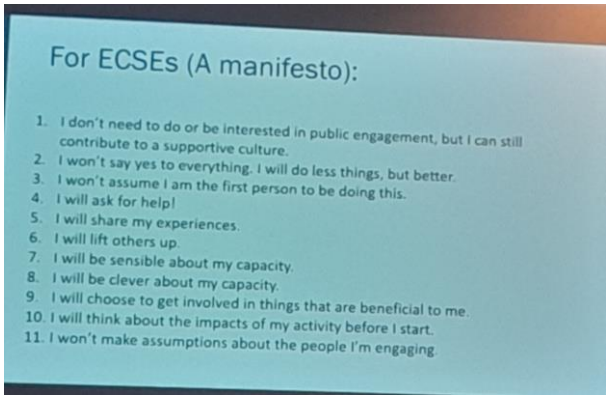
Recommendations for employers:



Give clear time
Fund properly
Contributions valued, effort recognised

Rec for funders:





STFC Spark award workshop

Claudia Antolini

Andy Thompson and Neville Hollingworth, UKRI-STFC

Good applications show clear planning: Plan, do, review (STFC virtuous cycle for public engagement)

- Plan: provide evidence of the need
- Do: explain how you will engage. Check resources from NCCPE. Get help from other people in your institution/STFC
- Review: what you think will happen, evaluation plans. Evaluation must not be an afterthought. Outcomes are used by STFC to provide evidence of impact and justify PE funding

Think about how you convey evidence

Allocate resources wisely: time, effort money must be accounted for

Convince the reviewer that you know how to measure the impact

Co-creation is something that STFC hasn't done much of but they want to support if impact is demonstrated

Assessment criteria:

- Track record
- Rationale
- Clarity and appropriateness of engagement plan
- Evaluation plan
- Planning for dissemination
- How effective the use of resources is
- Alignment to Wonder initiative (not necessary), people living in postcodes in the two bottom deciles of the IMD

The application process is very exclusionary, deadlines need to be better advertised and communicated

STFC needs to reach out to community orgs to advertise the award scheme and inform them on how the scheme works. JeS now doesn't require registration to apply, only if you are successful

JeS is a clunky and non user friendly platforms

New more flexible grant systems in the coming years

Mentoring system from successful applicants to prospective applicants

50 applications vs 20 successful (more or less) £120k in this round

STFC Spark award workshop

Eliza Hunt

Andy Thompson and Neville Hollingworth, UKRI-STFC

The session started with STFC emphasising that they would like to hear feedback and are particularly interested to hear what they can do to make the SPARK award more inclusive. Post-it notes were provided for people to give comments on this.

Neville Hollingworth gave an overview of what the SPARK award is. A few key points below:

- Currently the maximum amount of funding to apply for is £15,000 (but it was stated that this could be increased, they would like feedback on this).
- It was also noted that the minimum amount to apply for is £1000. Applying for smaller amounts is great for 'proof of concept' projects and they have included this lower limit so that people with smaller projects weren't put off by seeing 15K and thinking that this award wouldn't be relevant for them.
- It was also noted that there are other awards, e.g., nucleus and legacy awards. There is the potential to receive up to 12 years of support through all of these funding opportunities.
- It was noted that if your public engagement project is research focused then it is usually better to apply for funding through a research grant, rather than SPARK.

What is a good application? Best qualities and characteristics

- 'Virtuous cycle' of 'Plan, Do, Review'.
- It is important to be clear about how the project meets the aims of the funder, and to give evidence of why there is a need for this work.
- Evaluation is very important. Need to show how you plan to evaluate the project right from the start.
- It was noted that NCCPE have a really useful toolkit available for free on their website. It was also suggested that applicants can get guidance and help from their university central public engagement team, and from the STFC.

Andy Thompson discussed the assessment criteria. Key points:

- Peer review panel is made up of a mix of university staff and PE professionals. Each panel member does 3 years and then new members brought in. Panel is 50/50 male/female. They are aiming to make the panel more diverse.
- The case for support and the application form are both considered – so use the case for support to give further details and wider context.
- They look at the track record of the applicant in PE – where they are in their career. There are sets of criteria for early career applicants and also established applicants.
- The panel consider the rationale (who is benefitting), and delivery (how to reach the audiences). Importance of evaluation was noted again here.
- Noted that the WONDER initiative is used for audience targeting.

The session was then opened up to a Q&A and feedback. Some key points from this:

- General consensus that the SPARK award is not well advertised on the UKRI website, and this is potentially excluding a lot of applicants (only really advertising to people in the know).

Applicants would like to see more clear opening and closing dates for applications. It was clarified that the application window opens twice a year – in September and March for approx. 1 month.

- The application portal, Je-S, was heavily criticised. The audience discussed how the main applicant has to have a Je-S subscription, but this is very time consuming to register for. Neville and Andy pointed out that for the SPARK award applicants are able to part register for Je-S, and then only need to fully register if their application is successful.
- Je-S is aimed at higher education professionals, and SPARK award should be open to other groups e.g., small businesses. Je-S is excluding these groups from applying and making it very difficult. It isn't fit for purpose for PE.
- Andy said that STFC does recognise the difficulty of the application portal and how time consuming this is, and they are aiming to improve this over the next few years.
- It was pointed out that people would like to see examples of successful applicants, and would like the option of peer-peer mentorship. STFC are considering this.
- Audience member asked about how many people apply/how many grants are given. The answer is that in each cycle £120,000 is allocated. During covid times, the number of applications per cycle was approx. 20, and roughly 50% were awarded their grants. Applications were higher pre-covid. STFC tend to fund 100% of a grant, so if someone asks for £10,000 then if they are successful they will get £10,000. They find that often people don't ask for enough, and they get rejected because STFC believe that the project couldn't be carried out with the amount they've requested.
- Audience member asked if it is possible to apply for the same grant again (that was previously accepted) if it is to target a different audience. Answer is yes because this would be for a new audience.

Across Parallel Session One and Two

Equality, Diversity & Inclusion: Challenges & Opportunities

Stewart Eyres

Dominic Galliano (Freelance), Grace Mullally (Cardiff University), Debbie Syrop (Cardiff University), Dan Hillier (STFC, UKRI), Alex Perry (STEMPOINT East)

Dom Galliano facilitated this session, starting with four presentations from differing perspectives.

Deborah Syrop spoke about public engagement in Engineering she leads at Cardiff University. She noted that the new curriculum in Wales embeds diversity as a cross-cutting theme. The project focussed on race equality. Deborah reflected on her own lack of lived experience, and described herself as moving from complete ignorance to just ignorance. As a resource for those who can only learn from the experience of others, she suggested books by Susan Cousins (www.susancousins.com). It is necessary for the majority to act to make changes to improve the lived experience of under-represented groups.

Deborah has asked the question: What do decolonised, anti-racist, representative STEM resources look like? She offered some means to develop such resources.

1. Acknowledge the bias. Science is not an unbiased, neutral activity. Its paradigms are dominated by the dominant group and culture, and it has been used to justify racism. Superior by Angela Saini, and resources from Bristol University are both useful to understand what the impact of this bias is.

2. Include knowledge from other cultures. For example, nature-based solutions are gaining acceptance in western engineering. But they have been present elsewhere for a long time, for example living wood bridges in India. A curriculum needs to acknowledge that innovation in technology is common worldwide and throughout history.

3. Broaden what counts. Working with a magnet materials research group, it was recognised they were not representative of the population. So, the scope was broadened to include the stories of those who use magnetic materials, e.g. with MRI machines or in telecoms.

4. Avoid stereotypes, even positive ones. This might involve moving from "white saviour" narratives (e.g. western white engineers solving problems in other countries) to "local heroes" narratives, where solutions are created by those with the skills in the communities with the problems.

5. Checking all aspects. Not enough to just change the pictures to be representative. Need to look at all the curriculum content, including examples. It also means considering aspects such as the language used or how activities are organised. For example, one project involved children creating animations based on what they had learned about magnetic materials. These were then used with other groups, helping to ensure the language and imagery were accessible to the audience.

6. Emphasise the social and collaborative nature of STEM. By talking about who they work with, researchers can broaden the picture of who works in STEM. This increases the likelihood students will see themselves in those roles. Many teens want to know they will have friends and be valued. So, talking about the teams we work with helps present a social component to STEM careers.

