Institution: Bournemouth University

Unit of Assessment: 32

Title of case study: Enhancing scientific practice and communication, and enabling strategic and financial growth through science-art collaboration

Period when the underpinning research was undertaken: 2014 – 2017

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Vicky Isley	Research Lecturer	2005-2020
Paul Smith	Research Lecturer	2005-2020

Period when the claimed impact occurred: 2016 – 2020

Is this case study continued from a case study submitted in 2014? No

1. Summary of the impact (indicative maximum 100 words)

Bournemouth University (BU) artists Vicky Isley and Paul Smith (boredomresearch) have collaborated with scientists to produce powerful computer-animated artwork which have been exhibited worldwide including the UK, EU, United States, and Korea. The three interdisciplinary art-science research projects developed between 2016-2019 have enhanced scientific practice and improved the communication of science through art. BU research insights have enabled organisations to grow, both financially and strategically. The Biodesign Institute in Arizona used BU research insights to inform a successful USD8,500,000 bid to establish the Arizona Cancer and Evolution Center. Animate projects have benefited from a greater profile and have developed practice in new areas of animation which has allowed them to extend their work internationally.

2. Underpinning research (indicative maximum 500 words)

boredomresearch is a collaboration between BU artists Vicky Isley and Paul Smith, who are internationally renowned for their projects combining art, science and technology. Through high-profile collaborative projects they have created innovative outputs that represent scientific research aesthetically, not only communicating complex data to public audiences, but also leading scientific imagination beyond current research limitations.

Dreams of Mice (2015-2016)
Working with the University of Oxford, Isley and Smith captured data displaying the patterns of neuron activity in sleeping laboratory mice [R1]. Using computer modelling and game engine technology, they developed an innovative artwork in which real-time neuron activity is represented on a three-dimensional (3D) model of brain networks at a microscopic level [R1]. This artwork explores complex neuroscientific research in a form more intuitively understood by experts and non-experts alike [R2].

The project reflects upon the increased control, management and disruption of sleep behaviours by encroaching connective technologies, through illustrating the fragility of brain activity during sleep [R1]. Exhibitions include Mexico City, Glasgow School of Art and California.

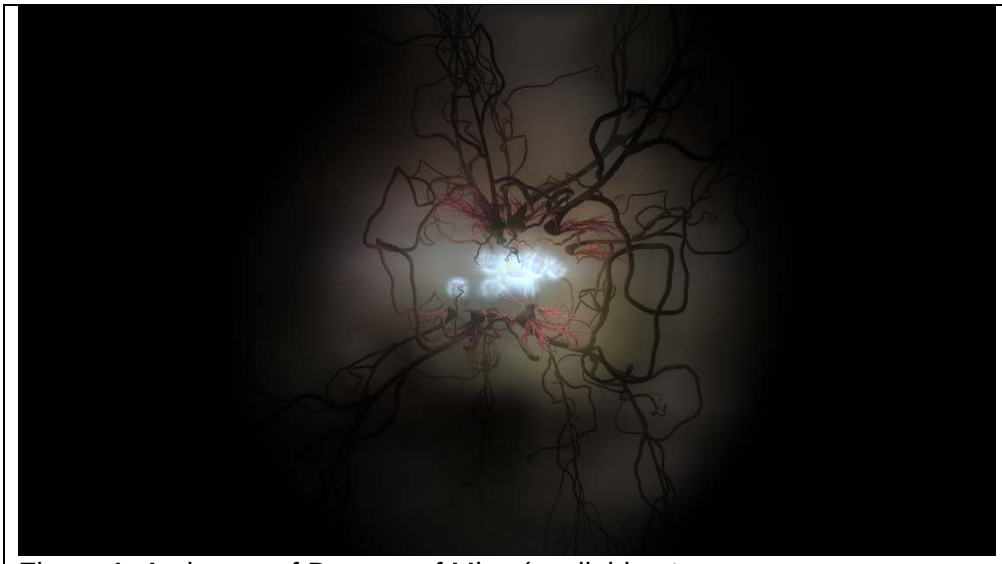

Figure 1: An image of Dreams of Mice (available at: https://boredomresearch.net/wp/portfolio/dreams-of-mice)

