Institution: Arts University Bournemouth

Unit of Assessment: 34 – Art and Design: History, Practice and Theory

Title of case study: Glowing Pathfinder Bugs: an interactive art project

1. Summary of the impact

The project impacts by connecting people with technology through an interactive art project. Portable equipment ensures wide participation: people respond to, and interact with, virtual living creatures in an entertaining but instructive context. Bringing together human participants (able to intervene in the environment) with the virtual bugs (responsive to stimuli/their environment), people are challenged to consider cause and effect in the physical environment as well as their own inter-social relations. The impact which is cultural, imaginative and pedagogic is achieved through touch rather than via the normal emphasis on the communicated world.

2. Underpinning research

Since 2007, Liam Birtles (Senior Lecturer in Digital Media Production at AUB) has been a member of the four-strong Squidsoup, an international group of artists, researchers and designers working with digital and interactive media experiences. Squidsoup was founded in 1999 by Anthony Rowe (now Associate Professor, Interaction Design at Oslo School of Architecture and Design); Rowe led the research that resulted in *Glowing Pathfinder Bugs* (henceforth GPB) At the time Rowe was Senior Lecturer at AUB (2005-2008); as holder of an AUB Research Fellowship (2007-8) he was able to purchase a Point Grey Bumble-Bee 2 Stereo camera which was used to devise GPB. Birtles was the key collaborator in furthering the research and targeting it to more ambitious outputs and greater impact. He remains a central member of Squidsoup and the only one working in a UK HEI. Recent research has led to the replacement of the earlier technology through the use of Microsoft Kinects; this has led to new and more sophisticated outputs and wider research, as evidenced by *Living Timeline*, an interactive evolutionary timeline *(*shown at At-Bristol from April 2012 to date).

The research question asked how to create a transportable environment where participants might collaboratively engage with (and attempt to control) responsive elements in a highly tactile, multisensory, spatial environment. Sand, a malleable material that most children are familiar with, was selected as the interface for GPB, because it fulfils a vital role in harnessing kinaesthetic intelligence, thus allowing for creative, dynamic, spatial interaction. While The Tangible Media Group at MIT had also explored the use of malleable materials like sand as interface, their application and technical methods are different from GPB. Other digital art installations such as Dew Harrison's *Shift-Life*, a modelled Darwinian eco-system, also focuses on emergence but through illustrating evolutionary, artificially intelligent processes that take account only of pre-defined meta-interactions rather than direct interaction with, and responses from, individual creatures. GPB is unique in using sand as the primary mode of synchronous communication between participants and virtual creatures. This creates a direct and understandable, though somewhat unpredictable, form of interaction. Furthermore, the research directly maps the real and virtual worlds onto each other: this is in stark contrast to the majority of augmented reality or even general metaphor-based interfaces, where a positional jump is required.

The nature of this research is that it evolved developmentally from previous projects authored by Squidsoup (see below) drawing in particular on *Freq2* (2006), where participants' silhouettes are used to define the leading edge of an extruding virtual landscape. In GPB, however, the physical landscape is mapped directly into virtual space; any changes to the physical topography of the sandpit are immediately mirrored in the virtual environment. This research continues to evolve; for example in iterations such as *Pest Control* (2010); and *Living Walls* (shown at the RSC 2012) and therefore has future potential for further significant impact.

3. References to the research

References not available online can be supplied by Arts University Bournemouth on request.

1. Randell, C. and Rowe, A. (2006). Come closer: encouraging collaborative behaviour in a

multimedia environment. *Interactive technologies and sociotechnical systems*; 13th International Conference. Vol. 4270 pp. 281-9. www.cs.bris.ac.uk/Publications/Papers/2000601.pdf (DOI 10.1007/11890881_31)
2. Rowe, A. and Birtles, L. (2010). Glowing Pathfinder Bugs: a natural haptic 3D interface for interacting intuitively with virtual environments. *Leonardo.* Vol. 43 No. 4. pp. 350-8. http://www.squidsoup.org/blog/wp-content/uploads/2011/08/LEON-ROWE-BIRTLES-43-4.pdf
3. Portable Pixel Playground. *(2008). Portable Pixel Playground. [online]. Available from* http://www.portablepixelplayground.org/playground/glowing-pathfinder-bugs-2008
4. Up Projects. (2010). [online]. Contemporary art at festivals. Available from: www.upprojects.com/portfolio/commissions/contemporary-art-at-festivals-2010/23
5. At-Bristol. (2012). [online]. Living Timeline. Available from www.atbristol.org.uk/ourworld.html?searched=our+world&advsearch=oneword&highlight=ajaxSearch_highlight+ajaxSearch_highlight1+ajaxSearch_highlight2
6. Royal Shakespeare Company. (2012). [online]. Squidsoup Living Walls. Available from www.rsc.org.uk/whats-on/exhibitions/squidsoup-living-walls.aspx

4. Details of the impact

Without the underpinning research, undertaken at AUB in the mid-2000s, GPB would never have come about and there would have been no impact. The significance and reach of the impact are evidenced as follows: GPB was commissioned in 2008 by Folly, a leading digital arts organisation, for Portable Pixel Playground supported by the Lottery Fund and other arts organisations. It encouraged young people to use everyday technologies in new and creative ways and helped to combat the stereotype that playing with technology is a solitary experience.

