

SMASHfestUK 2016

a festival... a Big story... *an adventure...*

18 - 20 February 2016

Evaluation

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Evaluation

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1.



Tackling critical issues: introduction

February 2016 - a solar storm is about to hit Deptford. Electricity, electronics, communications and infrastructure will all be hit. Deptford - and the world – will plunge into darkness as hospitals crumple, water supplies dry up ... life and health are at immense risk...

This was the scenario for SMASHfestUK 2016. This hyper-local Festival creatively interwove arts, science and entertainment to engage young people in science, technology, engineering and maths (STEM). SMASHfestUK 2016 took place in Deptford at The Albany and Deptford Lounge over the spring half-term 18-21 February 2016. This was the second year of the Festival, following a successful pilot in 2015.

The same professional team built on the innovative model developed in 2015 to explore a ‘*what if*’ scenario of the impacts of a global catastrophe. A fictional narrative of what would happen if the earth faced devastation from a solar storm linked together the programme for SMASHfestUK2016. Audiences were alerted as to how science and creativity might solve the issues of creating resources and energy to build a new future. The potential of science was revealed through inventive concepts such as a human power station, a self-build planetarium and the genetics of superheroes. Ideas were presented utilising the skills and imagination of artists, scientists and creatives to develop activities to engage audiences through performances, poetry, music, comedy, Aardman-style animation, virtual reality experiences and interactive installations as well as a coding club, exhibitions and films.

The rationale for SMASHfestUK

SMASHfest UK tackles an important and critical issue in an imaginative and engaging way. Its goal is to stimulate the interest of young people in Science, Technology, Engineering and Maths (STEM). This is a pressing issue as interest and achievement in STEM topics in schools is declining, leading to low entry levels to STEM tertiary studies and careers and an imbalance in the supply and demand for qualified STEM professionals¹. The implications are serious: science and research are major contributors to the UK’s prosperity. For the UK’s economy to prosper, high levels of skills in science, technology, engineering and maths (STEM) are needed, with citizens that are interested and aware of the importance of these subjects.

SMASHfestUK is rooted in the conviction that making STEM real and fun for young people will open up possibilities that will empower their futures. The Festival provides new opportunities to introduce STEM subjects to young people aged 7 to 17 through inspiring, innovative and interactive arts experiences that appeal to their imaginations, stimulate interest and embed learning. The Festival strategically targeted those who are under-represented in STEM, including economically disadvantaged young people and BAME communities, women and girls², and young people living in poverty.

‘Science, technology, engineering and maths (STEM) are enabling. They enable people to make sense of the world around them, they enable people to make informed decisions, and they enable people to pursue a wealth of exciting and fruitful career opportunities. For young people from relatively low socioeconomic status (SES) backgrounds in particular,

¹ <http://www.educationandemployers.org/wp-content/uploads/2014/06/joyce>

² <http://progressivescience.org/Diverse.html>

*STEM subjects can be invaluable. They can provide a means by which these young people can better engage with the modern world and take advantage of the opportunities it affords.*³

Enthusiating young people is especially important because *'careers from STEM are not popular aspirations for students age 10 -14 and pupils from age 10 start to self-identify as 'not STEM'. Teachers often have lower (stereotypical) expectations of under-represented groups in STEM.'*⁴ Several reports suggest that more must be done at school-age level, to redress the imbalance in STEM degrees/careers, and to sustain the STEM workforce⁵.

*'The accepted response to these facts is that female, black and minority ethnic and disadvantaged young people are underrepresented in STEM study and the STEM workplace and that, if only we can enthuse / inspire / encourage these particular groups to enter STEM fields, then the skills shortfall will disappear.'*⁶

Why Deptford?

Deptford is a particularly appropriate location for SMASHfestUK. 50% of young people in Deptford live in poverty, and 75% of young people in schools are BAME. The Festival aims to engage economically disadvantaged young people directly by bringing informal science-engagement activities into the community. Presenting the Festival in venues that already have the trust and awareness of the local community helps this engagement process. By holding the Festival in The Albany and Deptford Lounge Library alongside on-street performances, young people and their families were invited to be inquisitive and participate within their comfort zone. The Festival provides an important entry route into STEM subjects as well as stimulation and engagement for young people, *who 'should be inspired and engaged with science in order to continue developing the next generation of brightest minds.'*⁷ Introducing STEM topics to young people within their own community makes them accessible and helps remove the barrier that science is *'not for the likes of us'* by giving them a positive experience of science; *'it is for you'*.

SMASHfestUK 2016 objectives

- Produce an immersive science/arts festival with a strong narrative theme, engaging hard-to-reach audiences in STEM.
- Research and reduce access barriers with hyperlocal approach and engage 100 young people as facilitators/ambassadors.
- Deepen relationship with Deptford audience nurtured in SMASHfestUK 2015.
- Build community of science communicators/scientists/performers/audience members initiated in SMASHfestUK 2015.
- Grow relationships with scientific/cultural institutions already partnered with to bring them to local communities.
- Increase the science capital and cultural capital of young people in Deptford/Lewisham

³ Science beyond the classroom ,Experiments in Engagement: Engaging with young people from disadvantaged backgrounds, April 2014, Wellcome Trust

⁴ Not for people like me?" Under-represented groups in science, technology and engineering. www.wisecampaign.org.uk/uploads/wise/files/not_for_people_like_me.pdf

⁵ Improving Diversity in STEM A report by the Campaign for Science and Engineering (CaSE) May 2014

⁶ "Not for people like me?" Under-represented groups in science, technology and engineering. www.wisecampaign.org.uk/uploads/wise/files/not_for_people_like_me.pdf

⁷ Experiments in engagement: Research into engagement activities with young people from disadvantaged backgrounds.

http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh_peda/documents/web_document/wtp056381.pdf.

Funding for SMASHfestUK 2016 was provided by: Middlesex University London; Refinery; Wellcome Trust; Arts Council England; Royal Society of Chemistry; Science & Technology Facilities Council; University of Greenwich; Lewisham Council; Biotechnology and Biological Sciences Research Council (BBSRC)

This report

This report was commissioned by SMASHfestUK to develop its understanding of audience response to the Festival and the extent to which it is meeting its objectives.

The following sources of quantitative and qualitative evidence were used to compile this report:

- Onsite audience survey conducted at The Albany and Deptford Lounge. A total of 100 responses were collected during the Festival in three ways; on paper, on tablet and online. Data was then merged to produce the final audience data. Audience Survey was organised and undertaken by Cat McGahey
- Interviews conducted with artists, scientists and cultural organisations involved in the Festival
- Briefings and feedback sessions with SMASHfestUK Directors
- Feedback from teachers in schools that hosted a SMASHfestUK assembly or event
- Interviews with Young Science Explainers
- Social media and web analytics

SMASHfest UK objectives informed the framework for the evaluation, and determined the quantitative and qualitative data required to assess the impact of the Festival. It informed the topic guides for interviews and the questionnaire for the survey. The quantitative strands of the study contribute to a range of impact measures which act as KPIs for the programme and which will enable progress, achievements and change over future years to be monitored.

We begin this report by defining SMASHfestUK's main achievements for 2016 against a set of indicators that benchmark the Festival's progress from its beginning in 2015. We then look at how SMASHfestUK has impacted on audiences, creatives and artists, scientists and the education programme.

Finally we offer some suggestions and recommendations to inform future planning.