AfterGlow (2015-2016)

The Covid-19 pandemic highlights the importance of public understanding of disease transmission. AfterGlow is a real-time digital animation depicting malaria transmission, created under the Wellcome Trust funded Silent Signal programme and established by Animate Projects [R3].

boredomresearch collaborated with Dr Paddy Brock (University of Glasgow) investigating a malaria parasite recently found to jump the species barrier from monkey to human via mosquitoes. As epidemiologists' disease transmission models did not include 'space' in visual representations, Brock hoped to tackle this problem. Isley and Smith used Brock's mathematical data to develop a spatially-sensitive visual representation for AfterGlow; a computer animation that leads the audience on a visual journey through a landscape illuminated by glowing spirals which represent mosquito flight paths and infected blood, thereby illustrating the intimate relationship between disease and its environment [R4].

AfterGlow won the moving image Lumen Prize award in 2016 and has been exhibited all over the world as part of the Silent Signal UK touring exhibition, including: Korea, Holland, USA, Italy, Columbia, Austria and Germany among others.

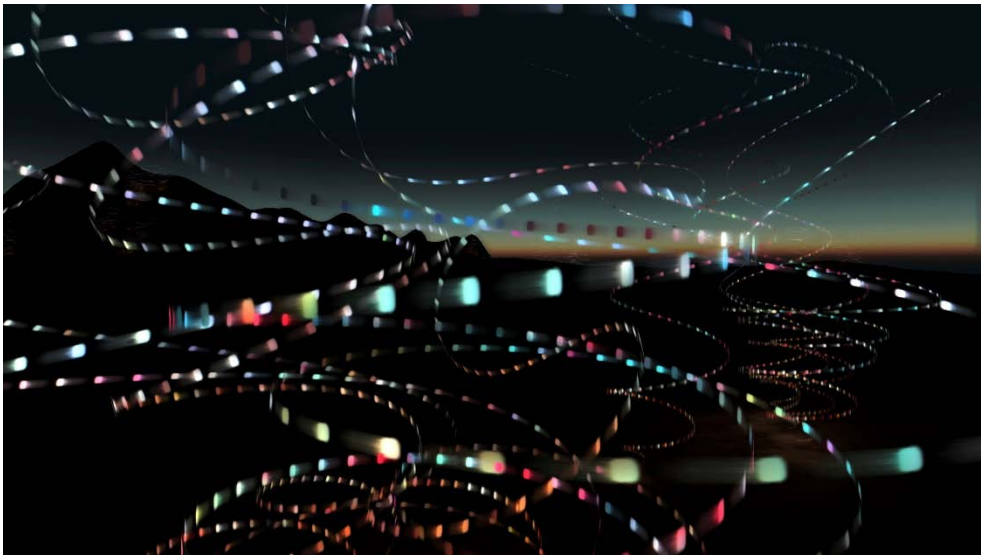

Figure 2: An image of AfterGlow (Available at: https://boredomresearch.net/wp/portfolio/afterglow)

Robots in Distress (2016-2019)
boredomresearch worked with computer scientists Thomas Schmickl and Ronald Thenius (Artificial Life Laboratory, Graz University, Austria) during the creation of the world's largest underwater robot swarm, designed to monitor the heavily polluted Venice Lagoon. Isley and Smith's research explored emotional robotics, highlighting that when addressing significant environmental concerns with technological solutions, the more human capacity for failure must be recognised [R5].

