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| Institution: Bath Spa University |
| Unit of Assessment: 35 |
| Title of case study: Multimedia Performance |
| 1. Summary of the impact |

Professor Joseph Hyde's research explores the role of music and sound in a broader performing/digital arts context, through installation and performance works using interactive technologies. Impact is generated through active participation by audience members as a way to embody the research. This work often engages a broader audience than purely music/sound work, reaching the wider arts, creative industries, education and science/engineering communities. Two recent projects illustrate this. *me and my shadow* was commissioned by MADE, a European Commission-funded initiative exploring mobility for digital arts. It ran simultaneously in London, Paris, Brussels and Istanbul, and formed the basis for a European Commission White Paper. *danceroom Spectroscopy* was a collaborative arts/science crossover project, which attracted attention in both arts and science communities. Both projects attracted substantial funding (c. €400,000 and £165,000 respectively), reached large audiences (5000 and 20,000 physical attendees) and had wide press coverage.

2. Underpinning research

Project 1: me and my shadow

me and my shadow was the 2011/12 commission by MADE (Mobility for Digital Arts in Europe), a consortium of four European arts organisations: the Centre Des Arts (Enghien-les-Bains, Paris), body>data>space (London), Transcultures (Mons, Belgium) and boDig (Istanbul). The consortium was commissioned by the European Commission to produce a white paper on arts mobility and co-production over an intensive two-year programme of workshops and public events across Europe, centring on a large-scale digital art commission. Hyde's project won this commission, and explored a unique combination of motion capture and telepresence. It consisted of four installations, one hosted by each of the MADE partners. Each of the installations comprised an innovative motion capture system which captured full 3D information about the users and fed these digital 'shadows' in real time into a virtual space (viewable continuously online) where users from the four geographically-separated installations could meet. The project developed over four two-week residencies between September 2011 and June 2012, one hosted by each partner in their home city. The finished installations ran from 9-26th June 2012 in London, Paris, Brussels and Istanbul. Further details of these installations and residencies are given in section 3 below.

Project 2: danceroom Spectroscopy

danceroom Spectroscopy was initiated by Dr David Glowacki, a computational chemist then at the University of Bristol. Over the year 2011-12 it grew into a larger collaborative project involving three key partners, Dr Glowacki himself, Laura Kriefman (Director, Guerrilla Dance Company), and Joseph Hyde. The key research aim of the project was to produce an accessible visualisation and sonification of the particle systems and behaviours that are the subject of Glowacki's research. The work consisted of an installation in which users were presented as energy fields and given the opportunity to interact with a vast cloud of particles, which exhibited complex behaviours true to particle physics. In addition to producing the sonification for the installation, Hyde acted as a mentor in exploring the artistic possibilities of the project and the 'placing' of it within the digital arts/music world, starting with a week-long workshop for 20 invited artists which he led at the Arnolfini in June 2011. He also proposed and drove the expansion of the installation into a large-scale dome format using six channels of HD video and 8-channel audio. He facilitated the partnering of Glowacki with choreographer Laura Kriefman and a corps of five professional dancers (Kriefman and several dancers took part in the Arnolfini workshop), and with Plymouth University's ICCI (Innovation for the Creative and Cultural Industries). Hyde's involvement culminated in the production of a performance piece using the danceroom Spectroscopy system, entitled *Hidden Fields*. This work, incorporating 5 dancers, was conceived by Laura Kriefman and Joseph Hyde, who also provided the sound design/music for the performance. Both *danceroom*

Impact case study (REF3b)

Spectroscopy and Hidden Fields went on to receive considerable further public exposure, as detailed in section 4.

Position held at Bath Spa University: Joseph Hyde (Senior Lecturer 09/2001 - 11/2011, Professor 12/2012 - present)

3. References to the research

- Practice-Led Research: Hyde, J. (2012) *me and my shadow*. Public installation project consisting of four installations running in four European cities, connected telematically to each other and to a virtual space, also viewable online.
- Glowacki, D., Hyde, J., (2011) *danceroom Spectroscopy*. Public installation. Interactive installation designed for large dome environment with 5 channels of full HD video and 8 channels of audio. Hyde produced all sonic aspects of the installation.
- Glowacki, D., Hyde, J. Kriefman, K. (2012) *Hidden Fields*. Dance media performance based on *danceroom Spectroscopy* interactive technology with 5 dancers, 3 channel video, 4 channel sound. Hyde produced all sound/music.
- Book Chapter: D. R. Glowacki, P. Tew, T. Mitchell, L Kriefman, J. Hyde, L. J. Malcolm, J. Price, and S. McIntosh-Smith "Sculpting molecular dynamics in real-time using human energy fields," in *Molecular Aesthetics*, Prof. Dr. Peter Weibel (ed), MIT Press 2013, ISBN: 9780262018784.
- Conference Paper: D. R. Glowacki, P. Tew, T. Mitchell, J. Hyde, J. Price, and S. McIntosh-Smith, "danceroom Spectroscopy: Interactive quantum molecular dynamics accelerated on GPU architectures using OpenCL," UK Many Core Development Conference 2012 (UKMAC '12)
- Evidence of Quality: The book chapter and conference paper have been through a rigorous peer-review process. Hyde was commissioned by MADE/European Commission for *me and my shadow* after a competitive application process. *danceroom Spectroscopy* was awarded a prize by the Royal Television Society (2012, Best Digital Innovation) and a Mention from Prix Ars Electronica (May 2012, Hybrid Arts category).

