



CREATIVE
XR

CreativeXR and the audience experience

A report produced by i2 media research for CreativeXR

Developed by

CATAPULT
Digital



**ARTS COUNCIL
ENGLAND**

This report has been produced by i2 media research as part of the CreativeXR programme.

The programme gives creative talent the opportunity to experiment with immersive technologies to create new experiences that inspire audiences.

Focused on the creative industries, particularly the arts and culture sector, CreativeXR gives the best creative teams the opportunity to develop concepts and prototypes of immersive content (virtual, augmented and mixed reality).

The programme offers access to early stage finance, facilities, industry leaders and commissioning bodies, and the opportunity to pitch for further development funding. The programme has been developed by Digital Catapult and Arts Council England, with support from Innovate UK.

The report has been co-authored by Professor Jonny Freeman, Dr Jane Lessiter, Polly Borden, Leah Kurta and Lewis Turner Brown.

www.creativexr.co.uk

Executive summary

The creative industries are the fastest growing part of the UK economy; contributing £101.5 billion in gross value added (GVA) in 2018.

⁽¹⁾ We are currently seeing substantial commercial and public sector investment in the UK's immersive sector. A key goal of this investment is to advance the UK's reputation for excellence in immersive content production. Alongside commercial investment of over \$600 million and Industrial Strategy Challenge Fund investment of £33 million in Audience of the Future, Digital Catapult and Arts Council England launched the CreativeXR initiative to support the development of impactful and engaging immersive creative and cultural content. This report records the results of a series of in-depth audience evaluations of the 2018 CreativeXR experiences to answer the question: how successful were the 2018 CreativeXR productions in engaging and satisfying audiences?

To answer this question, the researchers used a short form of the Immersive User Experience Evaluation toolkit that i2 media research developed with Nesta for Digital Catapult in 2018 ⁽²⁾, with support from Innovate UK. This research uses the toolkit in-situ with audiences of preview performances of each of the five 2018 CreativeXR productions that were funded to completion, augmented by lab based presentations of some of the productions. The short form toolkit is a self-report questionnaire administered to audience members after they have experienced a production. Taking approximately five minutes to complete, it evaluates creative productions on five core dimensions:

- Global quality of experience (Good, Memorable, Transported me elsewhere, Worth paying for, Powerful)
- Cultural value (An interesting idea, Thought provoking, Something I'd like to experience again, Engaged me on an intellectual level, Made me want to engage with similar contents, Has something to say about the world we live in)
- Engagement (I enjoyed myself, I felt myself being drawn in, I lost track of time)
- Emotional response (Intensity, and its characteristics)
- Willingness to pay (using van Westerland's Price Sensitivity Meter)

The toolkit also evaluates production-specific (bespoke) elements of the audience experience, for example satisfaction with role in the experience and information learned.

Key findings

The CreativeXR 2018 productions were evaluated very positively.

The results of the evaluations reported here shine a very positive light on the experiences created by the CreativeXR 2018 production teams. Using the methodology developed in 2017/2018 to evaluate award-winning virtual reality (VR) content, the CreativeXR productions scored admirably.

All the productions received high ratings of cultural value.

Whilst audiences varied in their ratings of global experiential quality, engagement and intensity of emotional response, they did so far less in their ratings of cultural value, which were high for all the productions. This demonstrates that all the productions delivered with regard to cultural value, a key goal of the CreativeXR programme.

77% of audience members were willing to pay to experience the CreativeXR 2018 productions.

Across the key audience impact indicators of global experiential quality, cultural value, engagement, emotional response, and willingness to pay, audience scores across the productions were very high. Willingness to pay was similarly highly rated. It varied between 54% and 97%, dependent on the experience, but across all the experiences 77% of the audience indicated they would be willing to pay in the scenario in which they experienced the contents.

Optimal price point of £10 per person experiencing each production.

In terms of how much people are willing to pay our analysis generated a range across the productions, from around £4.50 to around £14.50, with an average across all the experiences of approximately £10.

Demonstration of utility of the Immersive User Experience Evaluation toolkit.

It is worth highlighting the ease with which the Immersive User Experience Evaluation toolkit was applied to real audiences in natural, in-situ environments. The use of both a short URL and QR code that easily took audience members to the online feedback site proved effective – the research team observed no issues for audience members in accessing and completing the evaluation. This is a very positive outcome of the study as it points to easy adoption of the method across the sector more generally.

Strengths of each of the productions

Common Ground (by VR City): an exploration of the history of the notorious Aylesbury Estate in South London.

Common Ground rated strongly on its ability to transport audiences elsewhere and was considered particularly thought provoking, with something to say about the world in which we live. It engaged audiences on an intellectual level.

Fatherland (by Limbik): a father-son journey exploring dementia and disembodiment in a modern world. A mixed experience, a series of audience members experience immersive VR on stage, and the rest of the audience view VR projections and motion capture from the VR headset user.

Fatherland was considered Memorable, Worth paying for, an Interesting idea and Thought provoking. Audiences Enjoyed themselves, were Attentive and Interested, and reported feeling Happy and Inspired.

Immersive Histories – Dambusters (by All Seeing Eye): a VR experience allowing its audience to physically step into history and experience the famous ‘Dambusters’ mission from on board Guy Gibson’s Lancaster. Audience members are surrounded with a physical set and presented with VR visuals, spatialised audio and haptic feedback.

Immersive Histories scored consistently well in the evaluations, having higher than average scores across the board. Audiences were Excited, Alert, and Attentive, and felt Active and Proud during their experience of Immersive Histories. Audiences reported a strong appetite to experience more and to pay for this type of content.

Traitor (by Pilot Theatre): a high-stakes thriller, two-player escape game challenge requiring audiences to complete puzzles to reveal the story. One player uses the VR headset and the other, a control deck user, provides crucial information from props supplied, supported by a real world actor.

Traitor received positive audience evaluations. It was rated highly in terms of being Good, Powerful, Memorable, and an Interesting Idea. It engaged the audience on an intellectual level, and was something that they wanted to experience again. It also motivated audiences to want to engage with similar content, and nearly all were willing to pay to experience it again.

When Something Happens (by Boom Clap Play): a short, animated VR film presenting the 13.8-billion-year history of the universe, written and narrated by Leicester-based poet Boston "The Orator" Williams. Designed to inspire the next generation of scientists, storytellers and astronauts, the experience is available via a VR headset and as an immersive projection setup.

Large proportions of the audience for When Something Happens reported feeling Interested and Relaxed during the experience. Audiences agreed they Enjoyed themselves and felt Drawn In, and over 70% were willing to pay for this experience.

Summary

This research set out to answer the question "how successful were the 2018 CreativeXR productions in engaging and satisfying audiences?". The results summarised above, and presented in detail in the following report, give a clear answer to this question: they were very successful.

As noted above, the UK is uniquely well positioned to replicate in the field of immersive its leading international position in the productivity and excellence of its creative industries. The excellent audience evaluations of immersive experience obtained in relation to the 2018 CreativeXR productions, and the encouraging willingness to pay, demonstrate that the UK has the talent, skills and motivation to succeed.

2019 is seeing further technological leaps in immersive, making immersive experiences more accessible for much bigger and broader audiences. Anticipated increases in audiences for immersive content make this an important moment for continued investment in immersive content. The announcement of a new CreativeXR programme for 2019 is fantastic news in this regard, and bodes well for the UK immersive sector alongside continued commercial investment.

The UK already has the well-earned reputation, the skills, and the creative talent to produce compelling and engaging immersive content. As demonstrated in this report, reliable, easy to use tools to test the impact of what is created are also available. Their combination makes the compelling case for continued investment to support the development and distribution of many more immersive productions, as impactful as those created by CreativeXR 2018, for the benefit of audiences, the creative industries, and the economy more broadly.

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Introduction

"Tomorrow belongs to those who can hear it coming"

- David Bowie

Aiming to advance the UK creative industries' reputation for excellence in content production, Digital Catapult and Arts Council England launched CreativeXR. The programme is designed to support the development of impactful and engaging immersive creative and cultural experiences by UK content creators. This research report includes the final five companies from the first cohort of the CreativeXR programme, which ran from October 2017 to February 2019. This research reports on in-depth audience evaluations of these productions to answer the question: how successful were the CreativeXR experiences in engaging and satisfying audiences?

