

## Impact case study (REF3b)

<b>Institution: Birmingham City University</b>
<b>Unit of Assessment: UoA 35 Music, Drama, Dance and Performing Arts</b>
<b>Title of case study: Case Study 1: Integra - Fusing music and technology</b>
<p><b>1. Summary of the impact</b> (indicative maximum 100 words)</p> <p>Integra was a €3.1M international research collaboration led by Birmingham Conservatoire and funded by the Culture programme of the European Union. It brought together fourteen new music ensembles and research centres across Europe and Canada between 2005 and 2012. Integra achieved impact along three axes:</p> <p><b>Technology</b> was transformed through Integra Live, a new application for live interactive music production and through the modernisation of electronic components for musical works from obsolete to sustainable technologies;</p> <p><b>Culture</b> was enriched through the commissioning of 16 new musical works with live electronics receiving over 50 international performances;</p> <p><b>Education</b> was enhanced through the Integra “curriculum pilot”, a programme establishing a culture of live electronics pedagogy in music higher education institutions.</p>
<p><b>2. Underpinning research</b> (indicative maximum 500 words)</p> <p>The Integra project forms a foundational part of the research programme of <a href="#">Integra Lab</a> at Birmingham Conservatoire, an internationally recognised research centre directed by Lamberto Caccioli and Jamie Bullock, focused on enhancing creativity and artistic practice through a user-centred approach to interactive technologies. The position of Integra Lab as research centre within a music conservatoire facilitates a practice-based approach, enabling continuous engagement with professional musicians and public concerts – criteria essential to achieving high levels of artistic and public impact.</p> <p>Integra seeks to address two widely acknowledged problems in live electronic music practice:</p> <ol style="list-style-type: none"> <li>1. Many musicians are unable to work with live electronics because of technological complexity</li> <li>2. It is impossible to perform many works in the live electronics repertoire because of technological obsolescence</li> </ol> <p>In response to these problems Integra Lab has assembled and led a team of researchers from the Sonic Arts Research Centre (SARC, UK), Institut für Elektronische Musik und Akustik (IEM, Austria), the Norwegian Center for Technology in Music and Art (NOTAM, Norway), La Kitchen (Paris), Malmö Academy of Music (Sweden), Muzyka Centrum (Poland) and the Centre for Interdisciplinary Research in Music Media and Technology (CIRMMT, Canada), to develop a new software application that makes live electronics more usable, more accessible and more sustainable. The first three-year phase of the Integra project (Integra 1), which ran from 2005 to 2008 and was funded by the Culture 2000 Programme of the European Union, entailed an investigation into these issues through a series of international scientific meetings, software prototyping and dissemination through peer-reviewed conferences and journals. This resulted in the production of user interface prototypes that were developed through a research study engaging with practising musicians (Bullock and Caccioli, 2009). Integra 1 formed a strong component of BCU’s 2008 RAE submission in which Birmingham Conservatoire was ranked third out of all UK Conservatoires, and number one outside London.</p> <p>In Integra 2, the research of the project was developed into a commercial-quality, open source and cross-platform application: <a href="#">Integra Live</a>. This software formed the basis for all of the artistic outputs of the project, including large-scale concerts at international music festivals. In addition to feedback gathered from Integra project musicians, a public survey of 76 users was conducted to gather user requirements, and lab-based studies were conducted at BCU’s state-of-the-art user testing facilities at Birmingham Institute of Art and Design (BIAD). The results of these were used for a</p>

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design and user-experience modelling phase that was conducted in collaboration with commercial design company Less Rain (<http://www.lessrain.com>). The software was then developed over a 12-month period by the Integra scientific partners and released publicly in July 2010.

The second research goal of Integra was to address the urgent question of hardware and software obsolescence in live electronic music repertoire. This research was conducted in partnership with Malmö Academy of Music at Lund University in Sweden, and entailed an extensive study into the preservation and sustainability of the audio processing and synthesis components of live electronics works. The result was a set of description standards and storage formats implemented in the Integra Live software and enabling works to be realised in other environments supporting a base level of functionality (Bullock and Frisk, 2009, 2011). A set of methods was then devised for 'repertoire migration' to modern systems. As a result, over thirty works were updated by Integra research centres through the course of the project and rescued from obscurity (<http://www.integralive.org/migrations/>).

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

#### Peer-reviewed research outputs relating to Integra:

2011: Bullock, J., Beattie, D. and Turner, J., [Integra Live: a new graphical user interface for live electronic music](#), Proceedings of the 2011 NIME conference, pp. 387–392 (NIME, Oslo).