As part of the Future Emerging Art and Technology (FEAT) initiative co-financed by the EU Horizon's 2020 research and innovation programme, Isley and Smith created an animation visualising emotional robotics; depicting a murky underwater world populated by small glowing robots seemingly helplessly navigating the hazards of plastic waste [R6]. Exhibitions took place in the UK, Brussels and Arizona.

Figure 3: An image of Robots in Distress (Available at: https://boredomresearch.net/wp/portfolio/robots-in-distress/)

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

All the following outputs were rigorously peer-reviewed by international expert panels for exhibitions (R1, R3, R6) and publications (R2, R4, R5). R3 was also awarded a Lumen Art Prize, that ranks among the most prestigious recognitions within the Media Arts.

R1. Dreams of Mice (2015) [Exhibition]. Festival of Electronic & Video Art, Mexico City. 2015. https://boredomresearch.net/wp/portfolio/dreams-of-mice/

R2. Isley, V., Smith, P. (2015). Dreams of Mice, Proceedings of the 2015 ACM SIGCHI Conference on Creativity and Cognition, ACM New York, 2015. New York, NY: Association for Computing Machinery. https://dl.acm.org/doi/10.1145/2757226.2757366

R3. AfterGlow (2016) [Exhibition]. Silent Signal Exhibition, London. 2016-17. https://www.silentsignal.org/Collaborations/afterglow/

R4. Isley, V., Smith, P. (2017). Artistic Interpretation of a Malaria Transmission Scenario, Proceedings of the 2017 Electronic Visualisation and the Arts, EVA London, 2017. London, UK: BCS Learning and Development Ltd. https://doi.org/10.14236/ewic/EVA2017.68

R5. Isley, V., Smith, P. (2019). Simulated Despondency for Robots in Distress, Leonardo, MIT Press, 52(1), 71-72. https://doi.org/10.1162/leon_a_01468

R6. Robots in Distress (2017) [Exhibition]. FEAT residency programme in collaboration with the Artificial Life Lab, Graz. 2016. https://boredomresearch.net/wp/portfolio/robots-in-distress/

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

Described as *"the best contemporary arts practitioners"* by the Director of Animate Projects [E1], boredomresearch's innovative work progressing science-art collaboration has produced significant impact for a wide and varied range of beneficiaries.

Enhancing scientific practice

By representing research data in visual, intuitive formats, boredomresearch provided their scientific collaborators with a *"fresh look at their own work"* [E2, p.10], encouraging questions and insights into abstract concepts at the frontiers of research. This positive feedback loop enhances scientific practice.

Scientists at the Artificial Life Laboratory described how working with boredomresearch on Robots in Distress *"surely improved the quality of our work"*; *"they felt like fresh wind, that show[ed] us things, thoughts, views about our own work we did not know"* [E3].

A collaborating scientist described how Dreams of Mice envisions, *"with an astonishing accuracy"*, a fusion of methodologies for displaying neural activity that would help scientists *"get closer to solving the mysteries of the brain and sleep"* [E4].

Dr Paddy Brock (University of Glasgow) describes how Isley and Smith's work on Afterglow advanced his thinking on incorporating landscape into epidemiology models, something his field struggles with: *"It is very difficult to make a model entirely spatially explicit, while at the same time making it quick, efficient and generalisable.[...] It's been really interesting thinking about [Isley and Smith's] approaches in terms of current trends in epidemiology and how space is being incorporated into these models"* [E5, 9:00].

Improving the practice of communicating science through art

Projects from boredomresearch have provided innovative engagement opportunities for the public, in which *"the merit […] is scientific as well as artistic"* [E6, p.29]. Collaborator Dr Brock praised how Afterglow *"had great value in terms of science communication and engagement"* [E6, p.22].

