

<b>Institution:</b> Goldsmiths, University of London		
<b>Unit of Assessment:</b> 4 - Psychology, Psychiatry and Neuroscience		
<b>Title of case study:</b> Access to robust metrics improves creative industries' understanding of audience experience		
<b>Period when the underpinning research was undertaken:</b> 2001-2019		
<b>Details of staff conducting the underpinning research from the submitting unit:</b>		
<b>Name(s):</b>	<b>Role(s) (e.g. job title):</b>	<b>Period(s) employed by submitting HEI:</b>
Jonathan Freeman	Professor of Psychology	1999-current
<b>Period when the claimed impact occurred:</b> August 2013 – December 2020		
<b>Is this case study continued from a case study submitted in 2014?</b> N		
<b>1. Summary of the impact</b>  <p>Audience engagement is a key element of user experience of a website, app, or digital product, fundamental to both cultural impact and commercial success. It is vital, therefore, for the creative industries to optimise audience engagement in their innovative outputs. Freeman's psychologically derived audience impact measures have enabled the creative and technology industries to understand and improve user experience of immersive media. Between 2017 and 2020, high profile user organisations, including the Royal Shakespeare Company (RSC), Punchdrunk, Marshmallow Laser Feast, Philharmonia, Manchester International Festival, Epic Games, Intel, Magic Leap, Royal National Theatre, Young Vic and Arts Council England, have used Freeman's methodology in developing innovative, creative outputs to optimise their pricing structure and secure audience satisfaction. Further impacts include direct influence on leading arts and cultural organisations' audience and commercial strategies, revenue generation for Goldsmiths' spin-out (i2 media research limited, i2), employment and professional training for Goldsmiths' graduates, training for industry, and international revenue generation for Goldsmiths and i2.</p>		
<b>2. Underpinning research</b>  <p>In the mid-1990s, innovators in the broadcast television and gaming industries were exploring new ways of better engaging audiences in their productions, with a focus on what combination of technical advances could deliver increased engagement and immersion. Questions they needed to answer centred around the positive impacts on user experience possible through increases in picture quality, in audio presentation (number of channels, quality of the audio), in interactivity, in immersion (screen size), and in displays on other senses (e.g., haptics, olfactory). Importantly, industry needed an understanding of what were the relative contributions of each modality to a viewer's quality of experience, and what were their combined contributions. These questions required a new methodology that was capable of reliably capturing key elements of the user experience of immersive displays and content. Freeman addressed this need by identifying the key dimensions of users' experience of immersive media, and proposing a new measurement methodology to enable industry researchers to conduct their research and development; to define the new immersive platforms they were targeting and inform their technical and design decision making.</p> <p><b>Measuring user experience of media products and services:</b>  In 2001, Freeman published a paper on 'presence' describing a programme of research (supported by the TV industry) that measured the media experiences of 604 participants of TV, film, computer games and virtual reality and led to the development of a psychometrically validated questionnaire [R1]. Analysis of the data from the project identified four key components of media experience; (a) a sense of 'being there' in a mediated environment; (b) engagement, (c) naturalness/ecological validity; and (d) positive/negative effects. From this, Freeman developed a post-experience self-report questionnaire called the <i>Independent Television Commission – Sense of Presence Inventory (ITC-SOPI)</i>, comprising 44 easy-to-complete items which took respondents</p>		

under 10 minutes to complete. In developing the ITC-SOPI, Freeman ensured the items were phrased so as to be applicable to any content on any display platform.

In late 2017, i2 partnered with Nesta to develop an updated version of the 2001 measure for Digital Catapult (funded by Innovate UK) for application with the latest generation of Virtual Reality, Augmented Reality, Mixed Reality and Spatial Computing platforms. Reports of that work, published by Digital Catapult in June 2018 and September 2019 [R5, R6], were received positively by the creative and cultural industry in particular. Augmenting the 2001 measure, the updated version of the measure, the Immersive User Experience Toolkit (now branded the *Audience Impact Metric*), also quantifies, from a user perspective, the: (a) global quality of experience, (b) perception of the content's cultural value, (c) intensity and characteristics of the emotions elicited by the content, and (d) willingness to pay.