Alex Parry introduced the equity compass. As a STEM Engagement Coordinator for STEMPoint East, he works to bring together young people in schools and youth groups with businesses and universities. Funded by UKRI it places STEM Ambassadors into schools, colleges and other settings, to share their experiences. STEMPoint's mission includes addressing the lack of diversity in STEM.

He has used the equity compass to work with partners to move their offer from a position of equity, through equality and towards liberation. This includes removing barriers, which we may have put in place. The compass prompts us to ask where we can do more and be better at serving under-represented groups.

STEMPoint used the compass to work with the John Innes Centre working group. This led to co-opting LGBT representatives onto the Diversity & Inclusion Committee. It has informed planning for pilot sessions in the Autumn of 2022.

The Wales-wide physics mentoring project was described by Grace Mullaly. The project has been underway since 2019, involving six universities. In the future it will receive Welsh Government funding. It aims to address the bias in take up of A Level Physics and similar qualifications; A Level is currently 78% boys for example. The Aspires research showed that physicists were seen to be male geniuses, who are naturally talented and do not need to work hard to succeed. This is seen as unattainable by many. There is also a lack of physics teachers in Wales, particularly those with a physics degree.

The ethos of the project is based on the idea that physics knowledge can be instrumental to providing equity. It is relevant to all so should be accessible to all. It also provides access to key skills and opens up careers.

The approach involves mentors who are undergraduate or postgraduate students. They are trained to support mentees, students in years 9 to 11 who were unsure about studying A Level physics. A near peer approach was adopted, while being clear that these are not physics tutorials. Each mentor offered six sessions, and worked to broaden what counted. For example, mentees come to realise that many enjoyable things they already engage with are related to physics.

Formally, the project adopts science capital teaching research and resources from UCL. Over six cycles, 139 mentors have provided 3000 hours of mentoring for students in 43 schools. One outcome has seen a 38% move in A Level Physics intentions from "unsure" to "definitely" or "probably".

The project evaluation to date suggests several recommendations. Be clear on the underpinning theory. In this case, they incorporated the concepts of science capital, mentoring theory and a near-peer approach. An external evaluator with the right training is critical. It is also important that the project team create the right culture, by leading by example during the training. Partnership and collaboration across the universities and schools is also essential.

Speaking for STFC, Dan Hillier from Royal Observatory Edinburgh introduced the Wonder Initiative. This aims to engage with the 40% most socio-economically deprived areas of the UK. The participant demographics are 8- to 14-year-olds and their families or carers. It is cross-programme, so across all STFC-funded activities. It is open to all participants rather than being a closed grant programme, and has been ongoing since 2018.

Evaluation is underway, with a draft report for the 2018 to 2021 period available. This is applying the STFC framework for evaluating public engagement. Led by an independent evaluator, some challenges have been identified. These include: determining what we mean by deprived areas using the indexes of multiple deprivation; equipping the research project teams to gather data, with the consequent training requirements; collating the data and ensuring datasets are clean requires a lot of work. Consequently, the draft report reflects a lot of caveats and they are not yet seeing firm recommendations arising.

Parallel Session Two

UKRI Public Engagement Strategy

Holly Cave

Steve Scott, Public Engagement Lead, UKRI

UKRI is in the final stages of approving its long-awaited Public Engagement Strategy. It follows on from the recently published UKRI Strategy 2022-2027 “Transforming Tomorrow Together”. This overarching strategy strapline neatly summarises the sentiment at the heart

of UKRI's approach to public engagement: inclusive and meaningful engagement and collective action with wider publics to drive change for a better future.

The Public Engagement Strategy has been developed by drawing on insights and expertise from UKRI colleagues, engaging with external parties and partners, and listening to diverse community voices including STEM Ambassadors and those involved in community engagement programmes.

The Public Engagement Strategy outlines three key goals and key actions to deliver on these goals

Goal	Example actions
Support a sense of shared endeavour by making research and innovation relevant and accessible to all.	• Working with museums, galleries and science centres • Supporting researchers to engage widely
Make sure the benefits of research and innovation are shared widely by prioristising collaboration and valuing diverse forms of knowledge and expertise.	• Fund communities as knowledge producers • Test new approaches in dialogue • Involve publics to set priorities (e.g. initiatives like ScienceWise)
Create opportunities for all by inspiring and engaging the next generation.	• Young people's involvement and decision-making • Review national programmes

The strategy highlights where UKRI needs to act to make change happen, specifically:

- Culture change: shifting mindsets to appreciate that public engagement is integral to research and embedded into funding applications
- Working in partnership
- Investing in infrastructure and partnerships
- Piloting innovative approaches to public engagement (i.e. understanding "what works")
- Developing new approaches to evidence the impact of public engagement

Dr Scott shared some of how UKRI intends to drive the necessary structural and cultural changes that will ensure the Strategy's success. He acknowledged that the design and delivery of funding mechanisms needed to change, from setting of priorities and design of funding calls through proposal assessment processes, project delivery, monitoring and assurance. He also notes that research training would also need to shift, with greater emphasis on engagement skills.

UKRI's forthcoming development and launch of Community Research Networks got a special mention as they are designed to create sustainable, equitable and purposeful relationships between communities and the professional research and innovation sector.

Other initiatives include:

- Scoping work on learning and development for engagement skills (led by NCCPE and Young Foundation, due to report November 2022)
- Rethinking public dialogue projects (testing novel approaches to more deliberative engagement and challenging the boundaries of dialogue for change)
- STFC Wonder Initiative (including the Wonder Match programme)

Dr Scott hinted that UKRI was shifting from project-based to infrastructure funding, citing the Community Research Networks and the Ideas Fund (joint BSA/Wellcome initiative) as examples of place-based, community-engaged approaches). He also acknowledged they vital importance of "broker" roles to connect actors and collective mobilise knowledge.

People like Me: Identifying Personal Attributes of STEM Professionals

Eliza Hunt

Carol Davenport, NUSTEM

- The session was interactive and encouraged discussion within each table.
- Carol defined 'attributes' and got everyone to write down up to six attributes to describe themselves.
- Carol explained the difference between hard skills and soft skills. This session was focused on soft skills, something people can ascribe to you. Soft skills are socially constructive, and can be gendered and classed which can lead to discrimination. It was pointed out that when job applications focus on soft skills, it can reduce the employers role in training.
- Job adverts were handed out, and groups were asked to go through the adverts and discuss what hard and soft skills the employers were looking for.
- Carol then went on to describe a study carried out by NUSTEM (which will be published in October). STEM professionals were asked how they would describe themselves, and this generated a list of attributes. A sample of STEM professionals were given an online survey with likert scale Q's and demographic information. They were asked how they think the NUSTEM attributes described them. Data from this study was shown on slides. In brief, the data was analysed and association tests were ran. A few weak and moderate observations were made, e.g., there was a weak observation that males were slightly more likely to mention domain specific knowledge than females (email carol.davenport@northumbria.ac.uk for more details and info on this work). One implication of this work is that using STEM attributes can help those who are thinking about careers to identify characteristics they share with those in STEM.
- Carol then discussed some more of the work that NUSTEM do, including adapting workshops (based around a career), STEM person of the week (posters that are put up in schools about a STEM professionals role and their attributes, students then praised through the week for displaying those attributes), lots of work highlighting skills and careers.
- There was then another group discussion within tables about what engagement people currently do, and what skills are involved in this. The whole group was then brought back together and each table gave an overview of what they had discussed.

- Session ended with Carol asking everyone to think about what they would do differently as a result of the session.

Turning Aim into Actions

Ghada Jameel

Sian Tedaldi, Kathryn Boast & Lena Shams (University of Oxford)


A key aim for this session was to communicate the following messages via their program of activities:
1. Anyone can do physics.
2. Physics is exciting, relevant & important; it goes beyond the classroom.
3. Studying physics further broadens career possibilities.

Theory of change - the big picture
- Science capital-informed experiences.
- Greater engagement with STEM.
- Increased uptake in A - level physics.

Context
- Access and Engagement Framework.
- Widening Participation.
- Large department.
- Research group activities.
- New:
  - PhD students from grad course.
  - COVID - 19 break for many of these activities.
  - Donor funding steering us.