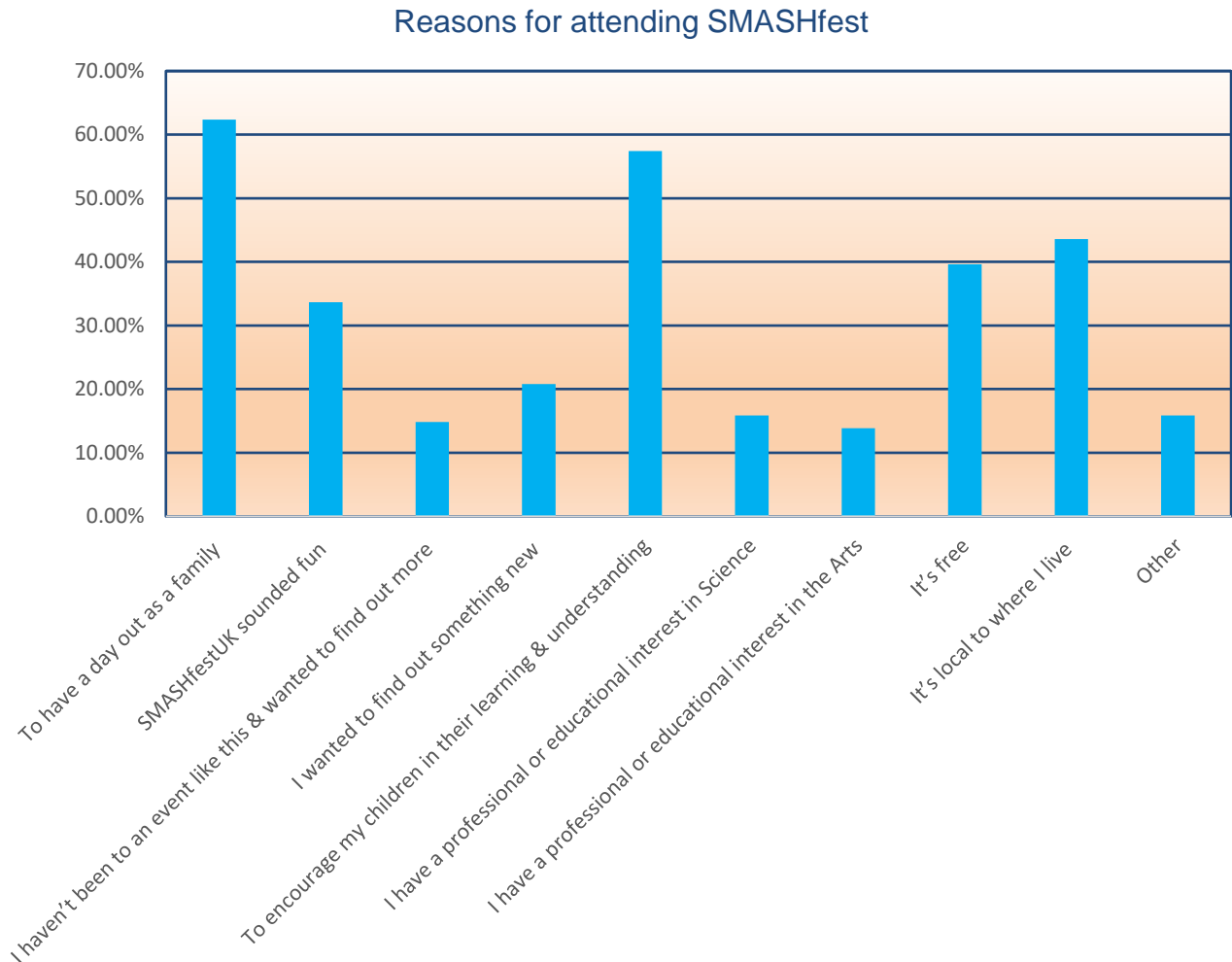
2. SMASHfestUK 2016 Summary of key achievements

- **35 unique events** in the Festival programme: **increase from 27 in 2015**
- **1048 attenders** for ticketed shows; **850** through **Deptford Lounge** activities
- **Increase in SMASHfestUK social media:** 70 Tweets; 36.9K Tweet impressions; 808 Twitter followers (up from 600), top tweet earned 2,379 impressions; 82 new followers with top interests of Science News and Technology.
- **94 artists and creatives involved** including writers, artists, performers, poets, musicians, digital producers and filmmakers
- **40 scientists** involved including an epigeneticist, a design engineer and a Professor of Mathematics
- **64 collaborations** (including Greenwich Student films) emerge as a result - **new artworks, presentations, and performance**
- **20 young people** volunteered as **Young Science Explainers**
- SMASHfestUK **Community Audience Development Programme (CADP) ran year round**, developing new connections
- SMASHfestUK **established and consolidated innovative partnerships** with major cultural and scientific institutions including Wellcome Trust, Middlesex University, Arts Council England, Royal Society of Chemistry, Science and Technology Facilities Council, The Refinery, , University of Greenwich, Royal Observatory, Lewisham Council, Telegraph Hill Festival
- **Relationships with arts and cultural organisations grew successfully** including The Albany, Deptford Lounge, Fun Palaces, National Maritime Museum, Besson Street Community Garden, Mind's Eye and local youth theatre - GLYPT and The Midi Music Company
- **Local partnerships are extended** - including Lewisham Education Arts Network (LEAN), The Mayor's Office, The Young Mayor's Office and the Lewisham Pupils Ambassadors Scheme.
- **Schools enrichment programme (SEP) delivers 9 education events** and **outreach** projects involving over **2924 schoolchildren**
- **Relationships with local businesses** (L&Q Housing, CIS Security) are brokered **and new sponsors** invest in the Festival
- **A new governance format:** an independent not for profit legal entity is being set up to deliver the Festival
- **Building a loyal audience:** 30% of attenders at the 2016 Festival had been to SMASHfestUK in 2015, showing that the Festival is starting to build a loyal following.

3. The Audience Experience of SMASHfestUK

1048 people attended SMASHfestUK ticketed events, which were free but had limited capacity. Many others attended the drop-in sessions.

3.1 Reasons for attending SMASHfestUK 2016



The Festival is seen as a *family occasion*

62% of people came to SMASHfestUK 2016 as a family day out in half-term. The majority of attenders came to SMASHfestUK as part of a family group, or a mixed family and friends group. Engaging families in informal science learning and enjoyable experiences can support positive attitudes to STEM subjects, foster science literacy and alert young people and their parents to new possibilities about careers in STEM subjects.

Happy Kids: for many audience members this was the most important aspect of SMASHfestUK, it was the chance to do something as a family and learn something with their children. Activities proved just as engaging for adults as they were for children:

*'The opportunity for a fun day with the children watching them learning and enjoying themselves (whilst learning myself!)*⁸

'Seeing the children learning and enjoying the event

'Spending some time with the children and learning'

'Come and learn together with the kids about science'

'Lots of adults and young people coming together to have fun and learn...and it's free!'

'Everything - sorry its true - everything as no matter the age you can still get involved'

'A great day out for the kids' (10 survey respondents said this)

The *'family'* audience has immense variations - from parents who have aspirations for their children and are actively engaged in lots of activities to those who are apathetic and disengaged.