#### **Applying the methodology:**

In 2002 Freeman founded i2 media research limited (i2), Goldsmiths' first spin out company, which acts as a vehicle for knowledge exchange through which to conduct commissioned strategic research and consultancy. Serving the UK and European media industries, i2 has a strong focus on immersive media and platforms and has earned international recognition as a leader in user experience evaluation methodologies, in relation to immersive content specifically. Via i2, Freeman and his research team have applied their user experience evaluation methodology to assess the impact of the arts (e.g., to evaluate the impact of creative and cultural immersive content [R5, R6]), computing (e.g., to evaluate user experience of video games [R2]), human-computer interaction (e.g., informing the development of new fields of study [R3]) and accessibility (e.g., informing development of more effective audio description for blind and partially sighted people [R4]).

#### **Collaborative Partnerships and International recognition:**

Freeman's original underpinning research paper [R1] has been cited over 1,100 times in academic literature and his user experience evaluation methodology has widespread interdisciplinary value, having been published in Psychology [R4], Computing [R2] and Engineering/Technology [R3] literature. This wide applicability derives from the measure's suitability to evaluate any content on any platform/medium. Because of this, the original measure (the ITC-SOPI) has provided a set of vital tools for use by the technology and content industries to inform their development of new platforms and experiences. Since publication it has been licensed to over 1,200 laboratories worldwide, for free to academic research and development labs, for a license fee to commercial labs (including Orange France-Telecom in the EU, AT&T in the US). The approach was recognised by the Independent Television Commission (ITC) and subsequently by key organisations supporting the UK and the EU's innovation in world-leading and effective immersive media. On the basis of his team's reputation for developing robust methods to evaluate user experience, Freeman has secured over £10 million of collaborative research and development funding through Goldsmiths, of which approximately £3 million was in the current REF period.

#### **3. References to the research** (indicative maximum of six references)

- R1. Lessiter, J., Freeman, J., Keogh, E., & Davidoff, J. (2001). A Cross-Media Presence Questionnaire: The ITC-Sense of Presence Inventory. *Presence: Teleoperators and Virtual Environments*, 10 (3), 282-297. DOI: <https://doi.org/10.1162/105474601300343612>
- R2. Jeann-Luc Luginn, Fred Charles, Marc Cavazza, Marc Le Renard, Jonathan Freeman, and Jane Lessiter. (2012). Are immersive FPS games enjoyable?. In *Proceedings of the 18th ACM symposium on Virtual reality software and technology (VRST '12)*. ACM, New York, NY, USA, 199-200. DOI: <https://doi.org/10.1145/2407336.2407378>
- R3. Jacucci G., Spagnolli A., Freeman J., Gamberini L. (2014) Symbiotic Interaction: A Critical Definition and Comparison to other Human-Computer Paradigms. In: Jacucci G., Gamberini L., Freeman J., Spagnolli A. (eds) *Symbiotic Interaction*. Symbiotic 2014.

Lecture Notes in Computer Science, vol 8820. Springer, Cham DOI: [https://doi.org/10.1007/978-3-319-13500-7\\_1](https://doi.org/10.1007/978-3-319-13500-7_1)

R4. Fryer, L., Freeman, J., & Pring, L (2014) Touching words is not enough: How visual experience influences haptic–auditory associations in the “Bouba–Kiki” effect, *Cognition*, Volume 132, Issue 2, 2014, Pages 164–173, ISSN 0010-0277, DOI: <https://doi.org/10.1016/j.cognition.2014.03.015>. [Submitted to REF 2]

R5. Nesta and i2 media research, for Digital Catapult (2018). [Evaluating immersive user experience and impact](#).

R6. i2 media research for Digital Catapult (2019). [CreativeXR and the audience experience](#).

#### Selected Research Grants

G1. Freeman, J. The Collective Experience of Empathic Data Systems (CEEDS), Horizon 2020 FP7-ICT European Council, (2010-2015) Total Award: £7 million.

G2. Freeman, J. Mindsee, European Commission 7<sup>th</sup> Framework Programme, (2013-2016) Total Award: £330,000.

G3. Freeman, J. CreativeXR and the audience experience, Digital Catapult/Arts Council, (2018-2019), Total Award: £45,000

G4. Freeman, J / i2 media research limited, Performers, Audience of the Future Demonstrators programme, (research consortium, led by the Royal Shakespeare Company) UKRI, (2019-2021) Total Award: £7,500,000

\*All outputs available on request/online

#### 4. Details of the impact (indicative maximum 750 words)

The impact of Freeman’s measure of Immersive User Experience [R1] is best understood in relation to the i2s ongoing work with the creative industries. From 2013 onwards, i2’s methodologies and strategic guidance have supported the development of immersive media content for cultural enterprises; maximising the impact of their creative outputs and delighting audiences. For the companies working with i2, the optimisation of their products, services and performances has led to increased revenue and satisfied customers. For i2, the commissions have led to capital investment, company growth, training and R&D opportunities.