How do we ensure our activities communicate our key messages?

How do we support researchers to include these key messages in their PER (if relevant)?

What we did
- Defined more precise outcomes.
- Grounded in science capital.
- Didn't hold back – 14.
- Consulted with Dr. Charlotte Thorley.

The process
Why? What? How? Where? What next? How do we know?

The activity today for this session

- DIY - turn your aims into actions!
- We will provide
  - Scaffolding/framework
  - Step-by-step instructions
  - Prompts for content if you need
- By the end: one line of something like the previous table
- Why? What? How? When and where? What next? How do we know?

Why ?
Key messages
1. Anyone can do physics.
2. Physics is exciting, relevant & important; it goes beyond the classroom.
3. Studying physics further broadens career possibilities.

(Choose your key message Does it need breaking down? You need your chosen message to be precise).

What ?
2. Activity outcomes (What do you need your activity to do, in order to convey that key message?)
3. Impact on students (What is the intended impact on participants?)

How ?
4. Delivery/activity objectives How are you going to make your activity achieve its intended outcome?

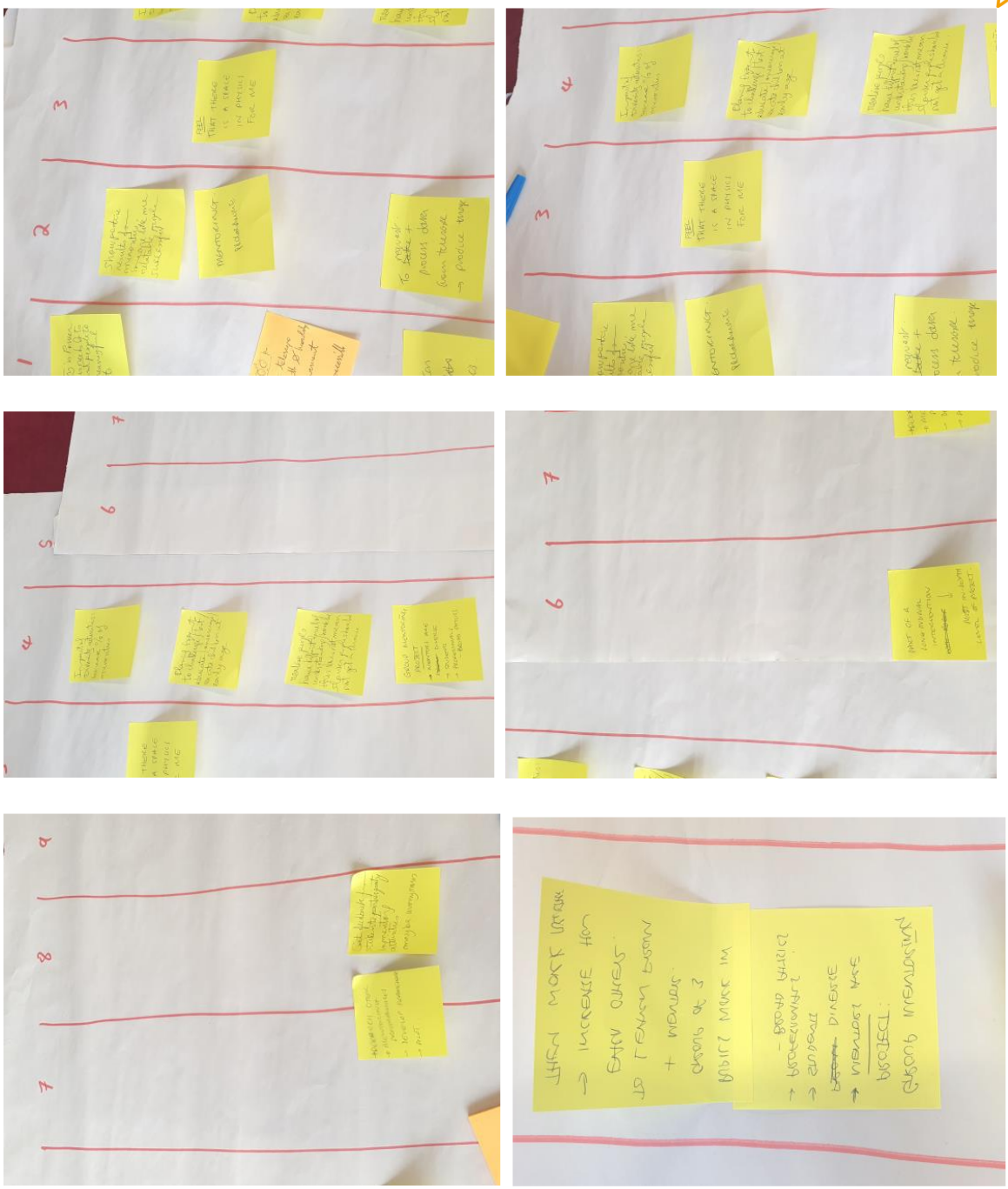
Where ?
5. Where should ... ? (Mapping and auditing Where should this happen in the program?)
6. Where does ... ? (Where does it happen in the program?)

What next?
7. Next steps for us.
8. Supporting researchers.
How do we know?
9. Evidence.
10. Review

Reflections, discussions & conversations

- Is this a useful process for you / your department?
- If not, what stops it from being useful?
- What would make it easier for you?
- How much of this tallies with what you do? Do your aims etc. match ours?
- Which bit of this process is most "missing" from what you do now? Which bit do you think would be most transformative for your programme?

The speakers divided the audience into three separate groups to discuss every single question during the session as the following pictures show.



Linking science: using cross disciplinary approaches for family engagement

Claudia Antolini

Claudia Antolini, Royal Holloway University of London

I was the convenor for this session.

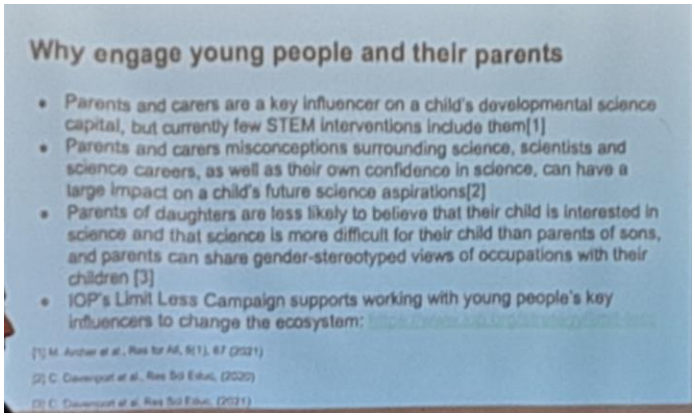
We presented approaches to cross-disciplinary engagement that includes science: people who are less confident about science won't engage with an event that is branded as "sciencey". Including links with other subjects supports learning and it's an easier "entry point" for parents/carers.

We presented 3 projects from University of Leeds, University of Southampton and Royal Holloway University of London discussing our aims, equitable partnerships, how to evaluate artwork and how to engage with parents through their young children.

Linking science: using cross disciplinary approaches for family engagement

Emmy Amers

Claudia Antolini, Royal Holloway University of London



Subjects cross disciplinary approach
Linked to develo and deliver

Cross curricular activities
Shifting from science perspective to secondary

'Mood amongst shop floor

65% don't include public engagement as a criteria for promotion

Be curious: presented in family friendly way
Create and lates
'Be curious Live event' Leeds uni

www.creatematerialsinnovation.com/maker-kit (resources for scouts)

Pilot study '
52 Surrey libraries
Stories has a linked activity

Actually message to parents, it's ok not to know and increase confidence

Train the trainer

Look up summer reading challenges

Aim of initiative:
Support current aims through co-design
Build relationships with new partners
Restart in person engagement in person

Evaluation of two projects: cervix or kahoot responses
How much they enjoyed it
Something they've learnt and what would they tell others

Parallel Session Three

NCCPE REF

Claudia Antolini

Paul Manners, NCCPE

Expert review by panels on 34 different units of assessment under 4 main panels

Accountability measure for government allocated funding

Funding is allocated depending on REF results

Impact is an effect, a change or a benefit to the economy, society, culture, public policy or services, health, the environment or quality of life beyond academia underpinned by excellent research

Impact case study template (5 pages)

1. Summary of the impact
2. Underpinning research
3. References
4. Details of the impact
5. Sources to corroborate the impact

From public to "publics"

Physics submitted most impact case studies than all the sciences

REF is about telling a story, using data from evaluation, but also how you connected with your audience

Storylines:

- Conceptual (enlightening)
- Instrumental (social innovation)
- Capacity building (social action)

REF is a good instrument for reflection, but still not perfect

Engaging a small group of Afghan refugees with the science of light

Holly Cave

Sadie Jones and Pearl John, University of Southampton

In October 2021, the University of Southampton's outreach team responded to a request by the council to provide half-term activities for 47 Afghan refugees, newly arrived in the UK.