2011: Bullock, J. and Frisk, H., '[The Integra Framework for rapid modular audio application development](#)', Proceedings of the 2011 International Computer Music Conference (ICMC), pp. 640–644 (International Computer Music Association, UK).

2010: Bullock, J. and Coccioli, L.: [Integra Live: a new software environment for the composition and performance of live electronic music](#).

2009: Bullock, J. and Coccioli, L., '[Towards a humane graphical user interface for live electronic music](#)', Proceedings of the 2009 NIME Conference, pp. 266–267 (NIME, Copenhagen).

2009: Bullock, J. and Frisk, H., '[An Object Oriented Model for the Representation of Temporal Data in the Integra Framework](#)', Proceedings of the 2009 ICMC, pp. 57–60 (ICMA, Montreal).

2008: Bullock, J. Coccioli, L. and Frisk, H., '[Sustainability of live electronic music in the Integra project](#)', Proceedings of the 2008 Melecon conference, pp. 182–187 (IEEE, Corsica).

2006: Bullock, J. and Coccioli, L., '[Modernising musical works involving Yamaha DX-based synthesis: a case study](#)', *Organised Sound*, Volume 11, issue 3, pp. 221–227.

#### Key Grants:

**2009–2012** Integra – Fusing music and technology

**PI:** Lamberto Coccioli

**Funder:** Culture Programme of the European Commission

**Total Project Value:** €1,897,768

**2005–2008** Integra – A European composition and performance environment for sharing live music technologies

**PI:** Lamberto Coccioli

**Funder:** Culture 2000 Programme of the European Commission

**Total Project Value:** €1,234,349

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

#### **Scientific Impact**

Integra Live is the first large-scale publicly-funded open source software environment for interactive music production developed through rigorous testing in artistic practice. The project embedded a design-led philosophy with a strong HCI emphasis from the outset, making Integra

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Live unique in the field of academic software. This attention to user experience generated benefits well beyond contemporary music circles, resulting in use-cases as diverse as [brainwave-based music control](#) and [audio processing for digital DJ setups](#).

Integra Live has received over 12,000 downloads worldwide since its release in July 2010. The software has been featured on Brazilian software site [Baixaki](#) and high profile music technology blogs including [Synthtopia](#). It has been presented at key music research conferences including NIME 2009, 2011; ICMC 2007, 2009, 2011; EMS 2011, and published in peer-reviewed journals (*Organised Sound* 2013). This has led to invited talks at the Earzoom Festival, Ljubljana, October 2011; the Association of European Conservatoires Congress, Valencia, November 2011; Integra festival in Copenhagen 2011; the Forum IRCAM workshops, Paris, November 2011; the INTER/actions symposium, April 2012; Music Tech Fest, London, May 2013; and the QMUL Sound Software workshop, London, June 2013.

**Artistic Impact**

The Integra project has transformed creative practice by empowering musicians to work directly with interactive audio processing without the help of a technical assistant. This has given them unprecedented control over artistic results, with the Chief Producer of the BBC Symphony Orchestra highlighting that Integra's research 'vastly reduced set up times and eliminated technical problems during rehearsals'. Impact is further demonstrated by 16 Integra-commissioned works for ensemble and electronics, 5 of which were 20-minute works involving additional media such as dance or video projection. Each piece has been performed at least twice, with over 50 Integra-based performances to date. Notable commissioned works included: Rolf Wallin (*Strange News*) performed by BCMG (Integra Festival 2008), London Sinfonietta (*Adventures in Sound* 2010), National Polish Radio Symphony Orchestra Katowice (Warsaw Autumn, 2011), Stavanger Symphony Orchestra (2011), Oslo Philharmonic Orchestra (2011); Tansy Davies (*Grind Show*) performed by Bit20 (2006, Edvard Grieg Festival 2007), BCMG (2007); Pierre Jodkowski (*Respire*) awarded the Prize for Musical Creativity at the International Dance On Line Film Festival awards. Performed at (SICMF, 2011), Bit20 (Borealis Festival 2011), Ars Nova (Integra Festival 2008); Alvin Curran (*Circus Maximus*) performed by Ars Nova (Integra Festival 2011); Iris ter Schiphorst (*Aung*) performed by Bit20 (Integra Festival 2011); Mauro Lanza (*Le nubi non scoppiano per il peso*) performed by Court-Circuit (Ultima Festival 2011), Athelas Sinfonietta (Integra Festival 2011); Philippe Leroux (*Extended Apocalypse*) performed by Athelas Sinfonietta (Elsinore 2011), Bit20 (Borealis Festival 2012); Hilda Paredes (*Revelación*) performed by Grup Instrumental (ENSEMS festival 2011), Court-Circuit (Bouffes du Nord 2011).