At time of writing, GPB remains the lead activity shown on their website and includes interviews with children and adults. Portable Pixel Playground travelled round North West England developing a digital audience and 'exceeding expectations and targets'. The research was validated professionally when GPB was accepted by Siggraph for the 37th convention and exhibition on computer graphics and interactive technology in 2010.

There followed in 2011 exhibitions at the Dowse Gallery (New Zealand); Maker Faire, Newcastle; Art Rock, St Brieuc; and Scopitone, Nantes. Scopitone is a trans disciplinary festival mounted by Stereolux and appealing to a large eclectic audience. GPB attracted a YouTube audience and was a great hit, described online as: 'Une Installation vraiment marrante - un gros bac à sable avec des bestioles dedans - et qui stupéfie les petits enfants !!'

The varied locations from techno-fairs and arts centres to rock and film festivals and from theatres to children's play areas, has resulted in considerable impact. Whereas the piece was originally researched and designed specifically to engage children with technologies, its popularity is connected to its playfulness, relative low cost and simplicity of installation, combined with its versatility. Science and technology centres like At-Bristol where a more sophisticated iteration of GPB opened in 2012 as 'Living Timeline', are part of the growing investment in science and technology learning through participants' direct experience and entertainment.

The At-Bristol piece exemplifies the impact of the GPB technology and builds on it to create a 4.6 m physical timeline at the main entrance to the Museum that combines a long table/timeline containing objects relevant to the environment, augmented with projected interactive creatures that will respond to being petted, picked up and splatted. It brings the last 460 million years of evolutionary development to life, with creatures ranging from spiders and snails, through ammonites and trilobites to dinosaurs inhabiting a Mixed Reality ecosystem. It is part of a permanent exhibition '*Our world – no more waste'* explores the Earth's systems and history and finds ways to make the incredible information accessible to visitors from two to eighty. The creatures are projected onto a physical 3D landscape. As with GPB, creatures sense the presence of visitors through the use of Kinect stereo camera sensors, and they respond accordingly by disappearing, running away, or crawling up your arm. In a sense, therefore, the impact of the entire museum experience will be preluded by this interactive piece.

Impact at these events is enhanced by the researchers' direct engagement with the users in discussion sessions as at Dowse Gallery (where they were described as 'ingenious and imaginative artists'). Squidsoup's 2012 commission for the RSC builds further on the GPB research to produce walls alive with a living wallpaper of animated texts which when touched will scuttle off like insects engaging participants in the ephemerality and the eternal presence of Shakespeare's work. The work was seen by an estimated 25,000 members of the public.

The beneficiaries of the research undertaken by Birtles as part of Squidsoup are: adults, children and anyone with an interest in discovering more about spatial relations, socialisation, ecology, cultural engagement, and science and technology in a digital age. The potential for this kind of approach to physical interface design is huge. The use of 3D cameras in computer interfaces is expanding, though current usage generally focuses on tracking and analysis of body movement and gesture. The research undertaken for GPB opens up possibilities for using similar technologies for analysing topography / surface shape. The organisations that have commissioned and exhibited GPB and related pieces have extended their audiences and been endowed with new ways of outreach and communication. The works impact through being immersive and interactive, family-friendly and playful, sociable and generative of communication; all the video footage of GPF indicates high levels of visual focus, manual engagement and verbal communication.

5. Sources to corroborate the impact

(i) Sita Trust. (2012). Annual report 2012: a year to celebrate. p.24/25. [online]. Available from http://www.sitatrust.org.uk/documents
Corroborates claims for engagement from a wide demographic and learning through participants' direct experience and entertainment

(ii) The Folly Trust, Trustees' report and financial statements for the year ended 5 April 2009 and for year ended 5 April 2010.
http://www.charity-commission.gov.uk/Accounts/Ends32/0000328232_AC_20090405_E_C.PDF
Corroborates claim for audience engagement in North West England; development of digital audience; exceeding expectations and targets.

(iii) Ecotec Research and Consulting Ltd. (2010). Playful ideas research summary. *Big Lottery Fund Research*. No. 59. pp.10-11.
www.biglotteryfund.org.uk/research**/-/media/.../**playful_ideas_**eval.ashx**
Corroborates claim for new and unique play opportunities; new ways of outreach and communication; high levels of visual focus, manual engagement and verbal communication**.**

(iv) Statement from Head of Audience Insight, RSC
Corroborates claim for audience viewing exhibition, which in turn supports claim for diverse audience and new ways of outreach.

(v) You Tube clip http://www.youtube.com/watch?v=qaykKzI8XzE
Corroborates claim for development of You Tube audience; video footage indicates high levels of visual focus, manual engagement and verbal communication; amazing the grandchildren quote.

(vi) At-Bristol website http://www.at-bristol.org.uk/1493.html
Includes statement from Dan Bird, At-Bristol's Exhibition Director, which corroborates claims for extending audiences; new ways of outreach and communication; and growing investment in science and technology learning through participants' direct experience and entertainment.