

<b>Institution:</b> University of Hertfordshire
<b>Unit of Assessment:</b> Panel D (35): Music, Drama, Dance and Performing Arts
<b>Title of case study:</b> <i>Plenum</i> : Projecting music and science into the light
<p><b>1. Summary of the impact</b> (indicative maximum 100 words)</p> <p><i>Plenum</i> is an algorithmic work composed by Rob Godman in 2010 as part of a collaborative art-music installation. It was performed six times between 2010 and 2013 at sound and light festivals in Poland, Estonia and the UK, at the Cambridge Music Festival, and at an Australian contemporary arts venue. Audiences totalling over 240,000 heard the work, with website visitors extending its reach to over 300,000; the Durham Lumiere alone, of which <i>Plenum</i> formed an integral element, created an estimated £4.3 million for the local economy. Festival and arts curators have described <i>Plenum</i> as ‘thought provoking’ and ‘inspiring’.</p>
<p><b>2. Underpinning research</b> (indicative maximum 500 words)</p> <p>Rob Godman, Senior Lecturer then Reader in music since 2005, composed an early version of <i>Plenum</i> in 2010 as part of a collaborative sound and light project with Professor Simeon Nelson (Art). The entire work was substantially revised in 2011.</p> <p><b>Algorithmic Composition</b></p> <p>The starting point was a 2-dimensional animated physics model on which the visual element was to be based. The original concept was for an algorithmic projection to ‘drive’ the audio, with the intention that the audio and visual elements should be perceived by an audience as being generated in real-time – i.e., for the art/sound work to be ‘live’.</p> <p>Godman and Nelson ‘storyboarded’ the work’s macrostructure, and the microstructure was then generated algorithmically, closely linked to the physics models. Working with artist/programmer Nick Rothwell, the collaborative team developed a networked system (programmed by Rothwell in Field) whereby the visual component sent data to audio (programmed by Godman in Max). Synchronisation was dealt with straightforwardly; but, more pertinently, there was real-time control of all other musical elements.</p> <p>As all of <i>Plenum</i>’s creators are time-based artists, the musical work’s strength lies in its convincing musical shape. The structure was created by the composer on the macro level, but its microstructure (down to the parameter settings of the software synthesizers) was generated via the moving image, performing the function of a real-time graphic score. This made each iteration of <i>Plenum</i> unique, the relationship between sound and image being taken far beyond superficial issues of synchronisation.</p> <p><b>Site Specifics</b></p> <p>As <i>Plenum</i> was to be performed at light festivals in Toruń (Poland), Tallinn (Estonia) and Durham (UK), Godman developed a multi-channel audio system that could be easily adapted to each outdoor site’s unique acoustic space. Allowing for, and making use of, the reflective qualities of the surroundings, the system was not restricted to specific loudspeaker configurations but was instead customisable, taking into account audience positioning, and particularly the likelihood that festival-goers would be moving about.</p> <p>A loudspeaker rig was developed that was capable of projecting the sound in an outdoor environment with the best possible fidelity. The software for <i>Plenum</i>’s musical component – written by Godman for this project – allowed the audio to be customised, mixed and fine-tuned for the space available at each site, making a unique listening experience every time. This allowed the composer to develop the aesthetic behind the audio whilst simultaneously achieving a technical realisation.</p>

## Sounds

Using a variety of hybrid synthesiser techniques, the software generated sounds varying from simple sinusoids – perceptibly difficult for an audience to localise – to complex noise, which permits accurate and perceivable point-source localisation. The work’s algorithmic nature meant that the sounds were subject to constant change, and were not predictable. Given that the visual part of the artwork was partly informed by Nelson’s conversations with Durham University astrophysicist Revd Professor David Wilkinson, the sinusoids, which mimicked early synthesis techniques from the 1960s, were an apposite, tongue-in-cheek reference to the sound-world of science-fiction movies of this period.

Since 2010, *Plenum* has been performed on six occasions. It is site-specific as a result of the customisable sound and image projection systems created by the team, combined with the uniqueness of the venues. The venues’ surroundings were chosen with their natural acoustic in mind (perceived aurally and visually) – the music ‘playing’ and intervening with the natural reflections large structures produce. The point-source localisation techniques allowed an audible understanding of the surroundings. The ‘purpose’ of the building (sacred, public meeting place, etc) was explored and combined with the electronic acoustic (models of Gothic cathedrals, ‘sacred’ domes), sometimes matching the visual surrounding and at other times being contradictory. These acoustics became composed spaces.