The team ran two workshops of one hour each:

- one based on photonics and the science of light, aiming to teach participants about the law of reflection and about the role of fibre optics and lasers in running the Internet. Children built and decorated their own kaleidoscope.
- one based on astrophysics, aiming to teach participants about the lifecycle of stars and supernovae. Children create artworks using paint pens to accurately depict these, which they could take home.

They also wanted for the workshops to be enjoyable, increase enthusiasm for studying science, show the role of women in science, and to provide the children with some free school supplies.

There were many barriers and hurdles

The team knew they needed a cultural interpreter and background information about the ages, English language levels and science knowledge of the participants. But this information was not ever provided by the council.

They discussed being "lucky" that one of their photonics post-graduates could speak Farsi, which made communication possible.

There were clear cultural differences when it came to the timing of sessions (their length and when they started). Participants also clearly expected food and drink as a way of being welcoming, but refreshments weren't provided.

These workshops were also done during the Covid pandemic, and the children came from unvaccinated families, so safety measures had to be strict.

The team prepared for 47 participants, but only 5 turned up which they found disheartening. However, Interact 2022 attendees discussed that the reach is only one aspect of success – these 3 girls and 2 boys may have taken a great deal from the workshops.

Outcomes

They evaluated the sessions using surveys – whereby the children rated using emojis. They enjoyed the sessions, especially the language aspect, in terms of learning new English vocabulary e.g., *reflection.*

The factual knowledge learned was tested using multiple choice. This wasn't as good as hoped for, but there may be many reasons for this, such as unfamiliarity with this testing approach.

Strategic Outreach & Public Engagement

Stewart Eyres

Dominic Galliano (Freelance), Jen Gupta and Nic Bonne (University of Portsmouth)

Dom Galliano facilitated a conversation with Jen Gupta and Nick Bonne about how they developed and implemented an engagement strategy within the Institute of Cosmology and Gravitation at the University of Portsmouth. Dom started by asking Jen to outline the reasons she wrote the strategy.

Bringing in the strategy in 2017, Jen described it as a framework outlining the reason for the existence of public engagement staff at the Institute. They were receiving a lot of ad hoc requests and being pulled in different directions. The strategy allowed them to be sure they were having the best impact, and were able to say no where a request did not support that. It meant they could prioritise activities to align them with their aims.

Dom noted that SEPNet had established a strategy approach aimed at moving people from doing what they fancied to something with more focus. Jen reflected that the Portsmouth strategy developed in parallel with the SEPNet work and adopted aspects of it. While she initiated it, the Institute Directors and her line manager were involved. SEPNet supported with Dom facilitating discussion. Dom noted that they may have been the only SEPNet department to adopt a formal strategy.

Reflecting on the development of the strategy further, Jen noted that the Institute is not a big department. It punches above its weight in public engagement, but cannot resource all requests. The strategy provides a reference point for considering requests. While staff can work on their own initiative outside the strategy, they cannot draw down on the public engagement staff.

Martin Archer asked if staff outside the public engagement team were working to the strategy. Jen noted that new staff are working to it and discussing alignment. They are referring to it when fielding requests for example.

Speaking to the revision she is currently working on, Jen outlined the approach and content in more detail. Having written a draft with input such as that from SEPNet, she presented it to the Directors. They asked for some additions to support them in working with the University, for example explicit reference to widening participation. The final draft was shared with the whole academic team, and was received without comment. This has been in place for 5 years, and Jen is working on a revised strategy for the next 6 years.

The strategy has two strands. The first was schools' outreach, built around multiple engagement at years 5, 7, 8 and 10. This was focussed on two secondary schools and their feeder primaries in Portsmouth. The second was public engagement. This provided channels for engagement activities via the Stargazing projects, as well as drawing in standalone projects such as the Tactile Universe. In the revised strategy, there will be a third strand which takes the community engagement aspects of public engagement and makes them distinct. For public engagement to form an impact case study in REF, there needs to be under-pinning research. In the new strategy the work that derives directly from the Institute's research outputs will be defined as public engagement. Work that comes from a broader base than the research will take place under the community engagement heading. This clarity will help planning and the development of a future Impact Case.

While there is a new strategy from 2022 onwards, Jen noted that the original strategy did evolve. For example, the engagement with schools changed from an upper age limit of 18 down to 16 to better distinguish from recruitment activities. As the concept of Civic University took hold in the sector, the strategy was adjusted to explicitly align with that language.

Nick Bonne was asked to reflect on how the strategy helped him to pick up maternity cover for Jen. He noted that he worked for IGC before the strategy was established, and he had seen a change on the focus of Jen's work as a result. It was clear she was making more effective use of her time. It also allowed him to better understand the demands for public engagement on his time. Once he was providing maternity cover, it really helped him to fulfil the role and keep to what it was intended to address.

Dom mentioned he had supported other departments to set up public engagement, only to see them lose direction through staff transitions of the sort seen at IGC. he believed this was due to the absence of a defined strategy. Jen agreed it had been important, although it did not solve every issue. It was also essential to have support in the department. It provided both ownership and authority for her.

Nick Bonne asked if the explicit link to the Aspires research outcomes had helped the strategy gain credibility with the Institute? Jen responded that it absolutely underpinned the justification for engaging at primary level. But in addition, with colleagues who speak the language of research, providing peer reviewed research was invaluable.

Dom commented on encountering some arrogance particularly amongst senior colleagues, who could dismiss social science research. When colleagues realised that a focus on social capital would take away resource from recruitment, some concerns were raised. But again, the strategy helped with this because it ensured buy in from the Institute Directors.

This is not a "standard" strategy, Jen added. The core document is short, ensuring colleagues read it. There are supporting documents, and it provides definitions of activities while making it clear how staff and budgets are allocated to the activities in the strategy. There is explicit reference to the relationship to recruitment, making a clear distinction from marketing.

Tactile Universe is explicitly referenced in the strategy. Nick explained that this provided resources to allow visually impaired people to engage with astronomy. It has support from STFC and the Institute. Dom added that public engagement Impact Case had a strong outcome in the REF, being either 100% 4* or 50/50 3*/4*. Nick acknowledged this has helped make the case for support, and Dom responded that the strategy had allowed it to develop distinct from the engagement with schools. Nick agreed, as it allowed him to develop it with the community of beneficiaries.

Commenting on the new strategy, Jen noted that while a 6-year duration aligned with the REF cycle, it also allowed them to complete all the points of engagement with a given school cohort. She knows that they cannot rest on their laurels, and need to maintain momentum. She did not think that everyone was thinking that way in the immediate post-REF period.

Thinking about that long-term view, Dom noted that engagement activities tend to fluctuate. Jen agreed, describing the work as a rollercoaster. People leave, with some transitioning to new roles. The Director became a PVC at the University, so that there was senior support but also a change of Director. In developing the new strategy, they had used the EDGE tool to examine the status of their work. They realised that staff turnover had caused them to lose ground compared to 2019. So, they

have been working to regain ground and rebuild their reputation. This reputation has been cited by colleagues as a reason they came to the Institute.

During the pandemic they focussed on the online activities. Only just getting back into their selected schools. These have participation rates at only 10%, so strongly aligned with widening participation priorities. The partner schools have been focussing on recovering the learning of their students. So, in the interim the Institute has been more relaxed in accepting requests from other schools, while being clear it is likely to be a one-off.

Dom drew the discussion to a close by asking about the next steps. Nick reflected his excitement at the new strategy, and that returning to schools would be like a fresh start with the existing schools and student cohorts.