Integra organised two international festivals of music with live electronics. The first attracted £30,000 of additional funding from BCU's New Generation Arts and took place in June 2008 at Birmingham Conservatoire and other Birmingham Venues (Town Hall, CBSO Centre, Custard Factory). It featured a 1-day symposium on live electronic music and premieres of commissioned works performed by Bit20 Ensemble, The Bays, Ars Nova and BCMG. The second festival, a collaboration with the Royal Danish Academy of Music, took place in September 2011 in Copenhagen, attracting €20,000 of additional funding from the Nordic Culture Fund and €30,000 from Kulturkontakt Nord. It was given a [5-star review](#) in Danish broadsheet newspaper *Jyllands-Posten*.

Birmingham Conservatoire's project to update Harvey's works involving DX7-based synthesis culminated in the performance of *Valley of Aosta* at Birmingham's Adrian Boult Hall in March 2009, and *Madonna of Winter and Spring* at London's Barbican Centre in January 2012, performed by the BBC Symphony Orchestra and broadcast to a worldwide audience on BBC Radio 3's 'Hear and Now' programme. The performance also received critical acclaim, with the *Classical Source*

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referring to the work as a 'welcome revival' with the digitally emulated electronics sounding 'of their time'. The Senior New Music Editor of Faber Music (Harvey's publisher) cites the project as providing 'far-reaching benefits for publishers (and audiences) by rescuing works that cannot be performed due to technological obsolescence and ensuring the long-term sustainability of live electronics.'

**Educational Impact**

The Integra Project included two educational strands: a curriculum pilot, intended to embed the use of Integra Live in instrumental teaching curricula and performer training workshops, to train professional performers in the concepts and practice of live electronic music. The curriculum pilots were delivered by three Integra research centres (IEM, Malmö Academy of Music and Birmingham Conservatoire) in their own institutions. They resulted in four instrumental teachers from each institution teaching live electronics with their students over a year of study. The Integra 'performer training' workshops were delivered using Integra Live over two sessions to members of the Integra member ensembles (Court Circuit [Paris], Athelas Sinfonietta [Copenhagen], Ars Nova [Malmö], Grup Instrumental [Valencia], Bit 20 [Bergen]), delivered by each of the five Integra research centres. As a result of this training, ensemble performers are now able to work directly with Integra Live without the need for technical support.

Integra Live is now being used as a teaching tool in music higher education courses worldwide. For example, an Integra outreach partner and Lecturer in electroacoustic composition at The Liszt Academy of Music, Budapest, states: 'Integra Live has enabled the creation of new works for live electronics within our composition group [...] Students have found the software easy to use and it has transformed their creative work by enabling them to achieve musically satisfying results at an early stage in the composition process.' The Co-ordinator of the Electro-Acoustic Music Program at San José State University states: 'Integra Live has transformed the creative practice of our students by accelerating the process of constructing interactive projects. Our students appreciate the simplicity, responsiveness and cost effectiveness of Integra Live compared to existing systems.'

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

1. Project newsletters and other evidence such as concert programmes, user testimonials and outreach reports can be found on the [Integra Issuu bookshelf](#)
2. Download statistics for Integra Live can be found on [the project Sourceforge page](#)
3. [Five star review](#) of Integra 2011 festival, Copenhagen, in *Jyllands-Posten*, 28 September 2011 (full text in Danish available upon request)
4. Testimonial: Chief Producer, BBC Symphony Orchestra: use of Integra for migration of Jonathan Harvey *Madonna of Winter and Spring* for new performance (text available on request)
5. Testimonial: Senior New Music Editor, Faber Music, London: benefits of Integra for publishers (text available on request)
6. Testimonial: Lecturer in electroacoustic composition, Liszt Academy of Music, Budapest: transformative benefits of Integra Live for compositional work (text available on request)
7. Testimonial: Coordinator, Electro-Acoustic Music Program, San José State University, California: transformative benefits of Integra Live for teaching environment in electro-acoustic composition (text available on request)
8. Newspaper article (*The Brazilian Post*) on the impact of Integra Live in Brazil, can be found [here](#).