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

#### Output

Nelson, S., Godman, R. and Rothwell, N. *Plenum*. 2011 (Computer-generated real-time architectural sound and light projection.)

#### Performances:

August 2010: Sound and light projection presented on Collegium Maximum Façade, Toruń, Poland. Skyway ’10 Festival. This was an early version of *Plenum*, substantially revised in 2011.

August 2011: Sound and light projection presented on Church of the Holy Spirit, Toruń, Poland. **Lux Scientia**, Skyway ’11 Festival.

September 2011: Sound and light projection presented on Tallinna Raekoda, Tallinn, Estonia. **Lux Scientia**, Valgus Festival

November 2011: Sound and light projection presented on St Oswald’s Church, Durham. **Lux Scientia**, Lumiere (produced by Artichoke Trust)

June–July 2012: Gallery presentation, Kick Arts, Centre of Contemporary Arts, Cairns, Australia.

November 2012: Sound and light projection presented on King’s College Chapel, Cambridge, Cambridge Music Festival.

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

#### Reach

*Plenum* was presented on six occasions in Europe and Australia between 2010 and 2012. As a site-specific public work, each time it was projected onto different buildings and surfaces the acoustic of the space created a unique sound-world. Festival and event curators confirm that, over the six performances, the installation was experienced by over 240,000 people; if website visitors are included, this rises to well over 300,000. *Plenum* was also discussed by resident artists and scientists at ‘round tables’ held by each festival, and at a culminating symposium in London.

Three performances – at Toruń (Poland), Tallinn (Estonia) and Durham – came under the Lux Scientia umbrella, described as ‘a major collaboration and international dialogue’ between the

three light festivals. Three artists were each commissioned to create an installation inspired by discussions with a scientist about the scientific and aesthetic aspects of light. The organisers reported that the resulting performances attracted a total of 240,000 visitors to the three festivals, and generated over 500 press, online and TV/radio features. The festivals' combined reach was further extended by 125,980 website visitors and 2,294 views of the Lux Scientia micro-site. The UK curatorial team, the Artichoke Trust, drew 150,000 visitors to the Durham Lumiere alone, significantly more than the other two light festivals combined. Durham County Council estimated that the Lumiere generated £4.3 million for the local economy.

Figures are unavailable for the Skyway '10 festival performance (Poland, 2010), but two other *Plenum* performances saw audiences of just over 2,000 each: KickArts Contemporary Arts in Cairns, Australia reported 2,100 visitors over June and July 2012; while the Cambridge Music Festival (November 2012) attracted an audience of around 2,500 over the two-night projection onto King's College Chapel. Again, the work's online presence extended the audience, with almost 3,300 Youtube views (in aggregate) of six videos of *Plenum* posted at various times between early 2011 and July 2013.

### Significance

Festival curators have commented on *Plenum's* significance and its reception by audiences. Mário Caeiro, Toruń curator and the work's original commissioner, described *Plenum* as 'thought provoking and exciting', noting in particular that: 'The adaptation of sound to visual concept, as well of the sound and image concept to a building (taken as peculiar kind of canvas), was of course a way to let art become truly important . . . for the public to be "there", at the artistic event, becomes truly a cognitive experience.'



After the King's College performance, part of the 2012 Cambridge Music Festival, the festival's director said of the installation's musical aspect that:

*Plenum* . . . appeals on many levels: from the scientists' awareness of particles amassing and breaking up, to the modern beauty and clarity of the narrative inspired by the stories and science of creation. Popular culture does not always demand much from its audiences but *Plenum* had that broad appeal but also demanded concentration and for people to allow themselves to be absorbed into the ever-changing sound and projection.

On another occasion, he described the festival as something that combined 'music, education and technology . . . and really what *Plenum* is about is trying to bring together at least the music and technology aspects'.