UK's creative economy as a key driver to growth

The UK creative economy is recognised worldwide as both hugely successful and influential. The creative economy contributes in excess of £100 billion per year to UK GDP⁽³⁾, and is a key driver to UK economic growth (Nesta, 2018⁽⁴⁾). To build on this success into the future, the Government's Industrial Strategy has prioritised immersive as one of its foci, investing £33 million in technical and creative research and development as part of the Creative Industries Sector Deal. A key goal of this investment is to maintain and expand the UK's impact in content creation and distribution.

The past five years have seen a big uplift in activity in immersive around the world. Consumers can now access virtual (VR) and augmented reality (AR) hardware; from high end headsets requiring high spec PCs to run content (such as the HTC Vive, Oculus Rift, PlaystationVR, and Microsoft Hololens) to smartphone based apps and viewers.

The advent of consumer hardware has been accompanied by substantial investment to create compelling content for audiences to experience. The UK is already a major player in this space: as Nesta reported from their research for the Knowledge Transfer Network (KTN) and Immerse UK, there were approximately 1,000 immersive specialist companies working in the UK in 2018, collectively generating a turnover of over £600 million⁽⁵⁾.

The UK's immersive economy is already substantial, and one domain in which the UK is a recognised leader is in creative content production. In the early days of the internet, Bill Gates wrote that Content is King! With the immersive economy in its early days, Gates' adage applies to it in the same way as it did to the internet then.

Some of the world's most recognised innovators in immersive content creation are UK studios and creatives; think Marshmallow Laser Feast for beautiful immersive VR content based experiences, Punchdrunk for incredibly engaging immersive theatre experiences, and hundreds more. Even some of the country's best established creative and cultural brands are recognised internationally for their innovations with immersive: the Royal Shakespeare Company's ground-breaking use of live motion innovations with immersive: the Royal Shakespeare Company's ground-breaking use of live motion capture and projection in their 2017 production of *The Tempest*, or the Philharmonia's VR enhanced Beethoven's Fifth.

So with a deserved reputation for excellence, and a wealth of talent and expertise in immersive content creation and production, with the right investment, the stage is set for even greater UK success.

A key goal of this investment is to maintain and expand the UK's impact in content creation and distribution.

Investment in the UK immersive sector

Recognising the opportunity, both commercial and public investment is currently flowing in to the UK's immersive sector. Focusing on commercial investment, PWC/Immerse UK reported over \$600 million of venture capital funding was invested in London's immersive sector in 2016/2017 ⁽⁶⁾.

The UK Government too has committed a significant investment through the Industrial Strategy Challenge Fund (ISCF) for the Audience of the Future project, led by UK Research and Innovation (UKRI) and AHRC (Arts and Humanities Research Council). The Audience of the Future project has launched a series of funded programmes in support of the ISCF.

Whilst these programmes have only recently started, their plans are ambitious and their outputs will be game changing. Coupled with earlier stage R&D focused on new modalities of interaction, and production and workflow focused research to make the production of immersive more efficient, this wave of investment is well targeted at cementing the UK's leading position in immersive content and production.

PWC/Immerse UK reported over \$600 million of venture capital funding was invested in London's immersive sector in 2016/2017 ⁽⁶⁾

CreativeXR

CreativeXR was launched by Digital Catapult and Arts Council England and focuses on the creative industries, in particular the arts and culture sector, giving the best creative teams, selected via open competition, the opportunity to develop concepts and prototypes of immersive content (virtual, augmented and mixed reality). The programme has offered participant teams access to early stage finance, facilities, industry leaders and commissioning bodies, and the opportunity to pitch for further development funding. Twenty teams were supported to develop initial proofs of concept and of these five were selected to complete their productions once match funding had been secured. This report focuses on audience evaluations of these five productions.

The five productions supported to completion by CreativeXR in 2018-19 are Common Ground, Fatherland, Immersive Histories, Traitor, and When Something Happens. Whilst all provide immersive experiences with their own coherent narratives, their specific offerings and characteristics vary. They include single and multi-user experiences that are virtual and/or mixed/extended reality. Some use 360 video, others entirely computer generated imagery. Some require extensive interaction, others more limited navigation. All pieces of content are suited to location-based presentations and designed for use with one or more types of headset (most commonly HTC Vive and Oculus Rift).

The research presented here reports on the findings of audience evaluations of the five cutting-edge CreativeXR productions described on the following pages.

Common Ground

(by VR City Ltd.)



Common Ground is an exploration of the history of the notorious Aylesbury Estate in South London. Through the monolithic prism of its concrete blocks this interactive VR experience examines how design, planning, dreams of utopian living and the political will of the day has affected the ordinary people caught in its midst. Utilising room-scale interactivity, photogrammetry, archive audio, photos, video and 360 video the story of the Aylesbury Estate is told, from its beginnings to the present day regeneration and demolition, through the testimony of the people who have lived on the estate.

Team profile:

Darren Emerson and the VR City team have been at the forefront of VR documentary since 2015 when they created Witness 360: 7/7, which was part of the IDFA Doclab selection in the same year and went on to tour festivals internationally.

In 2016 the same team won the first ever Sheffield Doc/Fest VR Commission for the 360 documentary "Indefinite", which went on to be featured as a New York Times Op-Ed.

The VR City team continues to make 360 and VR work for UK broadcasters, brands and institutions, including the Laphroaig Whiskey experience, which was nominated for a Raindance Award.

Name:

Common Ground

Genre:

Community, History, Social Issues, Cultural Heritage

Final Run Time:

25-30 minutes

Contributing Organisations:

VR City, StoryFutures Academy

Project team details:

Darren Emerson – Creator, Writer & Director

Conan Roberts – Post Production Supervisor

Ashley Cowan – Executive Producer

Fatherland

(by Limbik)



Fatherland is about a father-son journey exploring dementia and disembodiment in a modern world. It is a mixed reality experience, with a series of audience members experiencing immersive VR on stage, and the rest of the audience viewing VR projections and motion capture from the VR headset user. There are three "roles" that the headset user can take: 'Introduction to Dad', 'Wayne and Esperanza' and 'Dad's accident'.

Team profile:

Limbik is an award-winning theatre company that creates new work exploring human stories from epic environments. Distilling often-unheard voices into atmospheric works of theatre, the company investigate socially engaged questions, aiming to encourage debate and dialogue.

The University of Portsmouth delights in creating, sharing and applying knowledge to make a difference to individuals and society. The Motion Capture Studio has been involved in Motion Capture for over 10 years, capturing all kinds of action from gymnastics, break dancing, martial arts to modern dance and theatrical performances.

Laura Doye has been an executive producer for national and international live performance work for over fifteen years. As Artistic Director of a major regional theatre, she originated a new artistic vision entitled The Creative Technology Gateway.

Name:

Fatherland

Genre:

Arts and Culture, Experimental, Performing Arts

Final Run Time:

75 minutes

Contributing Organisations:

Limbik, University of Portsmouth

Project team details:

Ben Samuels – Writer, Performer, Co-Director

Juan Ayala – Co-Director & Dramaturg

Alex Counsell – Technical Producer

Laura Doye – Executive Producer

Marc Cook – Lead Technical Artist

Adam Cleaver – Lead Developer

creativexr.co.uk/cohorts/limbik

Immersive Histories: Dambusters

(by All Seeing Eye)



Immersive Histories: Dambusters is an immersive VR experience allowing its audience to physically step into history and experience the famous ‘Dambusters’ mission from on board Guy Gibson’s Lancaster. The experience surrounds the audience with a physical set that in conjunction with the virtual reality visuals, spatialised audio and haptic feedback, allows them to see, hear and feel the aircraft around them during the notorious mission. Offering two unique perspectives, audience members can take up position as Terry, the navigator, or Hutch, the wireless operator.

Team profile:

All Seeing Eye was established to explore the possibilities emerging technology can bring to more traditional forms of storytelling. They have produced work for clients including;

National Theatre, BBC, Wellcome, Royal Opera House, Aardman, Paramount, Warner Bros and Imperial War Museum. Their work has been featured at Tribeca, Cannes, Venice Film festival and Sheffield Doc Fest amongst others. Their work stretches from screen to stage, incorporating virtual/mixed reality, projection mapping, 360 film, motion capture and game design.