4. Details of the impact

Project 1: me and my shadow

- 1) Impact on public audiences. The project reached non-traditional arts audiences through participatory experience in venues such as the National Theatre foyer (during their 'Inside Out' festival) and the Galleries Royales Saint-Hubert in Brussels (a busy shopping street in the very centre of the city).
- 2) Education. Both the Centre de Arts and the National Theatre had extensive school visit programmes, covering all age groups.
- 3) Impact on other practitioners (across music, digital arts, technology and creative industries sectors). The four project residencies directly involved over 100 participants (as listed in the MADE white paper), and were designed to engage local arts and technology communities through talks, workshops, 'hack days', and process showings to share technical and aesthetic developments arising from the research.
- 4) Technical innovation. The installation was a worldwide first in combining full-body Kinect-based motion capture with telepresence, and as such attracted considerable attention from the tech sector, as evidenced by exposure in Microsoft (manufacturers of the Kinect) in-house publications and tech TV shows such as BBC Click and BBC Arabic 4Tech.
- 5) Influence on public policy. The MADE project was funded in part by the European Commission, and its findings on Artist Mobility in the Digital Arts were presented in the form of a white paper (details below).

Indicators

- Footfall for the four (single-user) installations conservatively estimated at around 5000 visitors.
- The *me and my shadow* website blog recorded just under 3500 discrete visits during the exhibition period.
- Visitor feedback was overwhelmingly positive – a small number of the thousands of comments collected can be found at <http://madeshadow.wordpress.com/feedback>

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- The MADE White Paper was presented to the European Commission by lead author Philippe Baudelot at a public event at Europe House, London, on 19/09/12. <http://www.wemade.eu/fr/wp-content/uploads/maquette.pdf>
- A multimedia exhibit based on *me and my shadow* was presented in Europe House's 12 Star Gallery from 19–28/09/12.

Selected Press

- Feature on BBC Click (BBC World Service) 19.06.12. BBC World Service audience estimated as up to 166 million. <http://www.bbc.co.uk/programmes/p00t7x3x> (11:30-17:30).
- Feature on BBC Arabic 4Tech, 20.06.12. BBC Arabic audience estimated as up to 32 million.
- Article in El Pais Technology section, 21.06.12. El Pais total readership estimated as up to 7.7 million. <http://blogs.elpais.com/arte-en-la-edad-silicio/2012/06/cuatro-portales-para-entrar-en-un-mundo-virtual.html>.
- Article in *Beaux Arts* magazine, Issue 336 (June 2012), pp. 40–42. (59,856 sold monthly).
- Article in *Telerama*, 06.06.12 (691,337 sold weekly).
- Article in *Regards sur le Numérique* (Microsoft Europe Magazine): <http://www.rslnmag.fr/post/2012/06/14/DIstanbul-a-Paris-un-corps-a-corpsnumerique.aspx>
- Article in *Stylus* magazine online (June 2012).

Funding

The MADE project attracted c.€400,000 in funding. The majority came from the European Commission, but other matched funding came from the Arts Council of England, the National Theatre, the City of Mons, The City of Enghien-les-Bains and The Brussels-Wallonia Federation.

Project 2: danceroom Spectroscopy

1) Impact on audiences. To date, over 20,000 people have attended *danceroom Spectroscopy* and *Hidden Fields* events. Web statistics show over 40,000 hits for related content, and Googling 'danceroom spectroscopy' gives more than 200 pages of hits. Notable live events include:

- Shambala Arts Festival (27-28 August 2011)
- Bristol's Arnolfini (21-22 July 2012)
- London 2012 Cultural Olympiad, Weymouth (4-5 August 2012)
- London's Barbican Arts Centre (3-4 November 2012)
- London's Big Bang science/engineering fair (14-17 March 2012)
- Watershed danceroom Spectroscopy festival, Old Passenger Shed, Bristol Temple Meads (24-26 October 2013)

A recently awarded grant from the Arts Council of England, along with additional funding from NVIDIA will facilitate further development and a Europe-wide tour from Autumn 2013 to Spring 2014. Confirmed dates include the Barbican (01-02.03.14) and the Zentrum für Kunst und Medientechnologie (Karlsruhe, 04.01.14).

2) Education. Both the Centre de Arts and the National Theatre had extensive school visit programmes, covering all age groups. The Big Bang fair has an explicitly educational role.