34% came because SMASHfestUK 'sounded fun'

The possibility of a shared experience that sounds *'fun'* is important to parents as it will give their children an enjoyable experience and they can all relax – they may feel intimidated by events that sound *'educational'* and *'not for me'* and where children ask questions they can't answer

'My son enjoyed it'

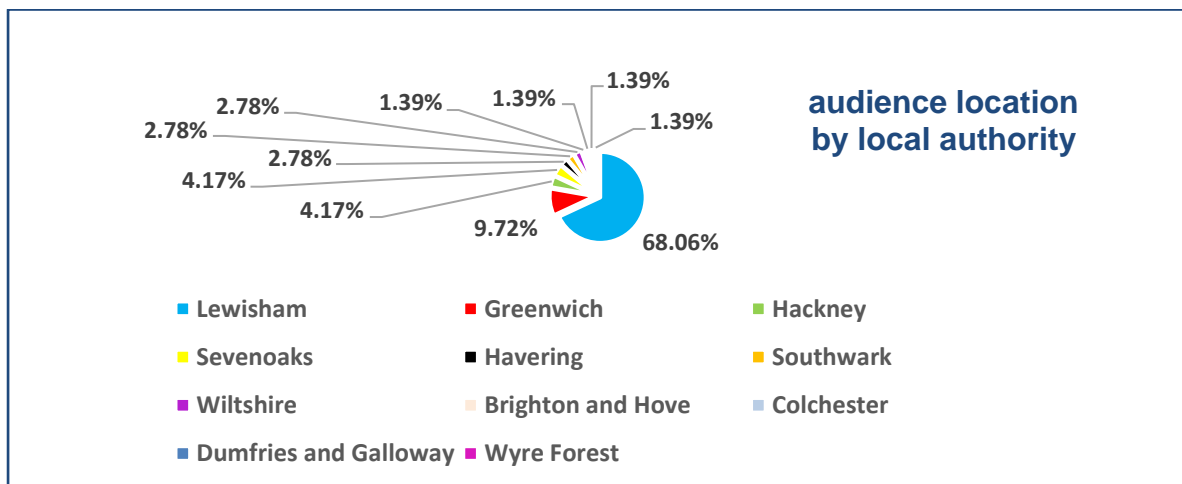
'My daughter being part of a show'

21% expected to learn something new through attending SMASHfestUK: their expectations were met. 95% of people at SMASHfestUK 2016 said they had learned something new

An equal number said the Festival had alerted them to new ideas or made them think of things they hadn't thought of before.

99% of attenders said SMASHfestUK is a good way to find out about science.

'It's local to where I live' was important to 44% showing the importance of convenient, known venues in the local Deptford community. Many Lewisham families do not have transport, making travel outside their area expensive. There is also an issue of venturing to places they don't know so being able to access free events within their familiar area and local community is a significant benefit. People are more comfortable *owning* the event. *'A local event for friends and family'* 68% of attenders were from the immediate Lewisham area. Others came from neighbouring Boroughs: Greenwich (10%), Hackney (4%), Southwark (3%) and Havering (3%). 15% came from areas outside Greater London.



⁸ All quotations are from audience members

However only 19% felt that holding SMASHfestUK 2016 in Deptford as a location was important. One of the key aims of the Festival is for it to be held in a neighbourhood where there are fewer opportunities for the community to engage in such Science/Art festivals. Some audiences were at The Albany or Deptford Lounge and saw the activities and came as unplanned, spontaneous attenders.

96% said there was something that appealed to them at the Festival

SMASHfestUK is free and this was an important factor to 40% of audiences.

This is especially important in an area that experiences high levels of poverty and restricted household spending. Poverty in this areas is higher amongst ethnic minorities and immigrant groups. Lewisham has the joint-highest proportion of pupils eligible for free school meals and lacking 5 A* - CGCSE grades including English and Maths, standing at 63%. Nearly a quarter (23%) of jobs based in Lewisham are paid below the London Living Wage and 24% of young people live in families claiming tax credits.⁹

'Affordable activities that have thrilled my daughter throughout her holiday'

Encouraging their children's learning and understanding was the reason for 57% of audiences coming to SMASHfestUK :

'Seeing kids enjoying science'

'Watching young people engage in science'

'Seeing my grandchildren really enjoy science'

*'Some parents clearly have high aspirations for their children and this appears to be more common amongst ethnic minority families.'*¹⁰ The "Not for people like me?" report¹¹ highlights the issues of under-represented groups in science, technology and engineering. It identifies the family as an important encourager or influencer for young people to take up careers in science and how important it is to ensure that parents, particularly in lower income groups, are aware of the full range of careers available. Presenting STEM subjects in fun and accessible ways opens up new ideas that this is something that could be *'for them'*.

Free, family fun and engaging activities linked by a consistent theme:

'All the activities related to the solar system'

'Diverse interesting and fun activities but all relevant to the theme'

'Lots of varied fun and facts'

Building a loyal audience

30% of people at the 2016 Festival had been to SMASHfestUK in 2015, showing that the Festival is starting to build a loyal following.

25% had been to a similar event. This suggests the Festival reached out to audiences who were new to the idea of Science/Arts festivals.

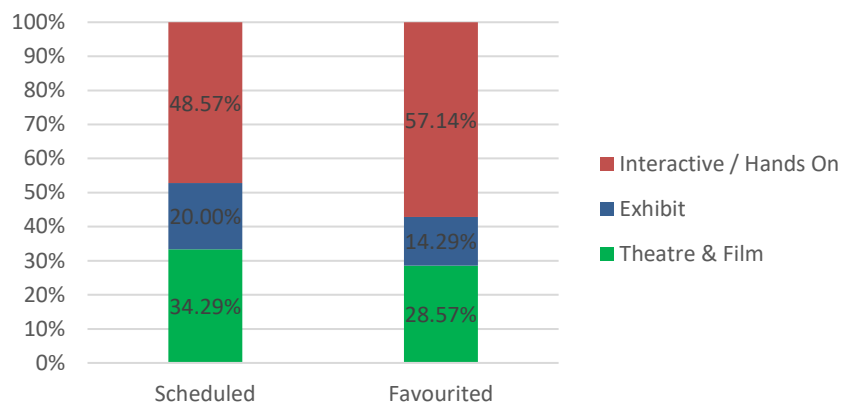
⁹ <http://www.londonpovertyprofile.org.uk/indicators/boroughs/lewisham/>

¹⁰ Experiments in engagement: Research into engagement activities with young people from disadvantaged backgrounds April 2014 Rebecca Atkinson, Kate Siddall & Carolynne Mason, Platypus Research

¹¹ Not for people like me? Under-represented groups in science, technology and engineering, A summary of the evidence: the facts, the fiction and what we should do next. Professor Averil Macdonald, South East Physics Network, November 2014