All Seeing Eye are passionate about storytelling in all shapes and forms.

Name:

Immersive Histories

Genre:

Anthropology, Arts and Culture, Experimental, History, Social Issues, War/Conflict, Cultural Heritage

Final Run Time:

+/- 10 minutes

Contributing Organisations:

All Seeing Eye, Royal Air Force Museum

Project team details:

Ollie Lindsey – Director

Adam Child – Technical Director

Ollie Kay – Art Director

Martin Jowers – Producer

Piotr Forkasiewicz – Lead Technical Artist

Traitor

(by Pilot Theatre)



Traitor is a high-stakes thriller, escape game challenge. This two-player interactive experience requires puzzle completion to reveal the story. One player uses the VR headset and the other, a control deck user, provides crucial information from props supplied, supported by a real world actor. In this instance, the players' coordinated communication is key to the overall experience.

Team profile:

Pilot Theatre has extensive experience of making immersive theatre, including shows housed in eighteenth century cells, cold war bunkers and schools after dark. Pilot is also a renowned touring theatre company working both nationally and internationally. The company produces work that speaks to young people and that is powerfully relevant to their lives right now.

For Traitor, Pilot worked with Matt Stuttard Parker and Rebecca Saw. Matt is an independent VR developer with his company MSFX and lecturer in Game Development at Aston University. Rebecca is a developer who explores interactive narrative, blending the virtual and real world. Traitor has been adapted from the original production by Esther Richardson, Cecilie Lundsholt and Richard Hurford.

Name:

Traitor

Genre:

Arts and Culture, Crime, Current Affairs, Education, Technology, Thriller, Youth/Children, Performing Arts

Final Run Time:

30 minutes

Contributing Organisations:

Pilot Theatre, MSFX Ltd.

Project team details:

Lucy Hammond – Creative Producer

Matt Stuttard Parker – Lead Developer

Richard Hurford – Writer

Rebecca Saw – Assistant Developer

When Something Happens

(by Boom Clap Play)



When Something Happens is an inspiring adventure designed for the next generation of scientists, storytellers and astronauts. It is a short, animated VR film, written and narrated by Leicester-based poet Boston "The Orator" Williams. The six minute experience narrates the 13.8-billion-year history of the universe. It does so by condensing David Christian's "Big History" framework, which defines the history of everything from the Big Bang to the modern day. Available both in immersive VR via a headset, and in an immersive projection set-up, When Something Happens is an educational, poetic immersive experience about the universe. The learning experience is enhanced by audience members interacting via their gaze and activating the unfolding story by looking at specific triggers in the experience.

Team profile:

Boom Clap Play are a small team of highly creative and pragmatic award-winning professionals that get inspired by ambition and talent.

In previous years Creative Director, Andrew McHugh, has been key in a number of award-winning design projects before directing the multi-awarded children's Google Cardboard app, Tara's Locket.

Co-founder David Baxter, has produced and animated work on awarded children's TV shows, worked as an audio technology educator, and continues to work in interactive audio design.

Name:

When Something Happens

Genre:

Arts and Culture, Science, History, Music, Literature, Experimental

Final Run Time:

8 minutes

Contributing Organisations:

Boom Clap Play, Northern Ireland Screen, NI Science Festival

Project team details:

David Baxter – Producer & Audio Lead

Boston Williams – Writer

Liam Ferris – Tech Lead

Aidan Scott – 3D Lead

Olga Wojciechowska – Composer

Evaluating audience impact of the CreativeXR experiences

In this emerging market, finding standard ways of measuring, classifying and predicting the impact and value of immersive storytelling experiences can support commissioners, stakeholders and production teams in their strategic decision making.

i2 media research and Nesta developed a methodology to address this objective for Digital Catapult (2018 ⁽⁷⁾). A post-experience online questionnaire, broadly entitled the toolkit, was developed to assess the psychological, emotional, cultural and economic impact and value of creative immersive content.

As described in the 2018 report, the development of the sections of the toolkit were informed by discussion groups with audiences, stakeholders and content creators, and through a review of literature published in this field. It was then used to evaluate three pieces of creative and cultural VR content, which had been internationally recognised at world leading film festivals, such as Tribeca ⁽⁸⁾ and the Venice Biennale ⁽⁹⁾. Recognition of VR at these film festivals is a recent development: both Tribeca and the Biennale included VR juries for the first time in 2017. Winning content has included narratives covering important cultural and social scopes, as well as making compelling use of XR formats to delight, stun, impress and engage its audiences.

Through extensive analyses, the toolkit was then refined to identify the most important sections and measures of impact and value. The current research deployed a short form version of the methodology, comprising these most important sections and measures. It was developed with a 'self-service' evaluation procedure in mind, to make it easier for production teams, commissioners and stakeholders to independently and cost-effectively evaluate pieces of content.

The use in the current study of the same methodology allows comparison of audience responses to the CreativeXR productions to award winning content evaluated in 2018 by i2 media research.

This report summarises how audiences rated the CreativeXR content in terms of three broad domains of experience: (a) psychological and emotional impact, (b) perceptions of cultural value, and (c) views on economic value and pricing.

The findings offer independent evaluation data, which has benefits for different stakeholders:

1 - to share with commissioners at exhibition locations (including theatres, museums and galleries) to facilitate more commissions

2 - to share with funders to evidence the value their funding has created, to enable funders to show the impact of their support

3 - to share with distribution platforms, to guide pricing

4 - to share with investors, to support the case for additional funding (for the same or different projects)

5 - insight on strengths and weaknesses of the production, as a resource for productions' creative teams

The current study was designed to evaluate audience response to the CreativeXR content and to better understand what stimulates audience appetite for more similar content.

These evaluations showcase what can be achieved through the creative endeavour of innovators at the cutting edge of immersive production, and the impressive impact of these new immersive formats for storytelling content.



Method

Following the audience experience of the content, individuals were invited to participate in the study by members of the production and/or research team.

Those willing to do so gave informed consent before providing their evaluation feedback. (See also Appendix for planning phase prior to fieldwork). None of the participants were paid to take part.

Testing locations

– Common Ground

The audience sample comprised attendees to lab-based presentations at i2 media research premises. Whilst some of the audience was recruited via social media, most of the audience was recruited opportunistically by i2 media research colleagues, drawing on students and staff on and around the Goldsmiths University of London campus in South East London. Content was presented on the Oculus Rift. The content tested for this project relied on interaction using the Oculus controllers – note that VR City plan to enable gesture based interaction using Leap Motion for the official release and launch of Common Ground.

– Fatherland

It was evaluated in a live performance at the Guildhall in Portsmouth on Wednesday 28 November 2018. The audience comprised around 70 people, including a small group of representatives from the main stakeholders (Arts Council England and Digital Catapult). The audience included local people, and students recruited by Portsmouth University. For audience members who experienced the immersive VR part of the experience, content was presented on the HTC Vive.

– Immersive Histories: Dambusters

Evaluations took place with regular attendees of the RAF Museum London as voluntary participants/audience members, on Saturday 1 December 2018. Content was presented on the Oculus Rift, augmented by a physical model of the Lancaster bomber, and a haptic vest.

– Traitor

Evaluations were conducted at the Pilot Theatre, in York on 10 and 11 January 2019, with Pilot Theatre audiences including friends and family networks of the production team augmenting audience recruitment via social media. The VR content roles were presented on the HTC Vive.

– When Something Happens

Evaluations took place at Digital Catapult's Immersive Lab Northern Ireland (Belfast), on 13 and 14 December 2018, and at the i2 media research lab (between 4 and 12 December 2018). Participants were recruited mainly via social media. Content was presented on the Oculus Rift.

Audience questionnaire: the toolkit

The toolkit, a questionnaire administered to audience members via an online survey, was modified into sections: some sections and items applied across all five experiences ('Core All'), and another was bespoke to each piece of content ('Core Bespoke'). The 'Core All' section contained the main outcome metrics of impact and value, as well as key background characteristics of the audience members such as demographics and engagement with arts, culture, VR and technology (see Table 1).