As well as communicating research, the work of boredomresearch exemplifies and promotes the actual practice of communicating science through art. Award panellists commended how *"in AfterGlow art embraces science"* [E6, p.28], providing a *"memorable example of artists employing digital media to its full potential"* [E6, p.28]. Over 3,422,063 engagements from scientists, industry, civil society, policy makers and the public were recorded for the Silent Signal exhibits [E7]. A further 252 people [E8] visited the Robots in Distress exhibition in Arizona in December 2020, where visitors *"gained a greater appreciation of scientific artwork"* and are *"hopeful that exhibitions like this one can be used as an example of how art and science can intersect and demonstrate the social and academic merit of arts based research"* [E9].

Enabling organisations to grow financially and strategically

In 2017, the Biodesign Institute in Arizona invited boredomresearch to share their interdisciplinary research methods and present AfterGlow. The research insights *"played a key role in forming the strategic public outreach documents for a successful bid of over USD8,500,000 from the National Cancer Institute to establish the new Arizona Cancer and Evolution Center"* (ACE) [E10]. Best practice learnt from boredomresearch also led to a funded five-year art-science public communication initiative and a scheme dedicating *"an estimated USD30,000 of funding for the next four years enabling four artists to collaborate with scientists leading to an estimated four new public engagement opportunities"* [E10].

In addition, *"[w]orking with boredomresearch has enabled ACE to establish new and improved working relationships with cultural organisations at a national and international level including the public science education centre - Centre of the Cell, Queen Mary University of London, CDC Gallery (Centre for Disease Control), Atlanta, Georgia and the ASU Art Museum, Arizona"* [E10]. This supported ACE's goal of *"accelerating the progress of scientific research by harnessing creativity and innovation from the arts to create more expansive-thinking scientists and establish wider outreach potential*" [E10].

Animate Projects exceeded their exhibition target audience of 24,000, thanks to Afterglow contributing *"the largest proportion of viewings of all commissioned projects"* [E1]. In Berlin alone, 84,000 viewed AfterGlow at a screening at the Sony Centre [E1]. AfterGlow also helped Animate Projects extend their reach into Asia, with screenings in Korea. This achieved a key strategic objective for the organisation, which has now gone on to lead new SciArt programmes in Asia with Isley as their best practice representative and mentor [E1].

Animate Projects *"invited boredomresearch […] based on their previous work of creating dynamic real-time animation projects influenced by scientific research"* [E1]. These skills and experiences developed the practice of Animate Projects and their capacity for new types of work; *"AfterGlow was the first Animate Projects production that was produced as a live animation installation […] This has supported me to gain confidence in this field and has led onto the development of an XR project with gallery partners in the Midlands"* [E1].

5. Sources to corroborate the impact (indicative maximum of 10 references)

E1. Animate Projects. (2020). Testimonial letter, 17 January.

E2. Berghuber, F., Prem, E. (2017). 'FEAT Report D2.4 - Assessment.' Vienna: FEATArt.EU, pp.1-13.

E3. Berghuber, F., Prem, E. (2017). 'FEAT Report D3.3 - Recommendations.' Vienna: FEATArt.EU, pp.9.

E4. University of Oxford. (2020). Testimonial letter, 30 November.

E5. Silent Signal Animate Projects. (2015). Boredomresearch and Dr Paddy Brock video interviews on AfterGlow. Available at: https://vimeo.com/showcase/3701274/video/148991931

E6. Watson, D. (2017). 'Evaluation Report - SILENT SIGNAL: engaging the public in the science of genetics, cell biology, immunology and epidemiology through the medium of animation.' Derby: Silent Signal, pp.1-53.

E7. Berghuber, F., Prem, E. (2017). 'FEAT Report Final Management Report, Annex 4, dissemination table.' Vienna: FEATArt.EU, pp.26.

E8. Isley, V., Smith, P. (2020). ASU Art Museum Restless Balance exhibition attendance figures, 5-31 December.

E9. Isley, V., Smith, P. (2020). ASU Art Museum Restless Balance exhibition feedback forms, 5-31 December.

E10. Biodesign Institute, Arizona State University. (2021). Testimonial letter, 23 February.