3) Impact on other practitioners. *danceroom Spectroscopy* and *Hidden Fields* have had substantial impact on our non-academic collaborators. Laura Kriefman (choreographer) has enjoyed significant exposure, with invitations to conduct workshops with institutions including the Royal Academy of Dance (London) and Northern Ballet. Phill Tew (programmer) has boosted his international reputation as a generative digital artist. He was awarded a Watershed Pervasive Media Studio residency, which led to his participation in other high profile projects such as the REACT project *The Secret Lives of Books*. Nathan Hughes and Jacob Parish (film-makers) produced a series of documentaries on the project. One of these was shortlisted for a \$100,000 Forward Focus prize sponsored by GE. The five dancers have gained valuable experience at the collaborative frontiers of art and science, and learnt strategies for incorporating technology into arts practice.

4) Technical innovation. *danceroom Spectroscopy* represents the first ever real-time 360°, 3D depth-capture system, and has yielded a state-of-the-art GPU accelerated framework for carrying out quantum molecular dynamics. The latter has attracted interest from science and computing communities, indicated by a sponsorship relationship with leading graphics-card manufacture NVIDIA.

Impact case study (REF3b)

5) Commercial impact. On the basis of the technical innovations developed through this project, David Glowacki, Phill Tew and and Laura Kriefman have formed a spin-off company, Interactive Scientific Ltd. with a projected turnover of £100k during 2013 – 2014.

6) Broader cultural impact. *danceroom Spectroscopy* was highlighted by the newly appointed Arts Council England chair, Sir Peter Bazalgette, during his inaugural lecture in March 2013. The project's impact has been strengthened considerably through connections to Bristol's Pervasive Media Studio (Watershed) and Arnolfini Art Gallery. The Watershed has used danceroom Spectroscopy as a Talent Development Case Study detailing successful examples of cross-fertilization between media organisations and the academic sector, and built their 2013 showcase event around it.

Indicators**Awards**

- Royal Television Society 2012 'Best Digital Innovation'.
- Mention, Prix Ars Electronica (Hybrid Arts category), May 2012.
- University of Bristol 2013 public engagement award.
- On the basis of his work on danceroom Spectroscopy, Glowacki won a nine-year Royal Society Kohn Award 'for excellence in engaging the public with science', starting October 2013.

Selected Press

- Chemistry World: <http://www.rsc.org/chemistryworld/News/2012/March/danceroom-spectroscopy-video-science-art-visualisation.asp> (readership 45,000)
- Physics World: <http://physicsworld.com/cws/article/multimedia/2011/nov/01/dancing-in-the-quantum-world> (readership 110,000)
- Spark Salon: <http://spark.qualcomm.com/salon/escaping-uncanny-valley>
- Newsletter of the Society for Applied Spectroscopy: <http://danceroom-spec.com/wp-content/uploads/2012/03/SAS-Feb2012.pdf>

Funding

Orr-Ewing, Ashfold, et al, New Horizons in Chemical and Photochemical Dynamics, EPSRC EP/G00224X/1, 2008-13, £5,934,426

Glowacki, Ashfold, et al., danceroom Spectroscopy: collectively generating music from movement, EPSRC, EP/I017623/1 £20,000

Glowacki, EPSRC Pathways to Impact Funding, University of Bristol, £37,000

Glowacki, Arts Council England, £57,234

Glowacki, NVIDIA Academic Partnership Grant, £10,000

Glowacki, Artist residency from Bristol Arnolfini, £19,500

Glowacki, New Talent Residency from Bristol's Pervasive Media Studio, £17,500

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

me and my shadow

1. Individual: MADE concept, editor in chief of the MADE white paper (Consultant).
2. Individual: Creative Director, body > data > space, London
3. Individual: Lead Digital Creative, National Theatre, London
4. Click, BBC World Service, 19 June 2012, <http://www.bbc.co.uk/programmes/p00t7x3x>
5. Report: Bosco, R. and Caldana, S. (2012) 'Cuatro portales para entrar en un mundo virtual'. News: El Pais, 21 June 2012: <http://blogs.elpais.com/arte-en-la-edad-silicio/2012/06/cuatro-portales-para-entrar-en-un-mundo-virtual.html>.
6. Report: MADE White Paper: <http://www.we-made.eu/fr/wp-content/uploads/maquette.pdf>

danceroom Spectroscopy

7. Individual: Researcher, University of Bristol, danceroom Spectroscopy concept
8. Individual: Artistic Director, Bristol Old Vic
9. Report: Perks, S. (2012). 'Molecular dance set to make waves across the pond', *Chemistry World*, 5 March 2012: <http://www.rsc.org/chemistryworld/News/2012/March/danceroom-spectroscopy-video-science-art-visualisation.asp>
10. Report: 'Dancing in the Quantum World', *Physics World*, 1 November 2011: <http://physicsworld.com/cws/article/multimedia/2011/nov/01/dancing-in-the-quantum-world>