The section and question order of the toolkit was staggered, prioritising the core items, before asking participants if they had more time to answer further questions about their experience. If they continued into the non-core section, respondents were presented with the remaining sections and questions of the original toolkit. This made it a more or less in-depth evaluation to adapt to respondent preference and availability.

Table 1. Core toolkit items

Measures	Questions	Scoring
Global experience (psychological impact)	Five items. The experience was... [1] Good, [2] Memorable, [3] Transported me elsewhere, [4] Worth paying for, [5] Powerful	1 (low) -100 (high) - Global experience is the mean score of the five items - High impact scorers (% of sample) are those giving ratings 75 or higher
Cultural value	Six items. The experience was... [1] An interesting idea, [2] Thought provoking, [3] Something I'd like to experience again, [4] Engaged me on an intellectual level, [5] Made me want to engage with similar content, [6] Has something to say about the world we live in	1 (low) -100 (high) - Cultural value is the mean score of the five items - High impact scorers (% of sample) are those giving ratings 75 or higher
Engagement (psychological impact)	Six items. The experience was... [1] An interesting idea, [2] Thought provoking, [3] Something I'd like to experience again, [4] Engaged me on an intellectual level, [5] Made me want to engage with similar content, [6] Has something to say about the world we live in	1 (strongly disagree) - 5 (strongly agree) - Engagement is the mean score of the three items - High impact scorers (% of sample) are those giving ratings of 4 or 5 - For results presentation, values are standardised by multiplying by 20
Emotion intensity (psychological impact)	One item. Overall intensity of the experienced emotions	1 (low) -100 (high) Emotional intensity is the rated value High impact scorers (% of sample) are those giving ratings 75 or higher
Emotion type (psychological impact)	30 specific emotions to indicate which increased/decreased (for example Distressed, Excited, Strong)	Checkbox tick indicates emotions that apply
Economic impact	A. One item. Willingness to pay B. Four items. Indication of four price points (for example at which it is too cheap or too expensive) C. One item. Interest in accessing similar experiences in future	A. 'Yes' B. Price in pounds C. 'Yes'
Participant background	A. 10 items. Demographics (for example age, gender) B. 10 items. Engagement with arts and culture in terms of visits (for example museum or gallery, film, at cinema and other venues) C. 13 items. More informal leisure activities (for example spend time with friends/family, watch TV) D. 14 items. More formal, structured arts and culture activities (for example in front of an audience such as singing but not karaoke or played a musical instrument) E. One item. Experience with VR F. Four items. Attitudes to technology (for example I am interested in all types of hi-tech product, I generally feel in control of the hi-tech products I use)	A. Scoring as appropriate to each item B. Indicate items relevant to the past 12 months C. Indicate items relevant to the past 12 months D. Indicate items relevant to the past 12 months E. Five response options, indicate one (ranging from 'Never' to six or more times in the last 12 months) F. 1 (strongly disagree) - 5 (strongly agree)
Bespoke section	Questions enquired about elements of the experience specific or important to that content, for instance, Player experience role, Co-player relationship, Experience with specific related content (for example puzzles), Player dynamic, Experiences of interaction (for example, gaze) and sensory feedback (for example haptic vest), and reasons for attending location Eight items: Common Ground 14 items: Fatherland 19 items: Immersive Histories 16 items: Traitor Eight items: When Something Happens	Response options as appropriate to question Note. These items are not addressed in this report. Bespoke analyses were reported back to each production team

Audience sample

A total of 202 audience members (59.4% male, 40.1% female, 0.5% other) aged 15 to 71 (average age of 30 years), gave their evaluations on the core sections of the toolkit. The audience sample comprised a large proportion of younger, rather than older people, with 75% aged under 35 years. Forty-six percent (n=93) of respondents agreed to continue into the non-core sections.

Across the five pieces of content there was variation in the size and composition of their audience samples. A summary of their audience characteristics is presented in Table 2. For instance, When Something Happens comprised the largest proportion of the overall sample (30.2%) with 61 evaluations, Common Ground received 39 evaluations, whilst Fatherland and Immersive Histories each received 36 evaluations. Traitor contributed the smallest audience (14.9%) with 30 evaluations. Similarly different proportions for each production had time to complete the non-core section. Whilst only 26% of Fatherland respondents continued, for Traitor, nearly 70% of the audience continued.

Table 2. Sample size and composition

Production (% of overall sample)	% Gender			Age (years)			Sample n	
	M	F	Oth	Mean	<45	Range	Core	Non-core
Common Ground (19.3%)	43	57	0	28.9	87%	18-64	39	16 (41%)
Fatherland (17.8%)	80	20	0	29.6	86%	18-59	36	9 (25%)
Immersive Histories (17.8%)	60	37	3	38.4*	63%	15-71	36	15 (42%)
Traitor (14.9%)	52	48	0	26.0	100%	18-40	30	20 (67%)
When Something Happens (30.2%)	61	39	0	27.5	90%	18-57	61	33 (54%)
Overall (100%)	59.4	40.1	0.5	30.0	85%	15-71	202	93 (46%)

Results

What is the impact of these diverse virtual reality experiences on audiences, and what is the audience appetite to experience more of each one?

The five CreativeXR productions scored impressively on the toolkit, in most cases they obtained scores comparable or close to those obtained for the award winning VR content tested in 2017/18

Impact and value were rated positively

- Audiences were highly engaged with the experiences
- The content had high cultural value and psychological impact
- Global experience, emotional intensity, and willingness to pay tended to be more variable across the pieces of content than cultural value and engagement

Across responses to all the experiences combined, the average global experience and cultural value ratings (indicated in lime) were 78.4 and 81.5 (out of 100, respectively). The pieces of content were less dispersed in their ratings for cultural value than they were for global experience (out of 100) suggesting audiences considered the pieces had high impact. Average ratings of emotional intensity were generally lower across the pieces of content, ranging from 52.9 to 76.3 with an overall average of 63.4. Engagement was high, with average ratings of agreement (mean rating 4.1, standardised rating 82). Figure 1 summarises the range in scores across the content for these indices of impact and value.

Figure 1. Impact and value rating for the 5 CXR content compared with overall average rating

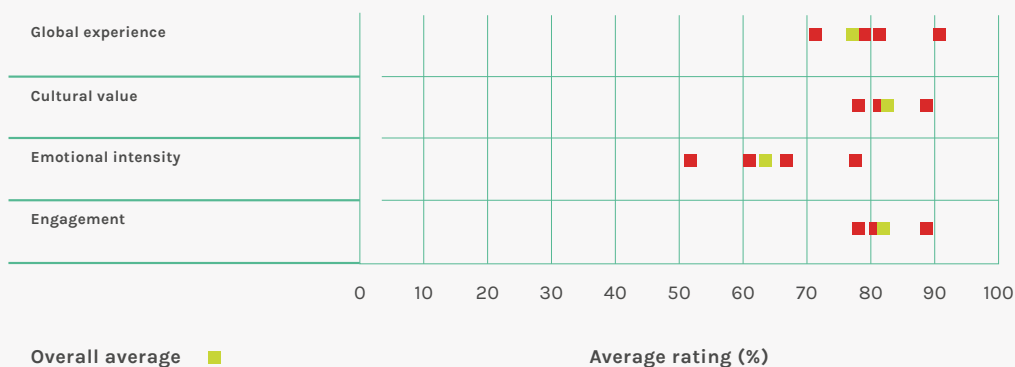


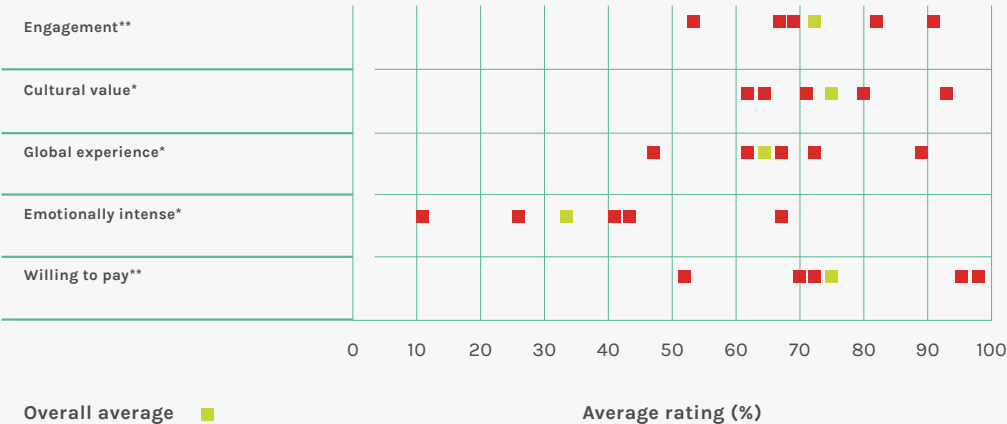
Figure 2 shows the proportions of each sample giving high impact scores. Overall, 64 and 74 percent of audiences gave ratings of at least 75 for global experiential quality and cultural value, and proportions varied across the pieces of content. For one of the pieces of content an exceptionally large proportion of the audience (94%) gave ratings of cultural value in this high range (75+). Overall, 72 percent agreed they felt engaged with the content but this varied depending on the content, ranging between 54 and 92 percent.