#### Supporting the Creative Industries develop immersive media content with high impact:

i2’s updated metric, released in 2017 [R5], has enabled creative studios to optimise user experience; providing them with the information they need to inform production decisions and pricing strategies. The i2 metric, now marketed as the AIM (Audience Impact Metric) is designed to evaluate users’ experiences of immersive content in the development stages of a project, identifying: (a) which immersive productions deserve priority investment and development support, (b) strengths and weaknesses of productions for different audience segments, and (c) optimal pricing and distribution strategies for each production, based on i2’s bank of benchmarking data that shows what audiences are willing to pay for a given experience.

In 2017-2020, i2 used AIM to conduct over 25 paid for evaluations, with high profile clients including: Royal Shakespeare Company (RSC), Punchdrunk, Marshmallow Laser Feast, Philharmonia, Manchester International Festival, Epic Games, Intel, Magic Leap, Royal National Theatre, Young Vic, and by Arts Council England and Digital Catapult. The goal of these evaluations, successfully met in each case, was to inform the development of creative and cultural content with high audience impact that would generate revenue for the organisations. Clients were typically seeking actionable feedback on how specific productions might be improved (to maximise audience engagement) and evidence to guide (and, in many cases, justify increased) ticket prices [S1, S2].

For example, after first applying our approach to the originally planned live RSC production of *A Midsummer Night’s Dream* (cancelled due to COVID) i2 consulted with the team to inform the production’s pivot to fully digital (premiering Q1 2021) across multiple digital and

location-based 'portals'. In Q3 2020 a pilot activity by project partner Manchester International Festival (with whom i2 media collaborated extensively in measuring audience engagement in relation to its 2019 Festival activities) generated a global audience of 1.6 million people. As a result of i2's engagement, and based on MIF's experience, the premier of the digital A Midsummer's Night's Dream (Q1 2021) is expected to engage and delight diverse global audiences numbering millions.

This quote from Sarah Ellis (Digital Director at RSC, Project Lead of the Audience of the Future Performance Demonstrator) clearly evidences this impact:

"i2 media research's work in the Performance Demonstrator has been transformative. Our Creative Partners and Producers value hugely the insights the application of i2 media's measures provide. For example, they directly led to changes to the creative to improve our Year 1 productions, and formed key components of the creative and digital briefs for the main collaborative Demonstrator production of a digital Midsummer Night's Dream. This is the first time in my experience that external research has had such influence in guiding the decisions my creative and technical teams are making. The research is also guiding the project's commercial planning, informing our distribution and ticket pricing strategies – essential considerations for the sustainability of the sector" [S3].

#### **Informing the commercial strategy of i2's creative partners:**

Between 2013 – 2020, i2's audience engagement tool was used in more than 20 consultancy projects, giving user organisations the insight they need to inform commercial strategies.

Recognising the strategic value of the metric, i2 was invited to join as a key partner, with Nesta, in the Royal Shakespeare Company (RSC) led Audience of the Future (AotF) Performance Demonstrator project in 2019-2021 (£7.5 million UKRI funding). As described above, the application of i2's methodologies directly informed the collaborative development of the project's creative, marketing, distribution, pricing and communications strategies and resulted in a new understanding of end users and value chain. This supported the production of more accessible, compelling, satisfying and engaging immersive media experiences than audiences would otherwise have access to. Further, it does so within the partner organisations - outside of the Demonstrator project.

Sarah Ellis adds, "As further evidence of the impact of Freeman's research, he has presented at RSC's Digital Working Group meetings, resulting in clear links from the research recommendations to new activities RSC are piloting to address our own audiences at home. By supporting RSC in addressing new and existing audiences at home, the impact of Freeman's research stretches far beyond the Demonstrator project through which our collaboration was born" [S4].

Evidencing the wider sector impact of i2's work, UKRI's 'Beyond 2020' Conference (30<sup>th</sup> November 2020) saw Freeman and his i2 media research team partnering with Nesta in an in-depth session guiding the arts and cultural sector's recovery from the pandemic [S5].

