

## Modern Methods for Musicology: Prospects, Proposals and Realities

### Mapping the use of ICT in creative music practice

*Celia Duffy*

Creative music practice (encompassing performance and composition) seems not to sit comfortably within the somewhat narrow confines of the title of the expert seminar: *Modern Methods for Musicology*. Music is a very broad discipline and, with such a diversity of teaching, learning and research in music as a backdrop, this paper proposes that it may be useful to map out the wide scope of ICT application in creative musical practice. In the particular context of the AHRC and the UK research establishment, there is a case for paying special attention to creative practice as a still-emerging research area and one that provides examples of some of the most exciting ICT developments. The multidisciplinary nature of ICT and music research and the interests of audio engineering and computing science in the topic also push and cross more familiar musicological boundaries.

The rationale behind the proposed mapping activity is simple: in the same way that Willard McCarty and Harold Short's landmark *Intellectual map for humanities computing* in 2002<sup>1</sup> (to which I'll return below) signalled a recognition of the maturity of humanities computing, the time is now ripe for a similar exercise in music. We need to understand what's happening right across our discipline and think about: the various

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<sup>1</sup> W. McCarty and H. Short, *A rough intellectual map for humanities computing*, in *Mapping the Field*, (Pisa: Association for Literary and Linguistic Computing, 2002), retrieved 26<sup>th</sup> May 2006, <<http://www.allc.org/reports/map/mapping.html>>.

types of ICT tools, applications and approaches, what they're used for and why, what could be further developed and how, how best to support those developments, and what the relationships are between the various constituent parts both within the broad field of music and outside in other disciplines (such as computing science, engineering, information science). That's quite a project and much more than can be tackled here, but some answers to these big questions may emerge over the life of the AHRC ICT programme.

This paper attempts neither prospect nor proposal, but rather identifying realities across one part of the territory, that of creative musical practice. This territory embraces ICT-assisted tools for performance training and analysis, and distribution and dissemination of audio materials. The world of ICT-assisted composition and creative music making across various genres is well documented, investigated and theorised. Its very breadth sets it outside the scope of this paper. However, there are some notable highlights: for example, the fairly recent phenomenon of compositional tools becoming available free over the internet or packaged with a Macintosh that, even 10 years ago, would have been the result of at least 6 months hard labour at IRCAM or the possibilities for collaborative creative work offered by the web offering radically new ways of creating, distributing and playing music.

A way of starting to draw a map for music is to mark a boundary between the use of ICT in assisting study of musical *texts* (which until recently with the interest in performance studies<sup>2</sup> and with other honourable exceptions, e.g. the sub-discipline of ethnomusicology, has been musicology's main concern), from the study and production

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<sup>2</sup> As exemplified by the activities of the AHRC Research Centre for the History and Analysis of Recorded Music, CHARM, retrieved 26<sup>th</sup> May 2006, <<http://www.charm.rhul.ac.uk/index.html>>.

of musical *sounds* (the performer's main concern). A separate stake can be claimed for the use of ICT in composition. Leigh Landy's work in providing useful working classifications of the various genres of electroacoustic music<sup>3</sup> indicates that this is complex terrain particularly bearing in mind that electroacoustic music is only one, relatively specialised, art-music genre.

The mapping project stems from an urge to try and create or impose some order on what seems to be an ill-defined situation as regards how ICT is being used across the musical domain. ICT is now often a standard or, at least, widely-used creative, analytical or distribution tool across this sector, and in some areas has been so accepted into the mainstream that it is not often regarded as a specialised discipline in itself. In that regard it has much in common with the debates that surrounded humanities computing not long ago. So-called humanities computing<sup>4</sup> presents a picture of another, related, chaotic, organically-developing discipline, as drawn in McCarty and Harold Short's map. It is not necessary to analyse the map in any detail, but rather note a number of aspects. This map is now out of date – and we can be sure its authors knew it would be – but at the time it seemed to herald the arrival of humanities computing as a discipline in itself. So, like all new disciplines, it's fuzzy. It's rough, it's chaotic, provisional, organic with fluffy clouds rather than hard-edged boxes. But it's fascinating: it juxtaposes graphically some areas that aren't usually conceptually

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<sup>3</sup> L.Landy, EARS, the ElectroAcoustic Resource Site at De Montfort University, retrieved 26<sup>th</sup> May 2006, <<http://www.ears.dmu.ac.uk/>>.

<sup>4</sup> Although, following the welcome landmark decision this year by the UK's leading conference in humanities computing, DRH (Digital Resources in the Humanities) to restyle itself DRHA (+ Arts) perhaps even the label humanities computing is now obsolete. DRHA, retrieved 26<sup>th</sup> May 2006, <<http://ahds.ac.uk/drha2006/index.php?cf=5>>.

related. It poses questions about methods (here computing methods), suggests links and relationships; it stimulates thinking, particularly about inter-disciplinary matters and the place of humanities computing in them. It is also teasingly difficult to achieve.