Emotional intensity scores were generally lower, with fewer participants giving high intensity ratings and ranged from around 12% to 66% of audiences across the pieces of content. Audiences across all content reported on emotions that increased during the experience, which included Interested (endorsed by 72.8% of the sample), attentive (50.5%), excited (44.1%) Alert (42.2%), surprised (32.7%) and inspired (32.2%). When audiences were asked about the emotions that decreased, proportions for each emotion were smaller and fewer emotional decreases were reported across the pieces of content. Overall, they felt less nervous (endorsed by 21.3%), distressed (19.3%), anxious (16.8%), jittery and irritable (both 14.4%).

- Across all productions, 77% of audience members indicated that they would be willing to pay
- Those who were willing to pay gave significantly higher psychological impact and cultural value ratings than those not willing to pay
- Across all productions, the average optimal price point was £10

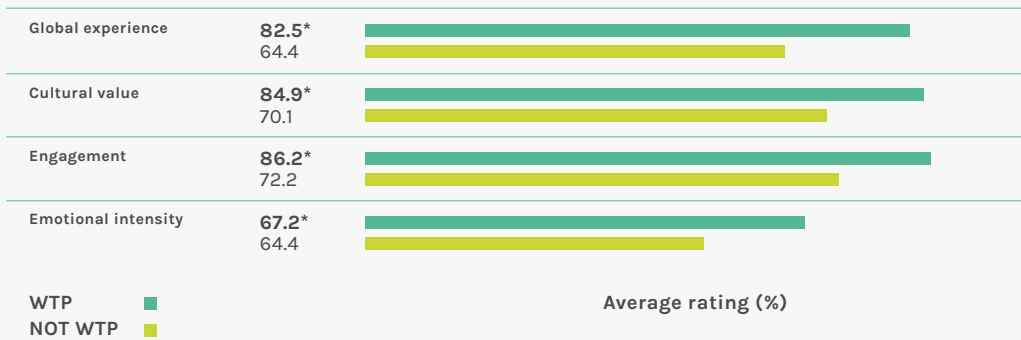
Considering the proportion of audiences to each production who indicated retrospectively that they would be willing to pay to experience the content, again the results are impressive. Proportions varied from a 54% to 94% across the five productions.

Figure 2. Proportion of samples giving high impact ratings (*rating of 75+, ** agreement with statement



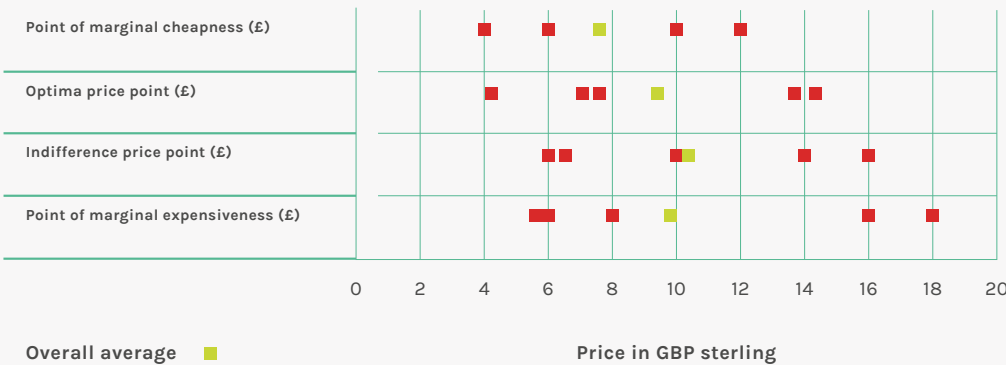
Audiences who were willing to pay for the experience gave ratings of global experience, cultural value, engagement and emotional intensity that were statistically significantly higher ($p < .05$) than those given by audiences unwilling to pay. This suggests a close correspondence between psychological impact and cultural value with economic value, at least in terms of willingness to pay something for the experience (see Figure 3).

Figure 3. Impact ratings of those willing to pay vs. unwilling to pay (* $p < .05$)



Results from the willingness to pay responses (see van Westendorp, 1976, and Kunter, 2016) indicated optimal price points across the contents ranging from £4.50 to £14.50 per audience member to access the content in the in-situ scenarios in which they experienced the content (see Figure 4).

Figure 4. Range of price points across the five pieces of CXR content compared with overall average price point



Variation in audience responses

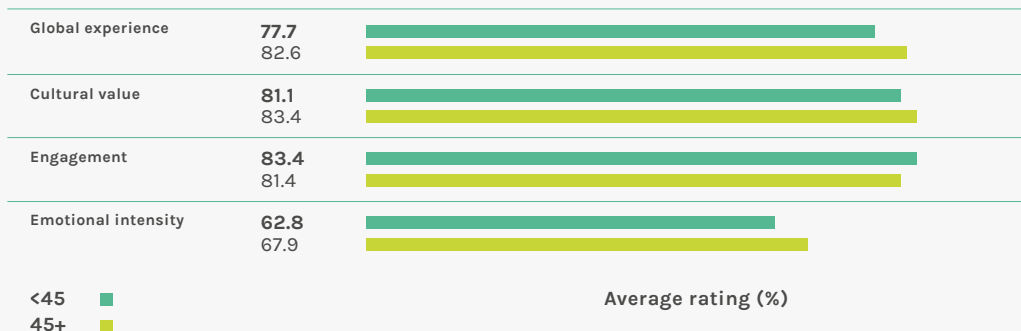
The research explored how audience responses varied and what factors might have contributed to differences in level of appreciation. For instance, audiences' age, gender, or interests may significantly influence their expectations and the types of evaluations they give. These findings may also help to explain why some productions seemed to be evaluated more positively than others depending on their audience characteristics.

Age and gender

- The older the audience, the more emotionally intense they found their experience
- Compared with men, women rated their experiences as generally more impactful, giving significantly higher ratings of cultural value and emotional intensity
- In correlational analyses, the research found that as age increased, so did impact ratings of emotional intensity ($r = .14$, $p < 0.05$, $n=195$), but not for global experience, cultural value or engagement

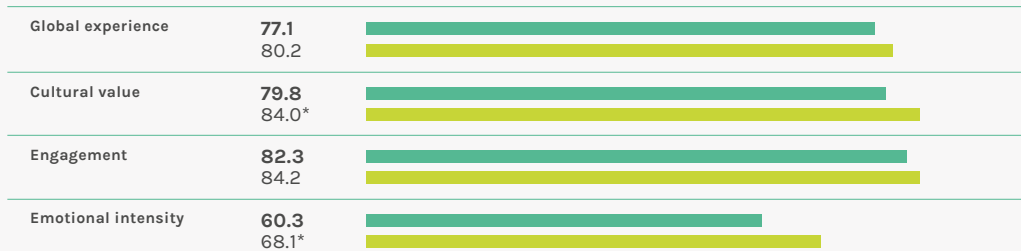
When the sample was split into two age groups - under 45 years and 45 years or over – older audiences tended to give higher impact ratings (with the exception of engagement) compared with younger audiences but these differences were not statistically significant (see Figure 5).

Figure 5. Impact ratings of younger and older age groups



Female audiences tended to give higher ratings compared with males across all impact measures. These differences were statistically significant ($p < .05$) for ratings of cultural value and emotional intensity (see Figure 6).