3.2 The Favourite SMASHfestUK event

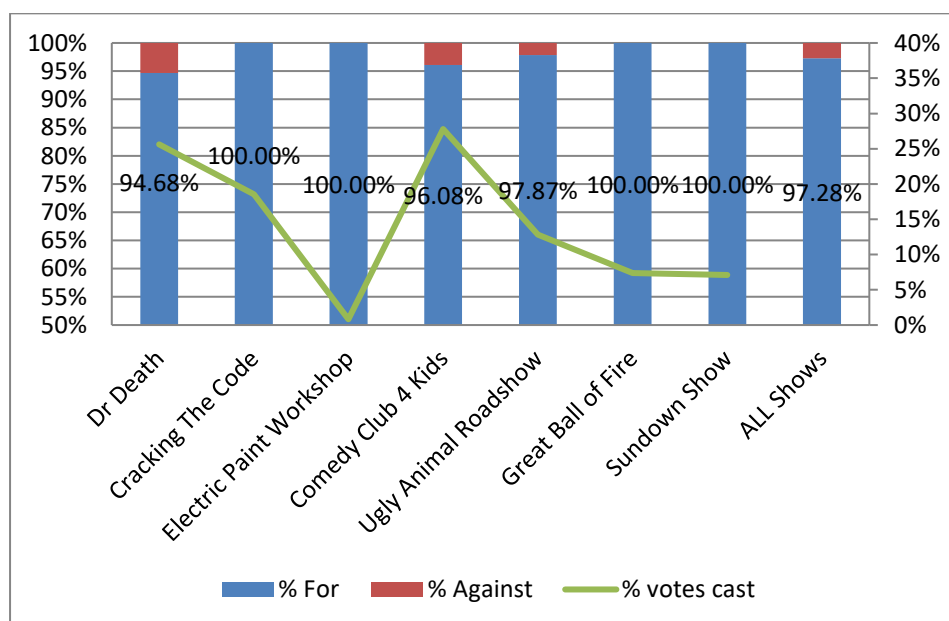
Activity Splits by share of programme vs share of votes by public.



- Audiences really liked the **Interactive activities** and overall these were the most popular, polling nearly 60% of votes cast despite accounting for only 48% of the scheduled events. Young people liked the interactive or hands-on exhibits the most as an opportunity to do something rather than read or sit and watch

‘Model making, solar system show, science busking, SMART tower’
‘Everything arty making things, hands on building’
‘Den Building, Magnets, Planetarium, Telescopes, Maths Tower’
- The big **theatre shows** received very positive feedback and a high number of votes – matching the popularity seen in ticket sales for these events and justifying the repeat of crowd favourites such as ‘Dr Death’ and ‘Comedy Club 4 Kids’ which received the most votes. Children attending the shows were invited to cast a simple happy face / sad face vote, depending on whether they enjoyed the show and wanted to see more, or didn’t enjoy. Of 367 votes cast, 97.28% were positive, and four shows polled 100% approval.

Approval ratings for theatre performances are shown below.



3.3 SMASHfestUK 2016 audience profile

SMASHfestUK was targeted at under-18s, particularly those who are BAME.

The table below shows that SMASHfestUK succeeded in attracting a very diverse audience:

Young audiences at SMASHfestUK by age and ethnicity						
Age	White	Black African	Pakistani	Mixed Heritage	Black Caribbean	Chinese
5 - 7	28%	17%	17%	11%	6%	
8 - 11	27%	33%	-	20%	-	
12 - 15					100%	
16 - 17		40%		40%		20%

Ethnicity

Lewisham is the 15th most ethnically diverse local authority in England, and two out of every five residents are from a black and minority ethnic background. The largest BAME groups are Black African and Black Caribbean: Black ethnic groups comprise 30% of the population of Lewisham.¹²

Age of audience

In Lewisham Borough, one in five of the overall population is under 15, but this is doubled in the Bangladeshi group, and more than more than doubled in the Black Other group. The under 15 proportion is lowest in the White and Chinese groups. The proportion in the over-65 group is highest in the White, Black Caribbean, Indian, and Chinese groups.¹³

Age: as given in the survey	% of total (90 respondents)	No. of survey participants
5 - 7 years	20%	18
8 - 11 years	17%	15
12 - 15 years	1%	1
16 - 17 years	6%	5
18 - 24 years	1%	1
25 - 30 years	9%	8
31 - 45 years	33%	30
46 - 50 years	8%	7
51 - 65 years	1%	1
Over 65	4%	4

The chart above reflects the respondents who completed the survey. Most adults came with children and young people recognising SMASHfestUK was a family event. Audiences aged 12 - 25 were not well represented in the audience evaluation and this may be due to reluctance to participate in such a survey by this age group. The **SMASHfestUK Schools enrichment programme** provides an important introductory route to engage young people in the Festival.

¹² <http://www.lewishamsna.org.uk/a-profile-of-lewisham/social-and-environmental-context/ethnicity>

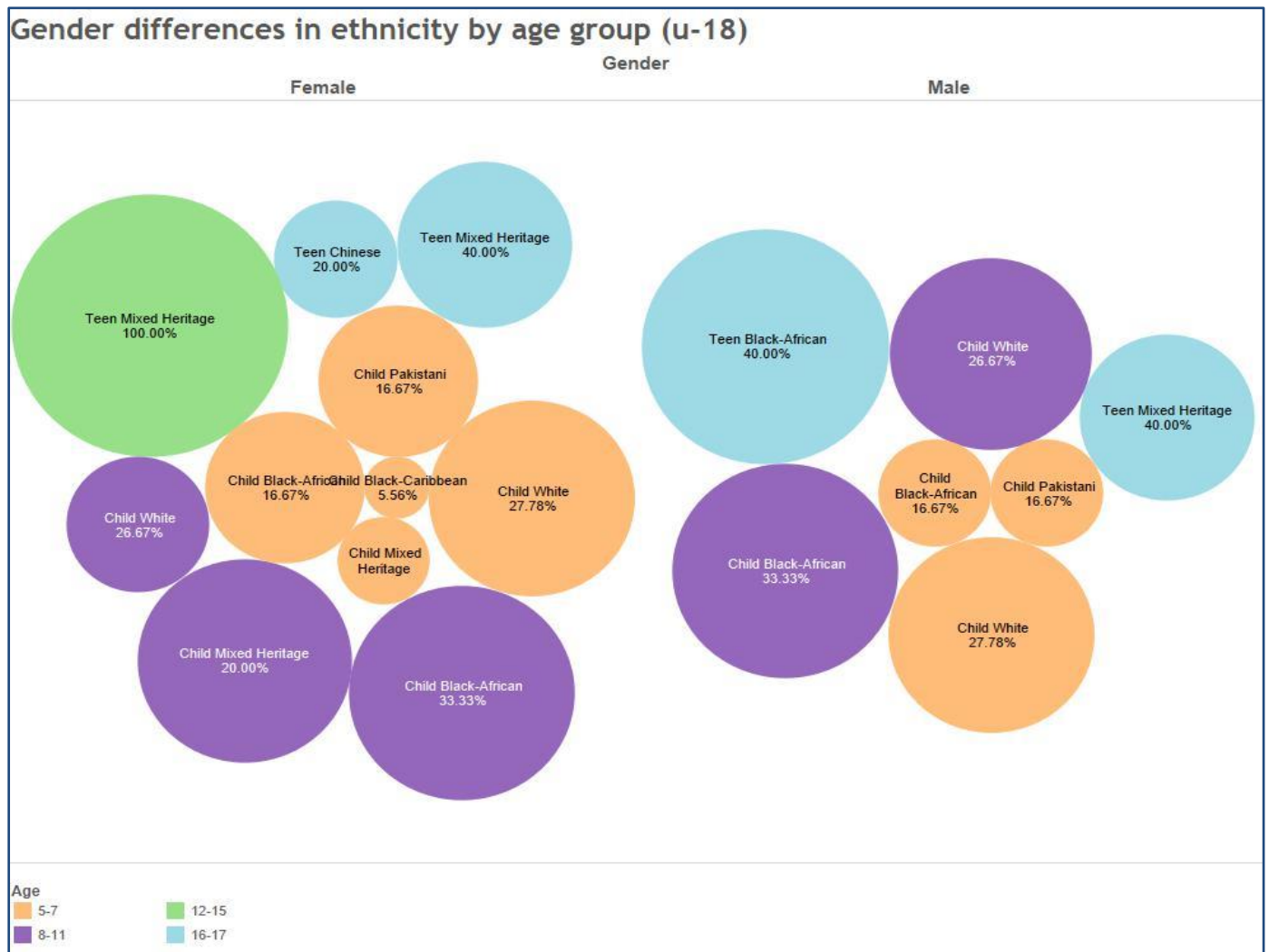
¹³ <http://www.lewishamsna.org.uk/a-profile-of-lewisham/social-and-environmental-context/ethnicity>