My particular take on this topic and an impetus for this paper is that over several years I've been involved with support systems for learning, teaching and research. My experience as a long-standing member of various JISC committees (in particular its Moving Image and Sound Working Group), through my involvement with the (then-named) AHDS Performing Arts Data Service at its inception, and the AHRC and its ICT programme committee structure leaves me with some anxiety about how best we support the needs of learners, teachers and researchers on the ground. My own interest is in using technology to assist learning and teaching in music and my particular niche is in tools to make sound archives as useable as possible. This is reflected in my HOTBED project and currently in EASAIER, a newly-funded EU project on access to sound archives. I chair the User Panel of the JISC-funded British Library Archival Sound Recording project which is providing several thousand hours of sound material to UK FE and HE online. How and where these projects intersect with the various activities and approaches described in the Expert Seminar – where they sit, how they might be useful – may be one outcome of this paper.

McCarty and Short remarked of their map that 'the mapping activity instantiated here is the point rather than the map itself'. The same goes for my attempts, which follow. The results are tentative, but the activity may have some use to get us thinking along less-travelled lines.

What I'm going to do is quite straightforward: taking a wide sweep, I map out how ICT is used principally in, and in support of, musical performance. I start by

characterising the overall nature and function of the ICT type or tool - in other words, looking at what's it for. The resulting broad categories are:

- Performance training
- Performance analysis
- Distribution and dissemination

and

- Music making.

Under each category I then look at what the ICT tool does (?), who it's aimed at (?), examples (?) and intersections with other disciplines(?). All of these are followed by question marks, further underlining the provisional nature of this undertaking. There's also a great deal of cross-over between one area and another.

### **Performance training**

The use of ICT in performance training is perhaps the area that has fewest intersections with the broad area of music research. It tends to be supported more by educational and psychological research sources, and it also has a significant commercial profile.

The function of ICT tools in performance training include analysing a user's performance (from either a digital or acoustic source), and giving feedback (visual/audio) and tutorial assistance and adding 'peripherals', such as notation, transpositions, 'intelligent' accompaniments, backing, arrangements.

There is a significant market for and widespread use of these tools for elementary performers and learners in the 'teach yourself' market, but specialised applications may

also be used for advanced and professional-level musical training. Playback/feedback functionality means that such tools are useful for research into pedagogy and have been used to collect data for music psychology research.

Starting with some examples from the bottom end of the market, there are a number of commercial ‘teach yourself’, or ‘help yourself’ applications, which are aimed at the elementary learner. Among these are applications like the Yamaha Digital Music Notebook or SmartMusic<sup>5</sup>, a very fully-functioned software package endorsed by the Associated Board of the Royal Schools of Music (ABRSM). The ABRSM is particularly interested in Smart Music’s ‘intelligent’ accompaniment functions that follow the user’s performance, unlike the old vanilla performances and set-in-concrete tempi of Music Minus One. SmartMusic has a large database of titles and can ‘simulate a rehearsal environment and encourages students to listen to fellow musicians. Students play their individual part while listening to the piece as a whole in a rich musical environment that makes practicing fun and engaging.’<sup>6</sup> Both SmartMusic and the Yamaha application allow users to record their performance in either audio or MIDI, play it back, switch between and compare pre-recorded demo data and their own recorded performance. The idea is that it’s easy for users to focus on a difficult passage, slow it down, and try it over and over again.

SmartMusic has very specific visual feedback for users. Users play or sing their part with accompaniment and receive, in real time on the computer, detailed feedback on their performance.

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<sup>5</sup> <<http://www.digitalmusicnotebook.com/>> and <<http://www.smartmusic.com/>>.

<sup>6</sup> From SmartMusic and your students, retrieved 26<sup>th</sup> May 2006, <[http://www.smartmusic.com/teachers/default.aspx?page=page1\\_1\\_1](http://www.smartmusic.com/teachers/default.aspx?page=page1_1_1)>.

As the web blurb has it:

Instant feedback and assessment tools help students master material faster. As students play or sing, SmartMusic shows students how well they've performed. Correct notes appear on the screen in green. Wrong notes and rhythms display in red, and indicate if the note was played early or late. Fingering charts for every note appear on demand with a mouse-click.