There was still work to do in evaluation to demonstrate impact, Jen felt. The pandemic clearly affected their ability to do this, but they are working to embed evaluation. She also added that it helped her with her own career progression, as writing and implementing a successful strategy clearly demonstrates a more senior role.

Dom rounded off by reflecting that the narrative through the session demonstrated the success of the strategy, as did the continuity through staff turnover. He then opened to questions.

Question: How have the schools responded to the strategy?

Jen answered that there had been a mixed response across the three identified secondary schools. One school did not engage in the first year due to the teacher being overloaded. In the second year a technician took over the relationship, and has been able to maintain a long-term commitment. This school has become the most engaged. The second school was slow to engage. While the Institute wanted to start with the whole cohort, the school insisted they started with a single Year 8 class. Having built some confidence with them, they then engaged across their cohorts. However, they lost staff and their involvement was interrupted until the summer of 2022. In the third school, following the first meeting they wanted everything linked to the curriculum. Institute staff were able to get back into the school eventually and champion their approach. Unfortunately, a change of staff contacts interrupted the continuity and the connection was lost.

While each school has agreements with the University to support tracking student outcomes, Jen felt it would be counter-productive to have something similarly formal for the schools engagement relationships. In practice things have worked out well as Institute resources have been able to engage well with the active schools and their feeders.

Question: Has there been any aspect of the strategy explicitly to support continuity and co-production with the schools?

The new strategy was developed late in the academic year. Nonetheless, Jen was able to share it with the schools. While there was no significant feedback, they were supportive and happy with what was being provided. The schools were clear that they did not need more teacher CPD, as they had plenty of that, and that they were well served on gender issues. The co-production aspects of the strategy will focus in the public and community engagement strands.

Question: How were the schools chosen for the 5 years of the strategy?

Schools in Portsmouth are all high on measures of deprivation and poor participation in higher education. While the chosen schools scored particularly highly, they were also identified as having a

manageable number of feeder schools at primary level. This allows the Institute to be confident it can resource the activity. There was a mix of structures and levels of engagement. Two schools were single-sex but both have moved since to co-educational. In discussion with the University's schools engagement team, it was decided to stick with the two active schools for 2022/23, with a third school being considered for 2023/24.

Nick finished by saying the most important impact was having a strategy to support explaining the importance of the engagement activity. Jen added that it is important, but not a magic wand - good relationships within a supportive department are essential.

Creative Spaces in Art and Science

Eliza Hunt

Helen Schell (Artist and Space Science Educator), Ione Parkin (Visual Artist), Dane Comerford (IF Oxford), Briony Thomas (University of Leeds), Morgan Herod (University of Leeds)

This session was split into different sections with multiple speakers.

- Helen Schell spoke for 10 minutes about the projects she has been involved in, showing pictures of her work on a presentation. These projects include 'The Human Spaceship', 'Moon Rocket', and 'Midnight on the Moon'. In the latter of these, Helen designed a midnight on the moon dress to show different concepts associated with the moon, e.g., 2 weeks of darkness followed by 2 weeks of light was represented by black and white stripes on the dress. The dress was very heavy to show that the gravity on the moon is weaker. Helen emphasised that art is not a service industry for science, but that the combination of art and science together can have great potential and lead to a huge and diverse audience.
- Ione Parkin then spoke for 10 minutes about her project creativity and curiosity. Ione has developed a body of work to represent space, and worked in collaboration with astrophysicists, cosmologists, and planetary geologists. Iona showed pictures of her work and read out descriptions of the different pieces and what the pieces are evocative of.
- Helen and Ione then led a Q&A for 5 minutes. The discussion was about why art and science collabs are important – art can draw people in to science in a way that sparks different parts of their minds. Everyone should have an opportunity to understand. They aren't trying to make everyone scientists. Creativity is key in art and science, and we don't need to put people into boxes.
- Dane Cormerford then spoke for 5 minutes about the Ideas Festival and said that the Arts Council can subsidise art, and everyone should be able to experience science. There is funding available for community groups etc. Dane demonstrated Glow Your Own, a coding project for which people were sent packs in the post and there were zoom workshops (see website for info). There was a digital artist designed LED exhibition, and people could scan a QR code and go online and change the colours etc.
- Briony Thomas then spoke for 10 mins about a project carried out in collaboration with Morgan Herod. They created 3D printed virus models with interactive mechanisms. Hands on, tactile models to show how viruses move/work/exist. They brought in their polio virus model and this was passed around the room. This was created in a co-design process by taking ideas from virus structures and getting young people to input on the designs. The

model also shows how antibodies work. They are currently in the process of making coronavirus and norovirus models. Cross curricula learning. They did workshops with schools involving plasticine modelling, drawing, and creating stories about viruses. They also have online augmented reality virus models. They got great feedback from students, who were inspired and really enjoyed these workshops. They have helped to change children's understanding and attitudes to viruses.

- There was then a Q&A. Questions about whether there was much interaction with the virtual virus gallery, the answer was that this was hard to track and there were lots of views but it is unclear who the audience actually was. They prefer to run this programme within the community rather than online.

Creative Spaces in Art and Science

Ghada Jameel

Helen Schell (Artist and Space Science Educator), Ione Parkin (Visual Artist), Dane Comerford (IF Oxford), Briony Thomas (University of Leeds), Morgan Herod (University of Leeds)

1) The human spaceship (A slice of the moon)
By: *Helen Schell* (Artist and Sun Space Educator)

This is a brief about the artist, and her works with pictures:

Moon Projects & Awards
Highlights: projects & research combining art, space science & outreach.
- As a guest artist at Rice Space Institute, I visited Artemis spaceflight scientists, NASA JSC, Houston 2019.
- The only artist to talk at the NASA Human Research Program Investigator's Workshop 2022.
- I am the only artist registered as a UK Space Industry.
- My artworks are on The Aldrin Foundation Art Space site (set up by Buzz Aldrin & run by his son, Andy)

Awards:

- *Sir Arthur C Clarke Award for Space Outreach Individual (first artist to win 2019)* (2018 - ESERO UK Team & 2020 - SunSpaceArt Team)
- *IAU100 Moon Landing 50 Prize for Most Innovative Event (worldwide 2019)* Ely Cathedral Science Festival
- *ESA 3D Printing Competition (Global Winner) - Moon Garden Design (2019)*

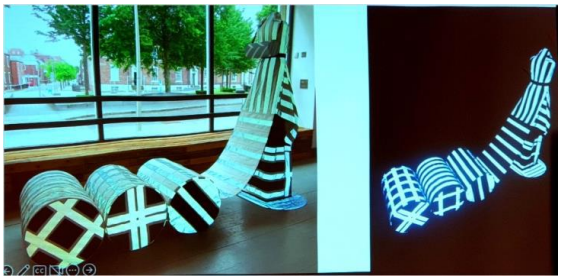
Partnerships & collaborations over the previous 10 years:

SunSpace Art, STFC, Comino, IoP, RAS, RAL, MOSI, ISU, Festival of Tomorrow, Science Museum, ESERO galleries, Sunderland Culture, councils & UK universities, NASA & ESA (connections since 2009) Online Moon resources (Artemis Missions) for research, development & resources.
- http://lunarexploration.esa.int
- https://www.nasa.gov/moon

Moon Rocket & Midnight on the Moon
Moon - shot : Woman on the Moon - started in 2011
(Exhibition at Ely Cathedral 2019, Apollo Anniversary)


Lunar Habitat & Lunar Space Station
Moon - shot : Woman on the Moon - started in 2011


Midnight on the Moon Dress - 2019
Moon - shot : Woman on the Moon - started in 2011



2) The International Art-Science Project Creativity and Curiosity
By: *Ione Parkin RWA* (Artist)

This is a brief about the artist, and her works with pictures.