Figure 6. Impact ratings of males and females (* $p < .05$)



Engagement with arts, culture and technology

- Those with less experience of VR tended to find their experience more emotionally intense
- Audiences engaged with either VR/tech or arts/culture gave higher ratings of cultural value and emotional intensity compared with audiences who were engaged with both, or neither

One third of the sample (33%) indicated having experienced one or two VR experiences in the past 12 months, 24.5% had no prior experience of VR, and almost 20% reported having at least six VR experiences within the last 12 months. There were no significant differences in impact and value ratings between people with and without experience of VR. However there was a tendency for those with less VR experience to give higher emotional intensity scores than those with more VR experience.

Overall 66% of the sample indicated an interest in all types of hi-tech product and feeling in control of the hi-tech products they use, perhaps reflecting a predominance of ‘early adopters’ in the audience sample. This could infer that the sample overall was positively inclined towards technology.

When engagement with (a) arts and culture and (b) technology and VR were analysed separately, there was no significant differences in impact and value ratings between those with more or less engagement. However, an interesting pattern emerged when exploring their interaction effects on ratings of psychological impact and cultural value.

Audiences were classified as low or high on these two dimensions relating to their engagement with arts and culture (visits/activities), and with technology (including VR). A target typical audience for these types of immersive experience might feasibly be one that is engaged with both arts/culture and VR/technology. In this study, 23% of the sample fell into this (high/high) category (see Table 3).

Table 3. Proportion of overall sample classified as each type

Arts/culture engaged	VR/tech engaged	
	Low	High
Low	28%	20%
High	29%	23%

The results showed that if audiences were engaged with either VR/tech or arts/culture, they tended towards giving higher cultural value (Figure 8b) and emotional intensity ratings (Figure 8d) compared with audiences who were engaged with both, or neither (see Figures 8a-d for all impact and value ratings, with trend-line added where applicable). For emotional intensity and cultural value ratings, the results approached statistical significance ($p = .056$ and $p = .078$, respectively).

Figure 8a. Global experience ratings by engagement (with tech/VR and arts/culture)



Figure 8b. Cultural value rating by engagement (with tech/VR and arts/culture)



Figure 8c. Engagement ratings (with tech/VR and arts/culture)



Figure 8d. Emotional intensity rating by engagement (with tech/VR and arts/culture)



Highlights by content — audience evaluations

Each of the production teams (per content) were provided with a detailed summary of their audiences' ratings on the core and bespoke sections of the post-experience survey. Here we summarise the strengths of each production based on how its audience in this research rated particular items or qualities of the experience. Each had distinct strengths, and encouragingly these were consistent with the intention of each of the production teams.

Common Ground

Common Ground rated strongly on its ability to transport audiences elsewhere and was considered particularly thought provoking, with something to say about the world in which we live. It engaged audiences on an intellectual level and provided a relatively high intensity experience. Audiences were both **Interested** and **Upset** by their experience of Common Ground, which was an intentionally gritty, socio-political piece, and this likely also accounted for its tendency to decrease happiness in audience members. The audience had a younger than average age, a predominance of women and was slightly more experienced than average with VR (78% had some prior experience).

"Very interesting way to watch a documentary and definitely more impactful than watching it on a TV."

Fatherland

Fatherland was considered memorable, worth paying for, an interesting idea and thought provoking. Importantly, audiences enjoyed themselves. They were attentive and interested, and reported feeling happy and inspired. They also tended to report increases in **Surprise, Excitement** and **Confusion**. When asked about the emotions that decreased, no one emotion was reported by more than 20% of the sample.

Compared to the other pieces of content Fatherland had a predominantly male audience (80%) and was more experienced with VR (86% had some prior experience).

"I enjoyed the experience of seeing this performance... and really appreciated the developmental nature of the work."

Immersive Histories

Immersive Histories scored consistently well in the evaluations, having higher than average scores across the board. This could have partly reflected the context of the RAF Museum, and that the audience was very engaged in the production's theme (evidenced by their visiting the RAF Museum voluntarily). There was a good appetite to experience more and pay for this type of content. Audiences were **Excited, Alert, Attentive**, felt **Active** and **Proud** during their experience of Immersive Histories.

Immersive Histories had the oldest audience (mean age 38 years) of the five productions, with 37% of the sample aged 45 years or older. In fact, it was significantly older than any of the other samples, which did not differ significantly from each other. 71% had some previous VR experience, fewer than average.

"It was really good. I think it could be improved by increasing the physical side of it to make it more immersive, such as the whole experience vibrating."

"It was really an excellent experience."

Traitor

Traitor also received positive overall audience evaluations. Compared with the average across all productions, it was rated more highly on the items, **Good**, **Powerful**, **Memorable**, and an **Interesting** idea. It engaged the audience on an intellectual level, and was something that they wanted to experience again. It also motivated them to want to engage with similar content, indicating good appetite to experience more. Audiences were highly engaged with Traitor. Increases in a complex array of emotions were reported, including **Interested**, **Excited**, **Enthusiastic**, **Alert**, **Attentive**, and also **Confused** and **Surprised**. This likely reflected the two-player approach. Audiences were most willing to pay for Traitor.

Traitor had the youngest audience (mean age 26 years) and no one was aged 45 years or older, which dovetailed well with the target audience. Compared to audiences for the other pieces of content, their sample had a higher proportion of women and their audience was least familiar with VR (47% reported having no prior VR experience compared with a sample average of 24.5%).

"Well done it was really interesting. I work a lot with young people and they will love it, but equally I found it really interesting and I'm old!"

"Really enjoyable."

When Something Happens

Large proportions of the audience for When Something Happens reported feeling **Interested** and **Relaxed** during the experience (77% and 61%, respectively), consistent with its comparatively lower emotional intensity rating. Over 70% of its audience were willing to pay for this experience. Audiences agreed they enjoyed themselves and felt drawn in, but were slightly less likely to report losing track of time. This might relate to its comparatively shorter duration.

The audience for When Something Happens was younger than average with 90% of it aged under 45 years compared to the average across all samples of 85%, and 82% had some previous experience of VR, higher than average.

"I thought the fractal look worked well in VR instead of trying to make a very realistic environment — making it look like I was in a simulation more than a realistic look."

"It was great, and I would love to come back and participate again."

Charts showing range of quality ratings per item

Figures 9a-c, illustrate how the audience evaluations across the productions varied, per item. Of greatest note is that whilst there is clear variation between the productions in the itemised evaluations, the ranges are consistently positive for all the productions.