This performance also created press interest from sources as diverse as *Gramophone*, technology publication *Cabume*, the BBC, and student newspapers *Varsity* and *The Cambridge Student*. The latter reported that 'many King's students appeared to enjoy the show, despite not seeming to know what it was about', and included humorous impressions alongside more considered observations: '*Plenum* starts as a grid of dots of light that slowly, but with increasing energy, merge together, decay and vanish in time with pulsating music and 'alien sounds' which made one King's student comment: "it sounded like the world was ending".'

The installation's Australian curator reacted positively to the work:

The combination of the sounds and the visual made that I felt I was WITHIN the work; there were no boundaries between sound, visual and myself, it was an experience of being entirely "present", all "thought" becoming "non-thought" . . . I found the work utterly inspiring.

## Longevity

*Plenum's* sound-world is now migrating from public art to concert-hall performance, in which the visuals will be projected inside the buildings rather than onto exteriors. In this form, it has been booked for three separate music events during 2013/14: the Huddersfield Contemporary Music Festival (November 2013), Frome Festival (July 2014) and the Kings Place experimental and multimedia group of concerts, London (January 2014). This shift demonstrates that *Plenum* has succeeded as a customisable piece, capable of presentation in a wide range of environments and able to reach different audiences.

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

### Report

'Lux Scientia: A European Collaboration', 2012. Vital Statistics from the three European Light Festivals, compiled by Helen Marriage and Nicky Webb (Lumiere, Durham); Przemysław Draheim (Skyway Festival, Toruń); and Indrek Leht (Valgusfestival, Tallinn), 12pp.

### Selected Media Coverage

'Durham Lumiere festival "attracts over 150,000"', BBC News Tyne & Wear, 21 November 2011. <[www.bbc.co.uk/news/uk-england-tyne-15826943](http://www.bbc.co.uk/news/uk-england-tyne-15826943)>

'Durham's Lumiere festival of light "brought in £4.3m"', BBC News Tyne & Wear, 11 April 2012. <[www.bbc.co.uk/news/uk-england-tyne-17674458](http://www.bbc.co.uk/news/uk-england-tyne-17674458)>

Anthie Karavaggelis, "'Plenum' light show illuminates Kings Chapel, but is too "artsy fartsy" for some', *The Cambridge Student*, 22 Nov 2012, p. 9. Available from TCS downloads page (Michaelmas Issue 9 2012): <[www.tcs.cam.ac.uk/download/](http://www.tcs.cam.ac.uk/download/)>

'King's College Chapel illuminated for Cambridge festival', BBC News Cambridgeshire, 16 November 2012. <[www.bbc.co.uk/news/uk-england-cambridgeshire-20359362](http://www.bbc.co.uk/news/uk-england-cambridgeshire-20359362)>

Justin Lee, 'Joining the dots – Technology and music meet at Cambridge Music Festival', *Cabume* <[www.cabume.co.uk/blog/joining-the-dots-technology-and-music-meet-at-cambridge-music-festival.html](http://www.cabume.co.uk/blog/joining-the-dots-technology-and-music-meet-at-cambridge-music-festival.html)>

'Light fantastic music show to entertain city', *Cambridge News*, 6 November 2012, <[www.cambridge-news.co.uk/News/Light-fantastic-music-show-to-entertain-city-06112012.htm](http://www.cambridge-news.co.uk/News/Light-fantastic-music-show-to-entertain-city-06112012.htm)>

### Video

*Plenum* video, including interview with Justin Lee, Cambridge Music Festival Director, November 2012. Available on the Cambridge Music Festival website: <[www.cammusic.co.uk/watch.html](http://www.cammusic.co.uk/watch.html)>

Several videos of *Plenum* are available on Youtube (including viewing statistics):

Toruń Skyway 11 (2011): <[www.youtube.com/watch?v=rCsirsXCEPU](http://www.youtube.com/watch?v=rCsirsXCEPU)>

Durham Lumiere (2011): <[www.youtube.com/watch?v=YkGaUd3D\\_bQ](http://www.youtube.com/watch?v=YkGaUd3D_bQ)>

Toruń Skyway 10 (2010): <[www.youtube.com/watch?v=cysjxHzCoh0](http://www.youtube.com/watch?v=cysjxHzCoh0)>

### Institutional Corroboration

Contact details are supplied separately for representatives of the Torun Skyway Festival, Cambridge Music Festival and KickArts Contemporary Arts, who provided comments and visitor statistics cited in section 4.