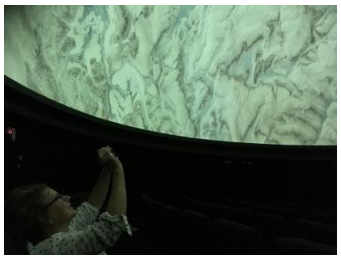
Ione Parkin is the co-founder and lead artist of the international art-science project Creativity and Curiosity. Ione engages in conversations and collaborations with astrophysicists, cosmologists, solar scientists, and planetary geologists. She is developing a growing body of artwork inspired by the rich imagery of space and her ongoing dialogue with researchers. Parallels of the process have emerged between the artists and scientists - an excitement about uncertainty, ambiguity, and anomaly - a desire not just to observe but to look beyond. This artist-led project explores the nature of interdisciplinarity within the practice of visual thinking.
Ione Parkin's large-scale paintings express her fascination with the formation of the universe; massive clouds of cosmic dust and gas, vast webs of color and shimmering light; solar dynamics; luminous visions of immensity.
Her richly texture mixed-media works on paper respond to planetary surfaces, extremes of temperature and geological process. These works resemble samples of the undiscovered terrain of distant moons; fragments of an iron-rich formation; a young planet in the throes of intense volcanic activity; the surface texture of glacial ravines and fissures which echo the hyper-cold regions of other worlds or vast oceans of frozen nitrogen.

Ione Parkin RWA

- Royal West of England Academician
- Honorary Visiting Fellow, Department of Physics & Astronomy, University of Leicester
- Grants: Arts Council England, Royal Astronomical Society, Hope Scott Trust

Parkin RWA
Turbulence Oil on canvas 127 x 102cm

Full - dome projections of artwork :
Zeiss - Grossplanetarium - Berlin Science Week 2018
Royal Observatory Greenwich - Marvellous Moons 2018



3) Oxford Science and Idea Festival
By: *Dane Comerford* (Festival Director)

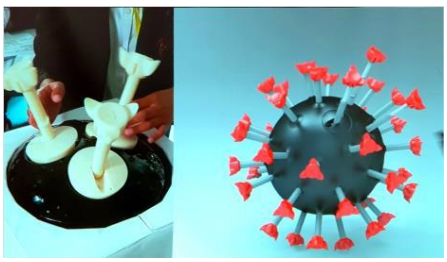
The speaker talk about: 2022 Science and Ideas Festival IF Oxford returns as a social way for you, your family, and your friends to connect with science and ideas. Events across Oxford, and online, are created for you to meet and question experts, have fun and experiment with something new. The collection of articles and poems in this magazine should get you in the mood for hundreds of activities and conversations awaiting you this October. Technology, art, or even Oxford as a place, are not static and represent unlimited perspectives, with IF as a starting point for a journey of discovery. The Festival makes connections across issues and society, with events designed to bring a smile to your face while setting those neurons firing in your brain. Orient yourself with the Festival map and calendar of events (pages 58 and 59) and search, filter and book your events online. IF Oxford is run by an independent charity and its hundreds of volunteers want you to have a good time. All events have age recommendations and are tagged as WORKSHOP, TALK, TOUR, PERFORMANCE, and more. The blue pages show interactive zones, where you can get up - close to experiments while meeting scientists and creative professionals in a safe and friendly place. Most events need to be pre-booked helpful for Covid or other circumstances and use Pay What You Decide (PWYD) ticketing, which means you can choose to pay whatever you want or can afford. You can make your donation during booking or after the event and the amount you pay is up to you, all supporting next year's Festival. Keep up-to-date and share your experience of # IFOx2022 on social platforms, and for information and tickets, visit : www.if-oxford.com
As well as he cleared up some examples by picture, and by a simple model that he made himself and bring it with him to the conference to let us see it, as shown in the following two pictures:

4) Art in science

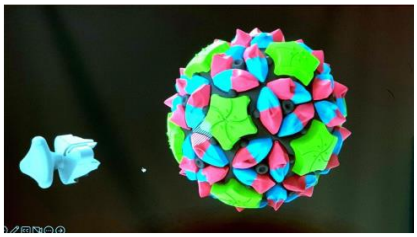
By: Briony Thomas & Morgan Herod University of Leeds

The speakers gave us a brief about the Microorganisms - also known as germs, bugs, or microbes - are tiny organisms too small to be seen with the naked eye. Although extremely small, microbes come in many different shapes and sizes. Most microbes are beneficial, but some can be harmful.

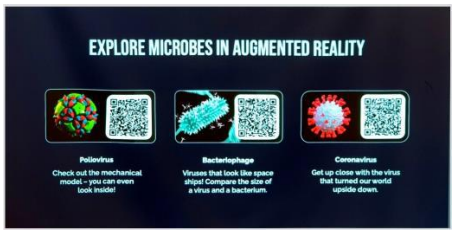
Viruses are the smallest of the microbes. They are so small that more than 1,000 coronaviruses can fit across the width of a human hair. As viruses are too small to see with the naked eye, they are most noticeable when they cause disease.
Viruses cannot reproduce by themselves. They are only able to replicate inside the cells of other living things. To do this, a virus contains a set of instructions that cause a cell to copy them. Viruses infect all types of life forms, from animals and plants to other microorganisms.
A virus is made up of a core of genetic material (the instructions), surrounded by a protective shell called a capsid. In some viruses, the capsid is surrounded by an additional spiky coat called the envelope. These act as a container for the genetic material.
The virus that causes Covid - 19 is a type of Coronavirus, named after the crown-like spikes on it surface. It was identified in the winter of 2019. Since then it has spread across the world. Scientists around the world have been working together to study the virus and develop vaccines. The key features that have been investigated include (1) the virus genetic material, (2) the virus envelope, and (3) the virus spike (or spike protein).



The capsid is made of a small number of proteins, arranged in a repeating pattern The pattern of proteins is most commonly helical, which makes a rod-shaped virus, or icosahedral, which makes a spherical virus. The envelope structure is made of proteins and lipids (fats) and is usually a less organized pattern.



Scan the QR code to see this Augmented Reality (AR) model of coronavirus.