Figure 9a. Ratings for items comprising global experience

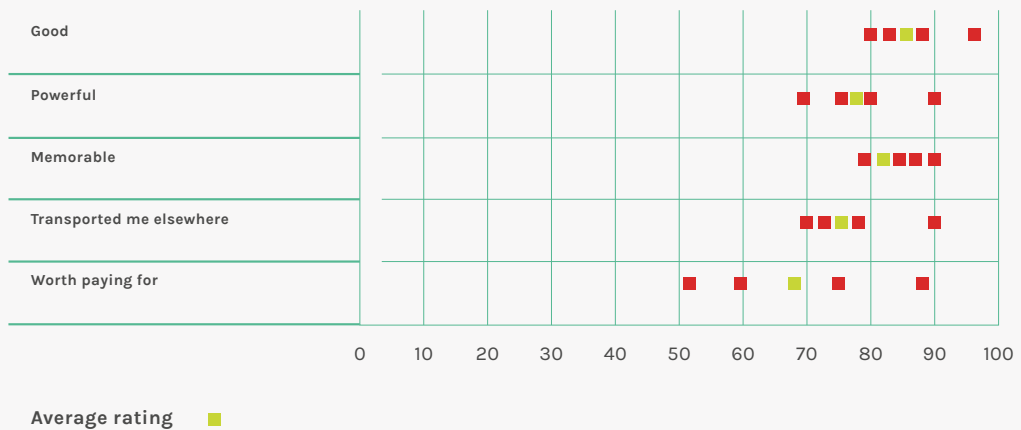


Figure 9b. Ratings for items comprising cultural value

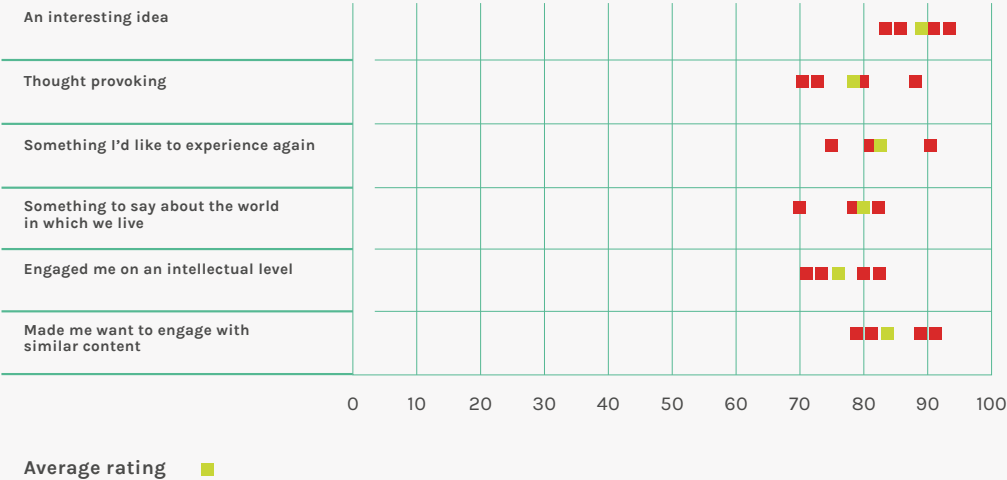
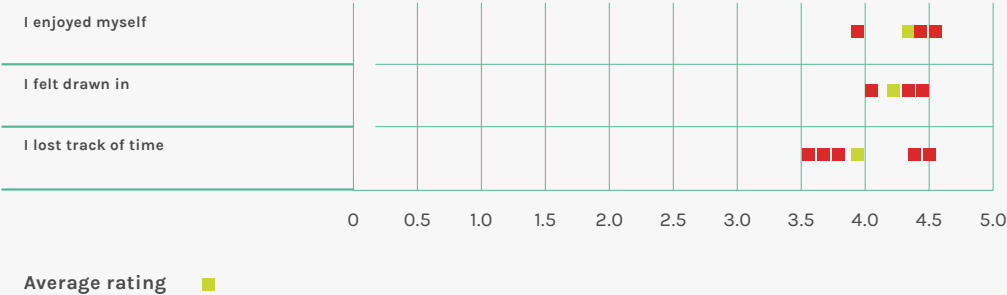


Figure 9c. Ratings for items comprising engagement





Conclusions: key insights and recommendations

Key insights

The CreativeXR productions were evaluated very positively

The results of this research shine a positive light on the experiences created by the CreativeXR production teams. Using the methodology we developed in 2017/2018 to evaluate award winning VR content, the CreativeXR productions scored comparably. Even more importantly, the research has revealed what elements of each experience audiences most appreciated. This insight can be applied to support the marketing and distribution of CreativeXR content. General learnings can be applied to new productions to inform future content development.

Most critical audiences were highly culturally and technologically engaged

An interesting pattern to emerge in the results, though not statistically significant, was that higher impact ratings (global experiential, emotional intensity) tended to be given by audiences reporting high engagement with either arts/culture or technology, but not neither or both. This might suggest that the novelty of the content or the technology might contribute to positive evaluations, or that high engagement in both culture and technology provides audiences with higher anchors against which to benchmark the quality of their experience.

Also of interest is the observation that younger and male audience members were more likely to be critical in their evaluations, regardless of which production they were evaluating. As the audience sample was skewed to male, younger people, it is possible that a slightly more representative audience sample would have produced even more positive evaluations of the CreativeXR productions.

All the productions received high ratings of cultural value

Whilst audiences varied in their ratings of global experiential quality, engagement and intensity of emotional response, they did so far less in their ratings of cultural value, which were high for all the productions. This should be interpreted as demonstrating that all the productions delivered with regard to cultural value, a key goal of the CreativeXR programme.

77% were willing to pay to experience the CreativeXR productions

The experiences developed within the CreativeXR programme were received very positively by the test audiences. Across the key audience impact indicators of global experiential quality, cultural value, engagement, affective response, and willingness to pay, audience scores across the productions were very high. Willingness to pay varied between 54% and 97%, dependent on the experience, but across all the experiences 77% of our audience indicated they would be willing to pay for the scenario in which they experienced the content. The previous research has demonstrated that willingness to pay is predicted by impact evaluations (most reliably by engagement and intensity of emotional response) – a finding reflected in the results we have reported here.

Optimal price point of £10

In terms of how much people are willing to pay our analyses generated a range across the productions, from around £4.50 to around £14.50, with an average across all the experiences of approximately £10. Some of this variation can be related to the different durations of the experiences: across the pieces of content duration ranged from six minutes to 30 minutes and, for the most part, the shorter the duration of an experience the lower its optimal price point. In-situ experiences (for example in a theatre or museum) also tended to generate higher optimal price points than the pieces of content more amenable to being experienced at home. Regardless, the finding demonstrates the excellent commercial potential of the productions we evaluated – it is higher than the typical price point of immersive content on commercial portals.

Demonstration of utility of the Immersive User Experience Evaluation Toolkit

A final insight worth highlighting is the ease with which we were able to apply the Immersive User Experience Evaluation Toolkit to real audiences in natural, in-situ environments. The use of both a shortened URL and a QR code that easily took audience members to the online feedback site proved effective – the researchers observed no issues for audience members in accessing and completing the evaluation. This is a very positive outcome of the study, as it points to easy adoption of the method across the sector more generally.

Limitations

The main limitation of this research centres on the engagement of real audiences in the evaluations. Audience members were recruited opportunistically, based on their availability and presence on dates agreed in consultation with the production teams for private or public performances. Because the research was conducted in-situ, where audiences would normally experience the productions, there were some differences in audience type and demographics across the productions. An alternative approach would have been to recruit nationally representative samples to experience each of the productions, though this would have caused other issues. In particular it would have reduced the ecological validity of the research, as the research would have been selecting participants unrepresentative of the typical audiences for each production.

A second limitation relates to the breadth and strength of the conclusions of the research. As the productions differed in so many ways, from the headset they were developed to run on, to the location of the experience, their duration, content and narrative approach, to the interaction they enabled and so on, the research is not able to conclude which combination of these characteristics is most effective in supporting engaging and impactful experiences of immersive creative and cultural content. This remains an interesting empirical question.

A final limitation to note is that the evaluations were conducted within a short timeframe, immediately once the near final versions of the productions were ready. This means that the versions of the productions which premiere, later in 2019 and beyond, will in most instances differ from the productions tested – for example with additional scenes included, or alternative means of interacting within the experiences. So the evaluations reported here relate only to the versions of the productions as they were in December 2018 - January 2019.

Development and testing

As discussed in the introduction to this report, the UK is uniquely well positioned to replicate its leading international position in the productivity and excellence of its creative industries in the field of immersive. The excellent audience evaluations of immersive experience obtained in relation to the CreativeXR experiences, and the encouraging willingness to pay results, demonstrate that the UK has the talent, skills and motivation to succeed.

2019 will see further technological leaps in immersive, with the upcoming launch of the standalone six-degrees of freedom Oculus Quest, making immersive experiences more accessible for much bigger audiences. Anticipated increases in audiences for immersive content make this an important moment for continued investment in immersive content.

The UK already has the well-earned reputation, the skills, and the creative talent to produce compelling and engaging immersive content. We also have the tools to test the impact of what is created. Let's continue to unlock the investment to support the development and distribution of many more immersive productions, as impactful as those created by CreativeXR.

Acknowledgements

Prior to fieldwork, the research team obtained ethics committee approval for the study from the Psychology Department's Ethics Committee at Goldsmiths, University of London. We are very grateful to all audience members of the CreativeXR productions who kindly gave their time to reflect and feedback on their experiences.

We would also like to acknowledge and thank all the CreativeXR production teams for their fantastic support for these evaluations, and the teams at Digital Catapult and Arts Council England for supporting us in delivering this work.