Gender: overall the ratio was male 27%: female: 73%

For Under-18s it was male 38% : female 62%

The fact nearly three quarters of all attenders were female shows that adult males were under-represented. To encourage all young people to consider a career in STEM subjects it would be helpful to have greater engagement from male role models and family members at such events. This is beyond the remit of SMASHfestUK but audiences here show a wider, nationally acknowledged gap in parental involvement in such initiatives.

Gender differences in under18's by ethnicity is shown below.



This is encouraging because *girls are less likely than boys to aspire to science careers, even though girls are more likely to rate science as their favourite subject at school. Women are consistently under-represented in STEM, particularly in the higher levels of academia and industry.*¹⁴ The Science Grrl report refers to gender stereotypes *From the start, children are confronted by gender stereotypes with girls' toys and boys' toys' and by GCSE level, gendered career ambitions are clearly evident.*¹⁵

¹⁴ http://sciencegrrl.co.uk/assets/SCIENCE-GRRL-Stem-Report_FINAL_WEBLINKS-1.pdf

¹⁵ Ofsted 'Girls' Career Aspirations' Ofsted, 2011 'All Things Being Equal? Equality and diversity in CIAG, Hutchinson et al, 2011

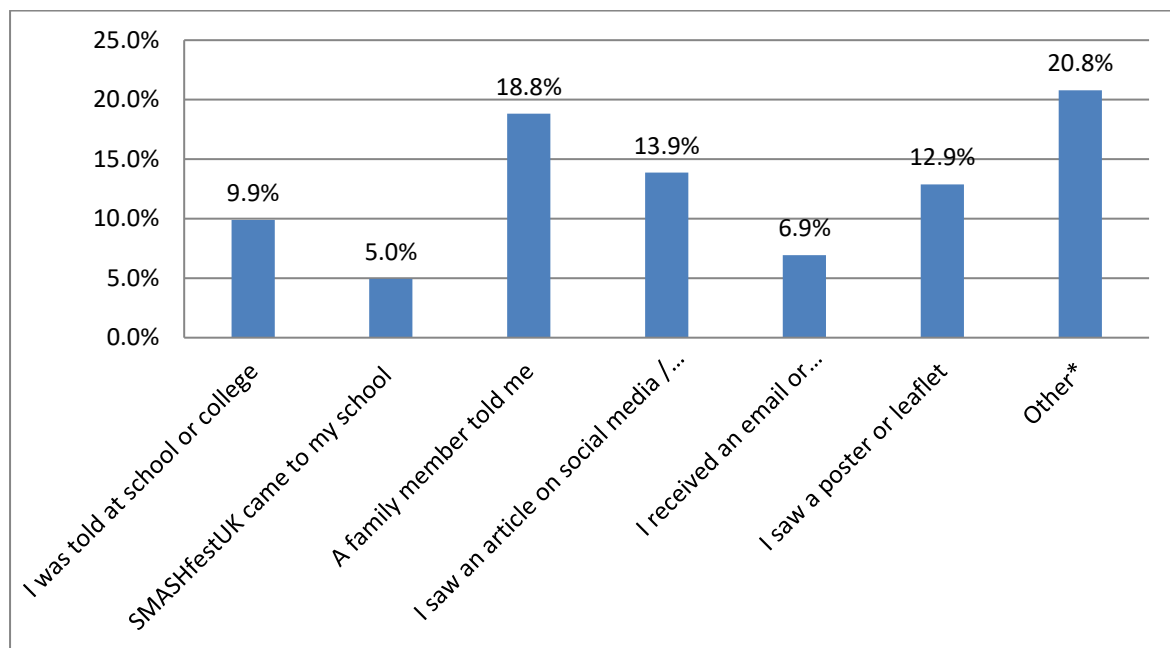
A parent commented that SMASHfestUK: *'inspires my daughter that science is fun, is artistic and is for girls'*.

'It's all about the girls and science'

(Males aged 12 – 15 were not present within the data captured but this does not mean that they were not represented in the audience mix. For other age groups the gender split was as above)

*'Mothers in particular, need to know their daughters could be happy in a career from physics/in engineering, and that the working environment would be supportive. Girls, in addition to parental support, need to resolve the conflict between self-identity and STEM identity in order to see STEM as offering careers 'for people like me.'*¹⁶

Communications: How audiences heard about SMASHfestUK 2016



19% were told about the Festival by a family member: Visiting informal science and arts events outside of school is more prevalent among younger children. Attending events as a family tends to decline in secondary school years. This is not unique to SMASHfestUK but a well-documented trend as children reach their teens.

14% saw an online article, post or blog and 13% saw a poster or leaflet. The 21% who said 'other' included people who were passing and either called into The Albany or Deptford Lounge on the day or saw the Science Busking and were intrigued what was happening.

Overall this shows an overwhelmingly positive view of SMASHfestUK in terms of reaching audiences and promoting science ideas in an inclusive, fun and friendly way.

¹⁶ Not for people like me? Under-represented groups in science, technology and engineering, A summary of the evidence: the facts, the fiction and what we should do next. Professor Averil Macdonald, South East Physics Network, November 2014

4. SMASHfestUK and schools

SMASHfestUK Schools Enrichment Programme (SEP) is having an impact: building relationships with local schools has been an important strand in engaging young audiences and the response is encouraging.

10% of attenders were told about the Festival by their school: 5% came following a visit by the SMASHfestUK team to their school.

The school environment often makes up the vast majority of young people's exposure to science¹⁷ and influences whether children view STEM subjects in a positive or negative way. Several reports suggest that more must be done at school-age level, to redress the imbalance in STEM degrees/careers, and to sustain the STEM workforce¹⁸. Attitudes to science are formulated at an early age so a positive experience that creates the sense of wonder and excitement at primary school influences how children feel about science subjects and develops interests they can take further at secondary school. Only 15% of young people aspire to become a scientist. *'Although pupils enjoy science, schools are failing to convey how science qualifications are valuable and transferable for a wide range of careers. Most young people do not see „scientist“ as a possible or desirable career „for me“.'*¹⁹ Lewisham's school population comprises almost 75% black and minority ethnic students. SMASHfestUK cites recent research carried out by the National Science Foundation which notes that black students identify even less strongly with science as a career aspiration because of its overwhelmingly white, male, middle class image of science, and the multiple inequalities they face growing up. It refers to the effectiveness of art-based learning of STEM and the causal relationship between arts-based learning and improved creativity skills and innovation outcomes in adolescents, and between arts-based learning and increased collaborative behaviour in adults.