#### **Wider economic impacts: revenues to i2 support employment and training opportunities:**

i2 media research limited is Goldsmiths' first spin out business. Founded in 2002, it provides the institution with multiple benefits, including: demonstrating College's investment in enterprise, a model for future enterprise initiatives, and a valuable source of Knowledge Exchange [S6]. Beyond Goldsmiths, and via Freeman, i2 offers industry training, R&D and collaborative opportunities to business partners across the world, who benefit from the company's 18+ years of experience in this field.



The commercial and economic success of i2 is best evidenced by its longevity as a business, the sustainability of its business model, and its capacity to generate revenue and provide employment. Established in 2002, i2 has grown since August 2013, winning contracts worth over £1.8 million (not including academic research income). This revenue has enabled the company to expand its services to meet the needs of industry clients, recruit and train 9 Goldsmiths graduates and support a team of 6 FTE staff [S7].

i2 is committed to supporting its employees and ensuring they are equipped with appropriate skills and industry knowledge, as evidenced by receipt of the Mayor of Lewisham's Business Award for Investment in Skills (2019) [S8]. The career pathways of i2's former employees are an indication of the value of their work at the company, with team members going on to secure positions in highly prestigious global corporations, including Facebook, Google, and Samsung. Jobs in these companies are highly sought after and the success of former staff members can, in part, be attributed to the relevance of their training and experience in i2's methods and approach.

The international impact of i2 on industry more broadly can be measured in terms of training provision, collaborative R&D and the development of international partnerships. The core methodologies that i2 draws on forms the basis of Goldsmiths' first Executive Training short course. Since 2016, 51 attendees from some of the world's leading digital and media agencies and brands (e.g., FMCG brands, Advertising Agencies, Charities, Design Agencies, and others) have participated in the course, developing their skills and knowledge and generating revenue over £45,000 within the REF census period, inclusive of an overhead/marketing fee to Goldsmiths [S9].

Since 2013 and based on i2's reputation in evaluating user experience, Freeman has won over £10 million of funding to support the team's participation in collaborative R&D projects in the UK, EU and China. The funding has supported fantastic international impact, with Freeman being appointed Immersive User Experience Evaluation Ambassador for the EU funded XR4ALL project, and i2's participation in the UK Global Business Innovation Programme virtual mission to the USA to expand the use of the methodology throughout the USA. Of greatest benefit to date, was the translation of i2's AIM to Mandarin for use with Chinese audiences. In Q4 2020, over 1500 audience members to an exhibition of creative immersive productions in Shanghai completed the Audience Impact Metric (Mandarin), and results were co-presented by Freeman and China-PI Dr Pearl Wang at 'Beyond 2020' (3<sup>rd</sup> December 2020) [S10].

#### 5. Sources to corroborate the impact

- S1. **Evidence of impact of AIM on [NESTA/Digital Catapult](#)**: (2018) and [new report published by Digital Catapult](#): (2020) providing multiple citations of i2's impact in the field of immersive user experience evaluation: (see Foreword, P1) [reports]
- S2. **Maximising audience engagement**, i2 media for Digital Catapult and Arts Council England, [Audience Impact Creative XR \(pp 38-42\)](#), (2019) [report]  
[S8 and S9 are evidence of 8 of the productions evaluated using AIM methodology]
- S3. **Impact of Immersive User Experience**, quote 1 from Director of Digital Development at Royal Shakespeare Company [testimony, 30<sup>th</sup> November 2020]
- S4. **Impact beyond Demonstrator project**, quote 2 from Director of Digital Development at Royal Shakespeare Company [testimony, 30<sup>th</sup> November 2020]
- S5. **Wider sector impact, UKRI '[Beyond 2020](#)' conference**, (2020) [event schedule]
- S6. **Freeman appointed [Academic Lead for Knowledge Exchange](#), [Evidence of impact on Goldsmiths Knowledge Exchange](#)** (2019-2022) [website]
- S7. [Confidential report](#): i2 media staff over the period 2014-2020 [report]
- S8. PDF of [Certificate for Mayor of Lewisham's Award for Investing in Skills \(2019\)](#) [award certificate]
- S9. **Engaging global brands, [confidential report](#)** (January 2020) of companies who have attended i2 media's short courses [report]
- S10. [Copy of Presentation Video](#) and see S5, '[Beyond 2020](#)' schedule, Thursday 3 December 2020, (10.40-11.40am) [video]