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Footnotes

¹ <https://www.creativeindustriesfederation.com/news/new-report-federation-growing-uks-creative-industries>

² <https://www.digicatatapult.org.uk/news-and-views/publication/audience-immersive-report/>

³ <https://www.gov.uk/government/news/britains-creative-industries-break-the-100-billion-barrier>

⁴ <https://www.nesta.org.uk/news/creative-industries-are-driving-economic-growth-across-the-uk-on-track-to-create-one-million-new-creative-industries-jobs-between-2013-and-2030/>

⁵ https://www.immerseuk.org/resources/immersive_economy_report/

⁶ https://public.tableau.com/profile/jeremy.dalton#!/vizhome/VRARinteractiveUKmap_0/VRARCompaniesAcrossTheUK_

⁷ <https://www.digicatatapult.org.uk/news-and-views/publication/audience-immersive-report/>

⁸ <https://www.tribecafilm.com/>

⁹ <https://www.labiennale.org/en>

¹⁰ Base sample n =202; where there is missing data, we report figures based on the valid n (excluding missing)

Appendices



Research method

Consultations with production teams

In the planning phase of the project and prior to fieldwork, the i2 media research team consulted with each production team as they finalised their content for Digital Catapult's showcase in early February 2019.

The research consultations were to coordinate logistics (for example testing dates and locations) for these evaluations, and to understand any specific intentions of their productions on audiences, such as the impact of any novel techniques or technology deployed, or specific affective or learning outcomes targeted.

Content and audiences

For the audience evaluations, three pieces of content were presented on the HTC Vive, and two (When Something Happens and Common Ground) were presented on the Oculus Rift.

The pieces of content varied in their subject matter, staging requirements, props, and type and quality of physical immersion and interactivity. For some content the audiences took on different roles or perspectives within the same overall experience. The five pieces of content ranged in length from approximately six minutes to 30 minutes.

Mixed recruitment approaches were used. For some evaluations the private showings/performances for the audience evaluations were led by the production teams, based on their plans for private test views. As such the recruitment capitalised on audiences who were either naturally drawn to attend at that time, or were invited to attend these early performances. The aim was to achieve a minimum of 30 evaluations per content, with a preferred target of 36 evaluations.

Important sample characteristics with potential to influence the results were measured across all samples and included engagement with arts/culture in terms of visits and activities, experience with VR and attitudes to technology. We checked how the audiences for each production evaluation compared to support the interpretation of the results.

The evaluations were conducted between late November 2018 and early January 2019, as soon as the content was in a suitable state of completion to evaluate.

Research results: sample characteristics

Demographics

Age and gender distribution of the overall audience sample are shown in Figures A1a and A1b.

Figure A1a

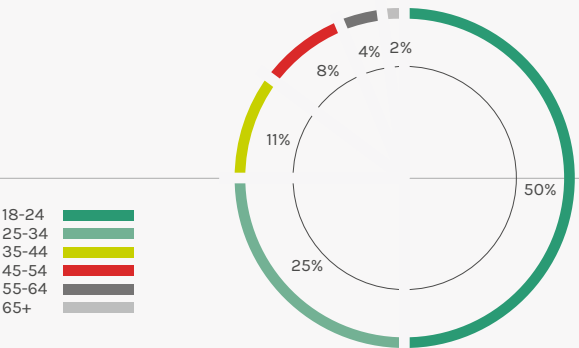


Figure A1a. Age distribution in the audience sample

Figure A1b

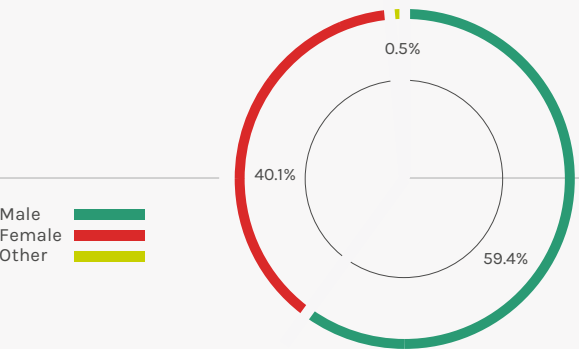


Figure A1b. Gender distribution in the audience sample

Engagement with arts, culture and technology

The audience sample tended to be more engaged with arts and culture visits, than activities that perhaps require greater commitment and investment. The most commonly reported recent arts and cultural visits, included attending film at a cinema or other venue (85%), museums or galleries (82%), historic park (66%), music event (65%) and non-religious historic building (64%). The most commonly reported activities were painting, drawing, printmaking or sculpture (25%), photography (22%), using a computer to create original artworks or animation, and making films or videos as an artistic activity (both 17%). Across the 24 arts and culture activities and visits combined, the audience endorsed an average of 8.5.

Most commonly reported leisure activities undertaken at least once weekly included spending time with family and friends (87%), listening to music (but not at an event), general internet browsing/surfing (each at 80%), watching TV (74%), emailing (62%), reading books/newspapers (55%), doing sports/exercise/gym activities (54%), visiting pubs/clubs/bars (53%), eating out in restaurants (51%) and playing video/computer games on a digital device (50%). Leisure activities less commonly reported were home gardening/DIY (16%), playing a musical instrument (24%) and arts and culture activities (34%).

Overall 66% of the sample indicated an interest in all types of hi-tech product and feeling in control of the hi-tech products they use, perhaps reflecting a predominance of 'early adopters' in the audience sample. Only 14 percent indicated having a more negative attitude to technology, such as getting frustrated when using hi-tech products.

Around a quarter of the sample had never experienced VR or AR before their experience of one of the pieces of CXR content. The level of familiarity with VR and/or AR across the overall audience sample is shown in Figure A2a.

High and low groups representing those with more or less engagement and experience with arts and culture, and VR and technology were created. For arts and culture, the number of visits and activities were first combined and the mean mid-point determined whether they were considered a ‘high’ or ‘low’ scorer. For engagement and experience with VR and technology, audiences with at least some recent experience of VR (within the past 12 months), and scoring higher than the overall mean on having a positive attitude towards technology were considered ‘high’ scorers. The proportions of high and low scorers on engagement with arts and culture, and VR and technology are shown in Figure A2b.

Figure A2a. Audience experience with virtual and/or augmented reality

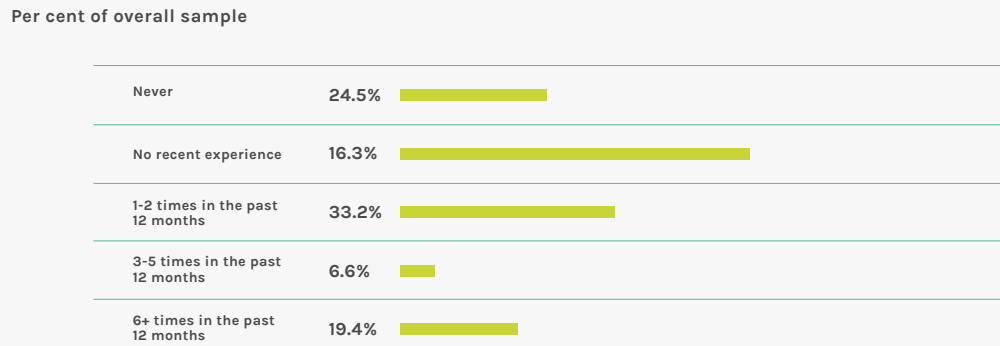
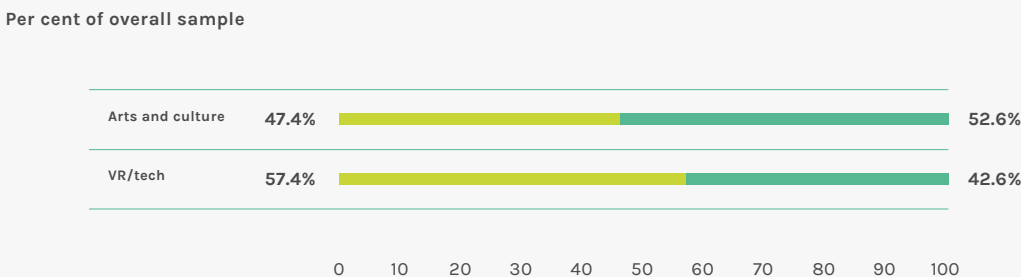


Figure A2b. Proportion of audience sample with high and low engagement and experience



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Digital Catapult provides physical and digital facilities for experimentation and testing that would otherwise not be accessible for smaller companies.

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