Baring Primary School in Lewisham hosted a SMASHfestUK Assembly. BAME pupils from Black African and Caribbean heritage make up over three quarters of this school, half have a first language other than English. White British pupils account for 20%. 24% of pupils are disabled or have special educational needs, (above the national average). The proportion of pupils eligible for free school meals or in local authority care is above average. Baring's Deputy Head looked to SMASHfestUK to *'promote science and inspire the children. Seeing the whole school aged 6-11 captivated: the behaviour was great as they were 'transfixed' by the exciting show. It is certainly not like this for all assemblies / shows (in my opinion). They were certainly inspired and curious to find out more and enthused and keen to visit the free show during the half term break.'*

'As a teacher the benefit of SMASHfestUK is livening up the subject - making it more fun and interesting at primary level. The Festival is also important as it gives local children an opportunity to get out and learn in a fun way (and for some who might otherwise be in their bedroom/ house all day staring at a screen...) I hope for some children SMASHfestUK may have helped them in their job aspirations - I would like to do that'.

¹⁷ Experiments in engagement: Research into engagement activities with young people from disadvantaged backgrounds April 2014 Rebecca Atkinson, Kate Siddall & Carolynne Mason Platypus Research

¹⁸ Improving Diversity in STEM A report by the Campaign for Science and Engineering (CaSE) May 2014

¹⁹ Aspires, Young people's science and career aspirations, age 10 –14

<http://www.kcl.ac.uk/sspp/departments/education/research/aspires/aspires-final-report-december-2013.pdf>

A teacher at a Deptford primary school that hosted a SMASHfestUK assembly commented *'Thanks for the assembly and since we came back I have lots of children telling me about the festival over half term and how great it was. They really enjoyed it and I can say for most that was the only fun thing they did over the half term'*.

Influencing choices about the future

42% of people at school or college said the Festival may influence their choice of subjects to study or work opportunities.

When looking at responses from young people just under 18's, 100% said the Festival had prompted them to consider choices in science subjects. This indicates that SMASHfestUK is addressing the issue of declining interest in STEM topics in schools that leads to low entry levels to STEM tertiary studies and careers and an imbalance in the supply and demand for qualified STEM professionals²⁰.

²⁰ <http://www.educationandemployers.org/wp-content/uploads/2014/06/joyce>

5. SMASHfestUK and young people

98% of survey respondents agreed that it is important that young people understand more about science and technology

'Maths structures and gaining confidence and independence'.

SMASHfestUK particularly set out to engage young people aged 7 to 17 years in STEM subjects particularly those that are under-represented in STEM. It succeeded in doing so as 44% of its audiences were within this age group.

What they would tell their friends about SMASHfestUK

Young people tend to be influenced by peer pressure so it is important to find out the kinds of things they might say about SMASHfestUK to friends.

Young audiences especially liked opportunities for hands-on interactive things to do - the games and spray painting. This is borne out by the study 'Exploring young people's views on science education' which notes *Young people in this study expressed a preference for more practical, hands-on activities, which they believed made learning science more interesting and subsequently easier to understand.*²¹

Aleksandar Zivanovic, Senior Lecturer in Design Engineering at Middlesex University, found that participating in SMASHfestUK was a rewarding experience: *It was nice to interact with enthusiastic young children who were keen to hear about science. It is hard to speculate on the long term impact, but many of the children I talked to were clearly enjoying themselves and I'm sure if they associate that with science in general, then that is a very positive outcome. Several of the children became engrossed and asked many really quite sophisticated questions. One little girl in particular sat in on at least 3 of the planetarium shows I gave and I had to ask her to leave because the building was closing. Showing that level of interest was very rewarding for me.'*

The Festival also gave young people opportunities to meet artists and scientists - and to recognise that scientists don't fall into stereotypes. *Kids tend to think of scientists as reclusive old men in white coats so it opens up horizons for them to see ordinary people in science jobs and see the possibilities that they too could be engineers or scientists.* Carmel Britto, Chair of Greenwich BAME Forum and Lpf kids club

New opportunities for young people: Young Science Explainers

SMASHfestUK introduced its scheme for Young Science Explainers to act as a bridge between scientific knowledge and ideas and small children and to break down seemingly complex concepts in ways they could relate to

The Festival recruited sixth form students studying a science, technology or creative subject and the role of Young Science Explainer gave them the opportunity to develop communication skills, knowledge of STEM subjects, and to gain experience in communicating science. Their responsibilities included actively engaging audiences with science and technology exhibits and interacting with audiences to enhance their Festival experience and understanding of the issues

²¹ Exploring young people's views on science education Report to the Wellcome Trust September 2011

explored at SMASHfestUK. It gave them the opportunity to meet scientists, artists and other young people interested in STEM subjects and the arts.

The two case studies below indicate some of the impacts on young people who volunteered as SMASHfestUK Young Science Explainers.

Laitan Odubiyi, a Young Science Explainer, became involved with SMASHfestUK because he is doing A levels in STEM subjects and is interested in science research and new technological developments and wanted to practice explaining such ideas - and '*SMASHfestUK looked fun and different.*'

'I met science experts—like an epigeneticist and someone from an organisation that sends satellites to the sun and tried a virtual reality headset. Seeing what other people do was mind-blowing as I'd never actually met people who work in such scientific fields or pursue academic careers. It was so positive and made me think – 'if they can do it - why can't I do it too'.

'I'd read up on subjects before the Festival so I felt prepared and I had covered a lot in my GCSE so I got the gist. Over the three days of the Festival I learned improvisation skills and I was expected to do all sorts of things as some volunteers didn't show up. I had to work on a stand with a big plasma screen and show people how it worked – I got better at doing this and felt proud of myself. It's convinced me about a career in science'.

Tyreese Hines had been involved with the Young Mayor of Lewisham where he heard of this opportunity to be a SMASHfest Young Science Explainer. He's studying biology, chemistry and physics at school so felt that being a volunteer would give him a chance to extend his interest.

'It's important that SMASHfestUK is in Deptford because there's a lot of gentrification and new development. What was a 'bad' area is being sorted out and it's great that there are events like this that bring a chance to people who wouldn't usually engage. Young people liked how the Festival was on the High Street, with games and outdoor activities and they could come in and enjoy themselves. They don't see these sorts of things in the rigid environment of school and they can't explore these sorts of ideas. I enjoyed explaining ideas to children and parents and I learned a lot of new things that you don't usually put together in the conventional sense. The arts make it all more creative and putting things together in different ways reveals the overlaps. For people who don't engage with science it hooks them in and makes them want to find out more.'

'I'd always wanted to do microbiology. By showing me different ways of doing it and career options SMASHfestUK has confirmed to me what I want to do.'

'I learned new skills by being thrown in at the deep end to help run SMASHfestUK activities. Engaging with the public has made me feel more confident and independent'.

This scheme has stretched and challenged the young people involved and added to their self-esteem by being able to achieve the tasks they were asked to carry out. The experience has validated and confirmed their thinking about progressing toward a career in science.

Carmel Britto is Chair of Greenwich BAME Forum and Lpf kids club. She volunteered at SMASHFESTUK to support what she saw as a *really fantastic opportunity - it's a great way to get kids involved in science.* Her two sons also volunteered as Young Science Explainers. '*SMASHfestUK is free which is important in an area with a lot of poverty and where kids get limited exposure to opportunities. This has a knock-on effect because it means as kids' progress they*

can't recognise opportunities or have the skills to know what to do even when opportunity is facing them – and they are unsure how to engage. They don't see past secondary school so it's good for them to meet university students and to see that 'I could do this too.' Kids could relate to SMASHfestUK events as they were right 'in their face' so they could understand the environmental issues. They had fun and could input and realise they could affect their own community when negative things happen.'