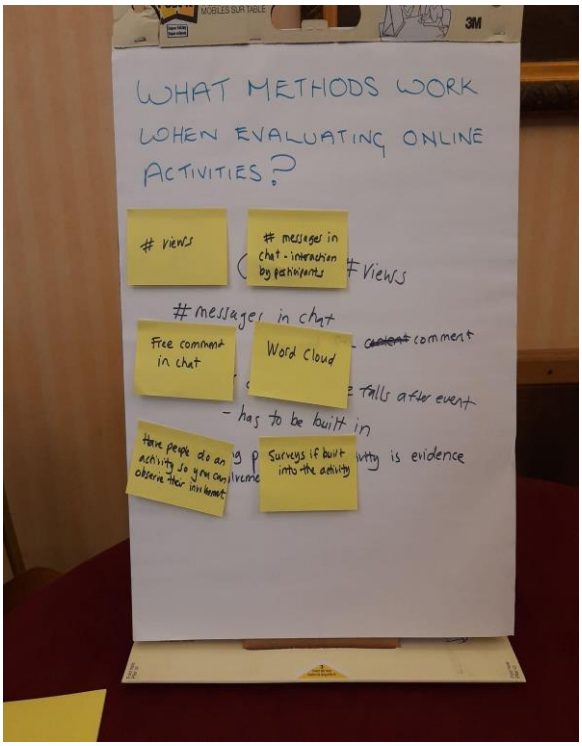
Parallel Session Four

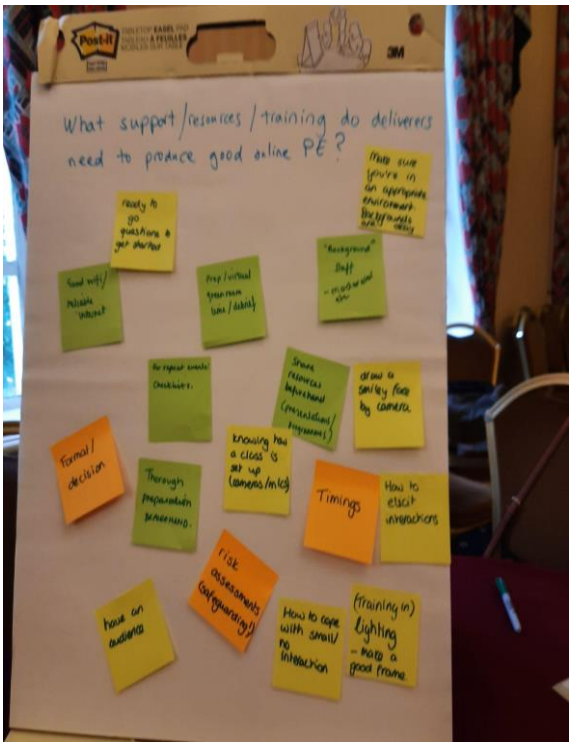
STFC National Online Programme

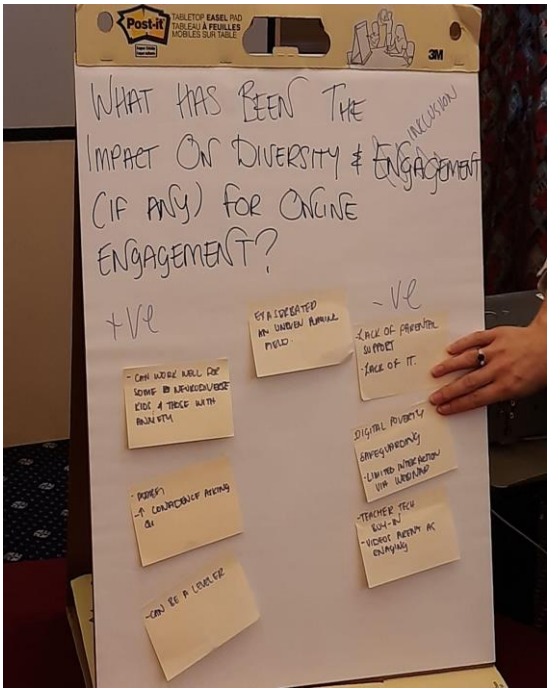
Claudia Antolini

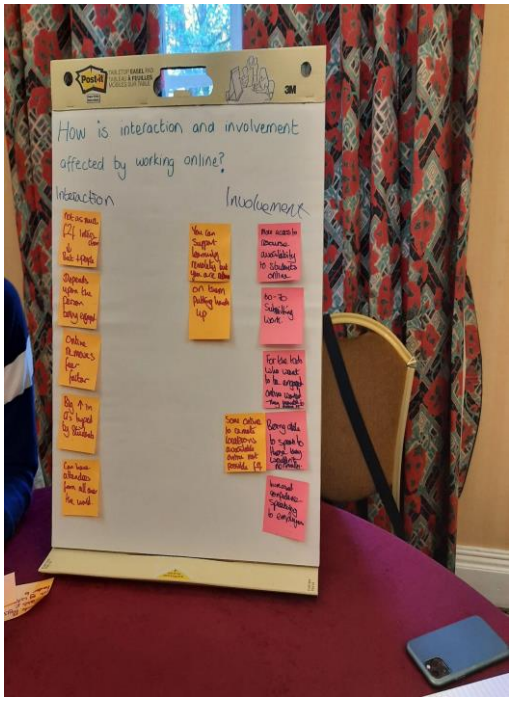
Gemma Reed, UKRI-STFC

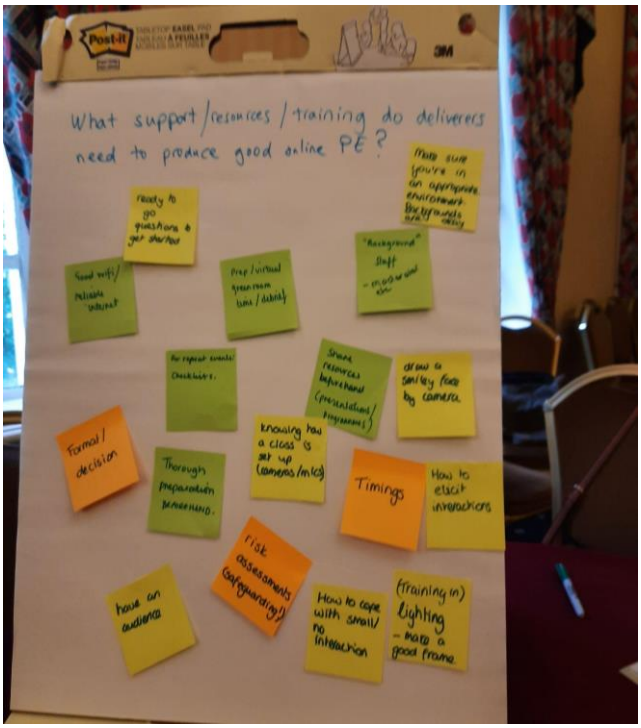
An interactive session to share our learning about online events: what works, what doesn't, best practice going forward. In the following there are pictures of the outcomes of the discussions.


WHAT METHODS WORK WHEN EVALUATING ONLINE ACTIVITIES?
views
messages in chat - interaction by participants
views
messages in chat
Free comment in chat
Word Cloud
comment
- has to be built in


What support/resources/training do deliverers need to produce good online PE?
Timings
How to elicit interactions
(training in) lighting
have an audience


WHAT HAS BEEN THE IMPACT ON DIVERSITY & ENGAGEMENT (IF ANY) FOR ONLINE ENGAGEMENT?
+Ve
-Ve
LACK OF PARENTAL SUPPORT
LACK OF IT
DIGITAL POVERTY


How is interaction and involvement affected by working online?
Interaction
Involvement


What support/resources/training do deliverers need to produce good online PE?
Timings
How to elicit interactions
Formal/ decision
have an audience
How to cope with small/ no interaction
(training in) lighting
- make a good frame

Andy is the digital creative officer in public engagement for research at the University of Leeds. Andy gave an overview of what this role involves – aiding researchers to reach new audiences and adapt their work for different audiences.

Overview of 'Be Curious' - the Leeds public engagement brand. They do live in person events, live virtual lectures, and creative strands (Read, Make, Create, With Us).

- Read - They have developed children's books to engage people with research. These are available online free and there are a limited number of printed copies (2000 copies printed of 'That's amazing, mum!' which is about a materials scientist at the Bragg Centre in Leeds). Printed copies were given to schools, libraries, charities, all for free. Planning to make more books.
- Create – working with researchers to interest general audiences. Informative, relevant to daily life. Andy talked about the Leeds ICKLE project (focused on impact of Covid-19 lockdown on young pupils). Helped inform educational policy. Andy also talked about another Create strand 'do you know how green your tshirt is?' which was a study into the cotton industry ethics and environmental impact. They created a video resource for schools, and a board game. This will be part of an exhibition at some National Trust sites. Andy also showed an animated video about anti-microbial resistance which is aimed at young people in India and the UK. Used to educate audiences.
- Make – collab with ESRC and EPSRC. They won prizes and reached lots of students locally and nationally. (couldn't hear much of this section – the acoustics of the room weren't great).
- With Us – researcher led. Created videos, hosted online and shared via social media.

Andy then discussed their upcoming activities. Leeds are piloting an exciting creative engagement with research initiative to enable researchers to work closely with the Be Curious team.

Engaging the Public Through Creative Practice

Stewart Eyres

Andy Guy, University of Leeds

Andy Guy, Digital Creative Officer at the University of Leeds, talked about the work of his department with researchers to realise ideas for creative engagement. They would adapt research content and help researchers to be more accessible, and so reach a new audience.

Leeds' brand for public engagement in their research is Be Curious. It supports Be Curious Live events in person, with 1200 people participating, the Be Curious Lates which run online and four creative strands.

The Read strand creates children's books to engage young people with Leeds' research. They are limited print runs of 2000 which are given away, supported by electronic versions available online. The first was "That's amazing, mum" from the Bragg Centre for Materials Research. It picks up on the authors identities as LGBT+, disabled and neurodiverse, and aimed to ensure the characters were representative. The books were shared with schools, charities, libraries and via Be Curious events. The project featured in Leeds' Future Together which celebrates interaction between academics and non-academics.

Within the Create strand, videos and animations are developed for a wider audience. They are fun, accessible and understandable. Working on these supported researchers to think differently about their practice to engage with their audiences. They form part of an existing public engagement strategy at the University. Andy went on to describe three examples under this strand.

An animation was developed to communicate the Ickle study on the impact of the pandemic on primary learning. A study of the cotton industry based around the idea of "how green is my t-shirt?" lent itself to a video and board game, with the creative aspect being a significant part of the research project. These were made available at Lowther Hall and Quarry Bank Mill. The third example was a project across five universities between the UK and India, about anti-microbial resistance. This looked at the impact on the health of people, animals and plants via the water they consume. The creative component was a video with narratives in Hindi, Bengali, Gujarati and Urdu.