'It's also good to see girls taking an interest in subjects they had thought were boring and to meet scientists and university students - and to see the lightbulb go on.'

6. A creative catalyst between arts and science: introducing audiences to new ideas

Artists and scientists involved in SMASHfestUK valued the opportunity to collaborate. Working together brought them into contact with ideas and processes that were constructive to both fields and led to new ways to explore different perspectives to interpret and experience the world. When these different disciplines work together to communicate complex concepts in ways that are both clear and compelling and will engage audiences, interesting cross-overs and novel ideas are generated.

‘Collaborations are useful for creativity as you see other people's interpretations and views, so can learn a lot and can develop something even better. I think that art and science are more similar than people think, but for some reason a boundary was created at some point in time. Artists and scientists working together shows that the two disciplines merely use different methods to interpret the world around them.’ Indrayani Ghangrekar, consultant; Fellowship Advisor, London chapter lead with Science Grrl Daphne Jackson Trust.

Jenny Edbrooke, artist in residence for SMASHfestUK 2016 finds that working with young people is revealing as they see things differently and this develops her artistic practice.

‘At SMASHfestUK it was great to see kids who had not been engaged with science ‘having a go’. Considering questions like ‘what would you take to a survival bunker’ led them to recognise what is important to them. Talking with scientists about ideas like the big-bang theory of creation got them to think about science in a way that is different from what they do at school. It captured their imagination to see how they can apply these ideas to their world. It was good to have specialists who know the facts and bring creative imaginations to science I see my role as a go-between for science and creativity by providing practical ways to emotionally engage.’

‘Even teenagers - who are much harder to engage – responded to the spray painting sessions to create a planet and lifeform near the sun. Some parents also joined in and the activity connected parents and children in a positive way.’

Dr Alison Megeney is Associate Professor of Mathematics at Middlesex University School of Science and Technology. *The Maths team got involved as we are keen to promote STEM areas (particularly maths) more widely and SMASHfestUK seemed a fun and engaging way to do it. I think it is great to get a link between arts and sciences as it helps show the creativity of STEM disciplines which traditionally may have been seen as dull and boring. The collaboration aspect enhances this and makes science types like myself look at things very differently, which is a good thing. It was rewarding to see my students working with young people and promoting maths. SMASHfestUK’s strength is its fun and interactive nature. It does a very good job of promoting STEM disciplines in a very creative way. I hope it has had a positive impact.’*

Alice Knight, Theatre Director of SMASHfestUK’s Cosmic Jives commented: *Socially and politically, SMASHfestUK aligns totally with the sort of work I want to make as an artist as it is free and inclusive. I believe in the message underpinning the play completely, which is to do with the empowerment of women and encouraging diversity in a field that historically has been the domain of white middle class men. I knew the quality of the work would be good as there was an established writer and experienced and talented producers on board.’*

Building on SMASHfestUK's strengths

What differentiates SMASHfestUK from other science festivals?

Clarity of purpose

A clear objective to engage young people in STEM subjects delivered through the framework of a strong core story through which they can see direct relevance to their lives.

Location and ability to engage diverse audiences

'SMASHfestUK's strength over other science festivals is its location: The Albany and Deptford Lounge are well embedded in their community: people of different faiths, ethnic backgrounds and ages all engage with them. Their local links enable SMASHfestUK to reach people who wouldn't go to a science festival. Many science festivals move around the county and have to create a new infrastructure each time, often in affluent areas. Working in Deptford means SMASHfestUK is building partnerships and relationships with local people and organisations so audiences are retained'. Simon Watt, biologist, science communicator and TV presenter.

Simon is committed to creating 'infotainment' that makes science entertaining and informative for schools and festivals. His *Dr Death: The Medi-evil Medicine Show* was a 'historically, scientifically accurate panto for children and other childish people' and one of the most popular events at SMASHfestUK. He went on to say: *SMASHfestUK doesn't brand itself as a 'science festival' – a term which can be off-putting to audiences. Its concept of a storyline is great for younger children who like science at school, maybe less so for teenagers who are much more difficult to engage. Most science festivals struggle with the teenage demographic. SMASHfestUK can engage them if they are just passing by the library or on the High Street as it's really local. Audience members came up and talked to me about issues that affect their health and life - that was also different from my experience at other festivals - I was aware that SMASHfestUK was reaching out to diverse communities.*

Indrayani Ghangrekar, consultant; Fellowship Advisor, London chapter lead with Science Grrl liked that SMASHfestUK *'aimed to involve the local community through the YSEs and in a community space - rather than just attempt engaging with an already engaged audience'*.

Alice Knight, Director of Cosmic Jives said: *'I live very near Deptford, so I feel SMASHfestUK has had a direct benefit on me as a local resident as well as a practitioner. It's enormously important that all communities have a place to congregate and moments in the year which lift us out of the ordinary and give us cause to think about who we are as people and as a society - this Festival allows people to do that. There was such a great buzz around the Albany, it felt like such a positive event for the community.'*

Inclusive ethos of SMASHfestUK

For me as an artist SMASHfestUK is a lovely Festival to work on because it's very ethical and has a strong team spirit. I like the way it's scheduled across the two venues. Lots of people remembered it from 2015 and recognised it by name. Jenny Edbrooke

SMASHfestUK is free and accessible to all

Welcoming staff and good atmosphere: everyone said they felt welcome at the events they attended. Outdoor space to play in was welcomed by parents.

'Everyone is very welcoming and friendly. The experts are very knowledgeable and the acting is brilliant!'

Partnerships reach out to people

David Pollock, The Albany's Operations Manager sees that SMASHfestUK brings a different audience into the venue: It gives them a good experience and it gives The Albany a chance to welcome them back and to be aware that it's part of their area. *'There isn't a lot of arts activity in SE London compared to SW London and SMASHfestUK is very engaging and informative in revealing science through arts. There are lots of workshops and performances and interactive stalls in The Albany's garden. Children can learn something new through positive experiences and it was fun for their parents too. It worked really well across the two venues as audiences could get to see lots of things quickly.'*

Embedded in the community

Jane Hendrie, Lewisham Education Arts Network (LEAN) has been a SMASHfestUK partner for two years. She organised a gatekeeper's event in January to introduce local opinion formers, network leaders and teachers to SMASHfestUK and to hear from the Festival's creators. The event included sessions on how to use storytelling and the arts to engage young people in STEM; how to get a free session in schools as well as the opportunity to try out some of the interventions and workshops which bring the STEM subjects together. The purpose was to encourage gatekeepers to promote the Festival to young people they work with and connect the Festival to the local youth and education community. The event was attended by 30 people, including some children. 13 guests were teachers from schools who do not take their pupils to activities over half term. *'It's important that events like SMASHfestUK happen in Deptford, which still has a strong sense of community despite all the unaffordable luxury flats going up. SMASHfestUK gets people excited. It is a gateway to a sense of something different that opens up ideas beyond the everyday. The Festival has great ambitions and does a lot on a limited budget. Bringing experts in from universities as well as creative arts people is an inspiring and imaginative approach to engaging people in science and empowering them to think more about their world. Local people trust LEAN and this event established new and stronger relationships between the Festival and the local youth and education community.'*

75% of attenders at the gatekeeper's event agreed that the Festival is fun, educational and valuable; 100% of attenders agreed to promote it to young people and families; 80% agreed to re-tweet, share on other social media channels. 91% felt they knew more about SMASHfestUK and could talk about it to colleagues, friends and pupils. 80% of the children who attended wanted to come to the Festival and would tell their friends. Parents also appreciated this opportunity: *Brilliant! Wish I had this when I was young. The kids will love it!*

7. And next time? Points for SMASHfestUK to consider

Interviewees and audiences made some suggestions about what SMASHfestUK could do differently next time

Build on what SMASHfestUK does best: attracting and engaging an intergenerational family audience and continue to build a following. We are already seeing a level of repeat attendance, awareness of the Festival and goodwill and these are strengths that can be built upon.

'My advice to SMASHfestUK is to focus on what it does best – to provide great experiences for family audiences and to programme work that has intergenerational appeal for adult family members as well as children. People take what they can from such events and adding content for adults doesn't detract from the children's' experience.'

Keep the concept of a central core theme – 'what if...?' A compelling narrative that forms the basis for all events and activities presents audiences with a coherent story works well in capturing their attention and imagination and opening up dialogue and engagement in complex issues.

Involve young people in programming SMASHfestUK: the Festival could look at increasing the engagement of young people in planning and producing the event, so that they play a part in decision-making and coming up with ideas for activities that appeal to their peer group, as well as acting as ambassadors and feeling a sense of ownership.

Continue to bring artists and scientists together in new collaborations: this has benefited audiences and practitioners and proved an imaginative way to give audiences insights and understanding into the complex issues that affect our lives and environment.

Create more opportunities to meet positive role models for exposure to new ideas about career paths for young people. SMASHfestUK provides opportunities for young people to meet people who have a wide spectrum of interesting careers. The opportunity to meet and talk to artists and scientists alerts them to potential new directions that their futures could take. This is a valuable aspect of SMASHfestUK that could be developed.

Create more visibility and extend communications:

- More resources for marketing and more visual presence for SMASHfestUK so that its physical presence is greater for audiences
- More targeted cultivation events through trusted channels such as the gatekeeper's session to spread the word about the Festival and to build relationships with the local communities; this will build the Festival's reputation and generate word of mouth
- Sustain relationships with existing audiences and supporters through newsletters and social media alerts
- More events that take SMASHfestUK out onto the streets: these are good for getting attention - as are the drop-in shows
- Produce the Festival programme earlier – especially to schools, opinion formers and gatekeepers

Keep in touch in order to build relationships with young people who have been involved with the Festival or attended with their families and with people who influence young people such as

teachers and youth workers. Regular communications from SMASHfestUK will increase their interest and maintain longer-term and year-round awareness and impact of the Festival.

Find SMASHfestUK Champions who will endorse the Festival and 'talk it up'. These can include high profile figures who can draw more attention to the Festival, or trusted local people such as youth workers, teachers, club leaders.

Build the digital reach of SMASHfestUK: there is potential to increase engagement and opportunity for informal science learning online through the website. The website could be further developed as a resource.

Volunteers are a strength of SMASHfestUK. The opportunity to be a Young Science Explainer has created positive impacts on young people and the scheme is proving its value. Getting them more involved would benefit the Festival. Training them, stretching their skills and making good use of their experience and enthusiasm would add considerably to the Festival's resources and inclusive ethos. It is also important for SMASHfestUK to find ways to build their commitment.

Engage more secondary schools, even if teachers are more resistant and teenagers are harder to engage. The development of relationships is important to meeting SMASHfestUK objectives. Emphasising the fun and sociable aspect of SMASHfestUK and encouraging teenagers at secondary schools to come with their friends.

Length of the Festival: there were several comments that the Festival could take place over a longer period, perhaps with an additional day.

8. Positive outcomes: conclusions

SMASHfestUK has created positive experiences for young people and their families that have stimulated their interest and engagement with science. The Festival is driven by the conviction that young people should have enjoyable and exciting opportunities to engage with STEM in ways that are pertinent to their lives. Enthusing them about science may be the impetus for them to decide on directions for future study and career paths. SMASHfestUK has succeeded in attracting young people from relatively low socio-economic backgrounds by creating lively opportunities to engage with STEM outside school and follows tried and tested routes to do so: *'Experiments in Engagement', identified ten steps to maximise the success of engaging young people from disadvantaged backgrounds with informal science activities. Key learnings included the importance of working locally, building long-term relationships and communicating through trusted channels*²².

The sense of aspiration and inclusive ethos, and the Festival's capacity in planning, programming, delivery and audience engagement come some way from its pilot year in 2015 and has built on its strengths. Evidence from audiences and participants indicates that its success is attributable to these factors:

A compelling core story that links all the events into a cohesive framework, Audiences can see the connections. The *'what if'* concept stirred the imagination of audiences and developed understanding of how science might respond to the impacts of a global catastrophe on daily life.

A successful model for engaging young audiences: the SMASHfestUK team goes out to meet young people on their home-ground, in their schools or through local gatekeepers and existing community groups who work with young people to encourage them to get involved and come to the Festival.

Presenting SMASHfest UK at The Albany and Deptford Lounge enables the Festival to benefit from the strong relationships with local audiences and the community connections nurtured by these venues.

SMASHfestUK's hyperlocal approach is effective in engaging local audiences in an area that experiences extensive childhood poverty and has large BAME communities. Audiences respond well to these familiar welcoming venues in a familiar street and this reduces barriers to access.

As a result SMASHFest UK has succeeded in engaging young people and taking science 'outside the classroom' and has encouraged them to think and debate about contemporary issues within biomedical sciences and other STEM topics. The Festival exposed them to scientific and artistic excellence which opens up new understanding

SMASHfestUK's Young Science Explainers provided a route to engage young people in the older age group (16-18 years): actively involving them in Festival events and activities has empowered them and led to a sense of ownership and the opportunity to learn new skills and gain confidence as volunteers. The opportunity to meet arts and science professionals confirmed their interest in STEM subjects and alerted them to new career paths. A similar initiative to involve the younger age group of 11-15 year olds could be considered.

²² Science beyond the classroom 'STEM-ulating' Youth Workers A collaboration with the Prince's Trust February 2016 The Wellcome Trust.

Increased recognition: the Festival is developing a strong local presence and more brand recognition, with local people now looking forward to the event. It has brought new opportunities for the venues' audiences. This has been a productive partnership for both organisations and brought mutual benefit. There is considerable potential to develop this relationship.

Raising interest in STEM subjects in schools: SMASHfestUK recognises the role schools play in encouraging the enjoyment of studying STEM subjects: if primary school science is 'fun' it can help to engage young people in science at secondary school and as careers. SMASHfestUK's Schools Enrichment Programme, with projects and assemblies is forging strong links with local schools - with the result that many young people and their families are coming to the Festival as they had heard about it from a trusted source.

Enabling conversations between scientists, artists and audiences: SMASHfestUK is a stimulus for experiment, collaboration and interdisciplinary dialogue that explores issues, ideas and challenges. This opens up new creative possibilities that is building the community of science communicators, scientist performers and audience members initiated in SMASHfestUK 2015

The support of organisations such as the Wellcome Trust, Royal Society of Chemistry, Science and Technology Facilities Council and Arts Council England allows SMASHfestUK to realise its ambition to produce a high quality event by involving a range of leading experts and practitioners.