Through the Make strand, simple materials were provided for schools, community groups and others, distributed via live events. Different kits and activities have been made available to 500 families, 500 students at schools and to 1200 people via Be Curious Live events. This work was awarded the Elspeth Gorman prize.

The fourth strand is Be Curious: With Us. These are online videos and animations created by researchers. The pilot programme funded creative content for existing public engagement projects. They include research journeys, with storytelling workshops to support researchers in speaking to their personal journeys. They speak to camera and have been widely shared.

Q&A
Question: Is this a central resource?

The work is funded from the public engagement team and working with early adopters, including a colleague in a Dean role. In future looking at a bidding process. The model is to complete one project at a time. There is work underway to raise awareness amongst those already engaging with the public.

Question: What time is required to develop resources?

Typically, three weeks in collaboration with the researchers. The scripts start with a lot of language. A significant part of the collaboration is adjusting the language to be accessible.

Question: Is it verbal content or text?

Spoken word is transcribed to subtitles. For the Create example this was in all languages. There was one webpage for all five collaborating institutes.

Digital Differences

Ghada Jameel

Shauni Sanderson (University of Leeds), Shane McCracken (Mangorolla)

1) Beyond the Zoom Room: Live streaming using Stream Yard
By: Shauni Sanderson (Public Engagement Officer, University of Leeds)

The speaker talked about:

- Pandemic challenged us to experiment with digital event formats
- Pilot #BeCuriousGoes Virtual (June 2020). Be Curious October
- 2020 - our first online family festival '
- Varied experience using different online platforms to engage
- audiences
- How can we improve our digital offer ... ?

Then she speaks briefly about herself and her achievements:

- "It did have some technical issues that I hope will be solved in future events, it is also understandable on this kind of event. In general, it was interesting and inspiring - and that was the point!" (Zoom event attendee).
- "I've done in-person events for years and have gradually built up relevant skills and knowledge (and I'm still learning)! I don't currently have skills/knowledge for virtual events or videos".
- "I don't know where to start with virtual events ... it's mostly unknowns for me!".
- "Running a Zoom Webinar fills me with dread ... !".

Where do our audiences go online?

- More than a third (39 %) of the total time spent online in the UK is on sites owned by Google or Facebook.
- (82 %) of UK adults have a social media account and about one in every five minutes spent online is on social media.
- Around nine in ten internet users visit YouTube every month.
- YouTube is now the second most used search engine (We Are Social 2019).

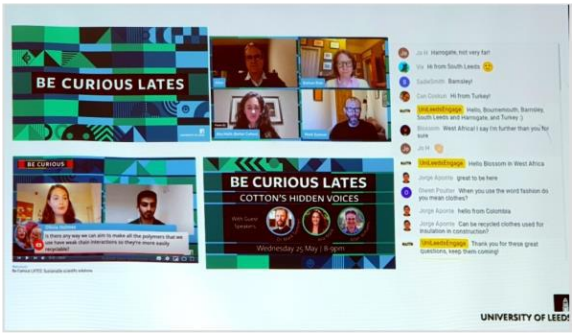
Exploring live streaming StreamYard Demo

StreamYard is a live streaming studio in your browser. Interview guests, share your screen, and much more.

Exploring live streaming StreamYard Demo StreamYard is a live streaming studio in your browser. Interview guests, share your screen, and much more.

Why StreamYard?

- From 'Zoom fatigue' to fun!
- Breaking down barriers.
- Branding.
- Livestream legacy.
- Ability to create professional-looking events with ease.



Outcomes:

- On average 184 % increase in viewing figures one week after live events.
- Lower drop-off rate from bookings (25%, compared to 48% when using Zoom).
- 2.5x growth in attendance numbers.
- Enhanced geographical reach: 60% from outside Yorkshire. 14% from international locations.
- 55% Viewed with family/ friends.
- Enhanced YouTube presence/ regular content - 100 subscribers.

And she added “Audience experience & impacts 90% Enjoyed Be Curious LATES 92% Learned something new 72% Inspired to learn more 65% Think differently about a topic 87% Would recommend Be Curious LATES ‘You don't need to travel to the venue, you can keep doing things at home one minute prior to the event and you feel more free to express yourself’. “Please continue with (online events) as we live too far away to attend in person and my daughter would struggle to attend in person because of her disability” In some ways for me, who is hard of hearing. they work better”.
Researcher experience 'We did feel very separate from the audience. I think, in that format, but at the same time, the audience did seem to participate and to engage by asking questions, which is good. “The fact that you know you create something and then it is stored and will exist forever is a great thing as well ... there's ... a legacy there that you don't have necessarily for the live event”. The biggest revelation for me ... I'd never ever thought it was that easy to live stream information.

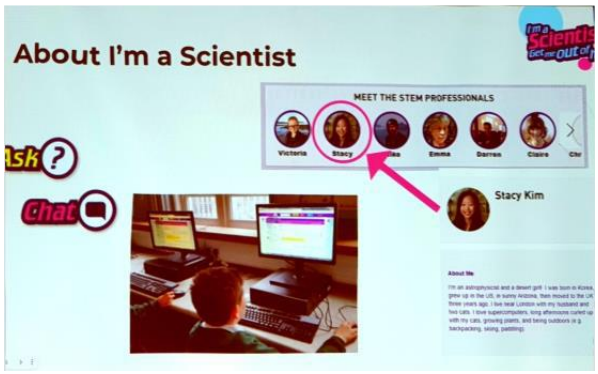
Drawbacks

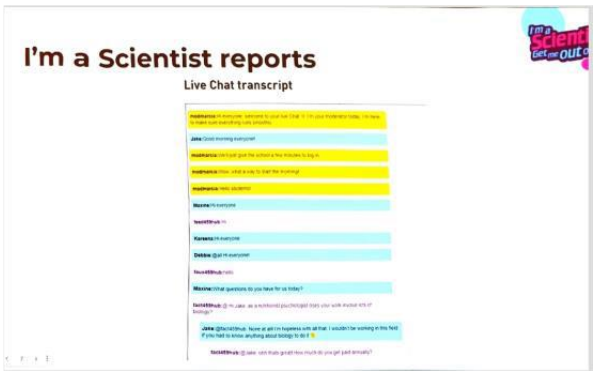
- Need to be logged in using a Google account to participate in the chat.
- Limit to interactivity.
- Slides with too much information, diagrams, or small text can be difficult to read.
- Live closed captioning is not available via YouTube (though possible via Linkedin, we choose to provide a live transcript using Otter All).
- Not a way to reach everyone (6% of UK households do not have internet access).

2) Digital Differences

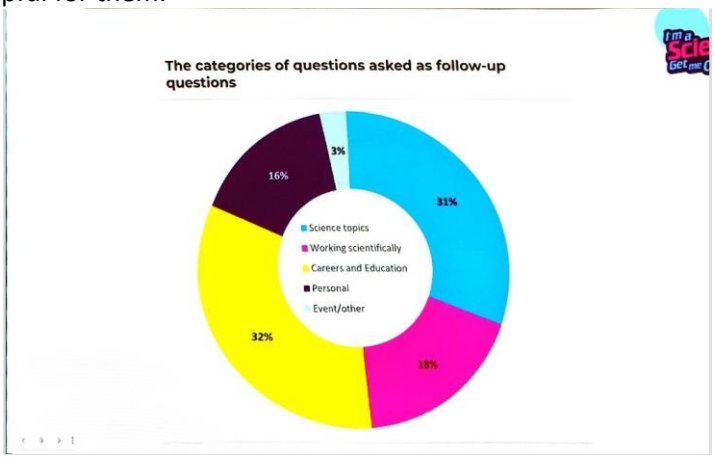
By: *Shane McCracken* (Scientist, Bath, England)

This is a brief about Shane:
Shane's career travelled through advertising, magazine publishing and broadcast TV before he started online schools engagement in 2001. He has developed a range of projects based on the I'm a Scientist format that have run in nine countries across the globe which its name (I'M A SCIENTIST, GET ME OUT OF HERE).





Then he shares a video showing us the student's and the teacher's experience with this Project, And how much it was helpful for them.



In the end, there was a discussion between the audience and the speaker about this project.
Thus this was the end of the last session in the internet 2022.