With Smart Music's built-in assessment tools, students see their mistakes and how to correct them. As they practice, students see their SmartMusic grade climb higher and higher as red notes disappear and the screen fills with correct green notes. SmartMusic eliminates the danger that students will unknowingly repeat a mistake over and over again until their next lesson with an instructor. SmartMusic helps students improve each time they play ...!<sup>7</sup>

I don't regard this approach as pedagogically sound – and a very new European-funded music teaching and ICT project called I-Maestro<sup>8</sup>, doesn't either. In contrast to the SmartMusic blurb, I-Maestro's initial publicity declares: 'Music performance is not simply "to play the right note at the right time"'. Led by the University of Leeds Interdisciplinary Centre for Scientific Research in Music, I-Maestro lists a number of collaborators including IRCAM and City University and the project is set to explore innovative pedagogical paradigms including gesture interfaces and augmented instruments (using visual as well as audio rendering).

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<sup>7</sup> From SmartMusic and your students, retrieved 26<sup>th</sup> May 2006, <[http://www.smartmusic.com/teachers/default.aspx?page=page1\\_1\\_1](http://www.smartmusic.com/teachers/default.aspx?page=page1_1_1)>.

<sup>8</sup> I-MAESTRO, Interactive multimedia environment for technology enhanced music education and creative collaborative composition and performance, retrieved 26<sup>th</sup> May 2006, <<http://www.i-maestro.net/>>

There are also interesting examples of educational studies using interactive musical applications. One such study<sup>9</sup> aims to understand how the use of interactive musical systems (such as the ones described above) can affect the learning and musical creativity of children (and particularly younger children). This study uses a music system conceived at Sony CSL in Paris that is able to produce music in the same style as the person playing the keyboard (thus taking the SmartMusic intelligent accompaniments one stage further) and it looks at how children relate to this particular interactive system, what kinds of musical behaviours develop and how the system might be used in the educational field.

Moving on to more specialist applications, there has recently been a great deal of activity and research in pitch tracking for singers, and this is covered in depth elsewhere in the Expert Seminar. But even within this specialist area there are niche applications. One such is the charmingly-named Rosegarden Codicil.<sup>10</sup> Named after the open-source Rosegarden sequencer from which it was developed, the codicil adds specialist functionality to deal with microtonal music and is designed to help performers ‘think’ microtonally (in 19 tones to the octave). It gives performers practice routines, guide notes, and visual feedback when going ‘out of tune’.

Finally and ever upwards, there is the crème de la crème of ‘wired’ acoustic instruments designed to give feedback on performance: the highly sophisticated

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<sup>9</sup> F.Pachet and A.R. Addessi, ‘When children reflect on their on playing style: experiments with continuator and children’, *Computers in Education (CIE)*, 2/1 (Jan. 2004): 14.

<sup>10</sup> The Rosegarden Codicil: A Microtonal Rehearsal Tool, University of Glasgow Centre for Music Technology, retrieved 26<sup>th</sup> May 2006, <<http://markov.music.gla.ac.uk/CMT/cmt.py/Projects/rgtracker.html>>.

Bosendorfer 290SE concert grand piano. This instrument is fully geared up for both recording and playback of a pianist's actions. The keyboard data can be used to replay faithfully a pianist's performance. The Yamaha Disklavier is similar. These sorts of instruments have both pedagogical and research functions: they can be used by performers and their teachers for very detailed analysis and by researchers into performance. Although useful for technical practice and detailed review, I can only speculate as to how useful pianist-researchers concerned with aesthetic and creative experimentation find the accurate playback data that such instruments produce (and with possibly less-than-ideal keyboard action).

A question for these applications is how effective they are in helping performers (of whatever level) improve, or better understand, their practice. There is a growing body of research investigating this, including elsewhere in this Expert Seminar. Anecdotal evidence from a specialist singing teacher colleague at the RSAMD and corroborated by singing teachers at the Universität der Künste Berlin as demonstrated at a recent ELIA conference<sup>11</sup> suggests that visual feedback can be useful. My RSAMD colleague's comment was that it was most useful for certain types of student – and sometimes as a last resort if none of the specialist singing teacher's considerable repertoire of methods seem to be getting through. Of course one person's research area is just another's ordinary professional routine: my RSAMD colleague has apparently been using visual feedback software for several years as a matter of course and not regarding it as anything particularly out of the ordinary – another indication that ICT use in music has been absorbed into the mainstream.

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<sup>11</sup> *Research in and through the arts*, European League of Institutes of the Arts (ELIA), 2005, retrieved 26<sup>th</sup> May 2006, <<http://www.research.elia-artschools.org/conference.html>>.

## **Performance analysis**

An ICT tool can facilitate analysis of a pre-existing, recorded performance by presenting it in different, usually visual, formats, offering tools for segmentation, markup, annotation and manipulation as well as tools for precise, recordable measurements.

Much of this functionality overlaps with the previous heading of Performance Training, but here we might concentrate on analysis not of the user's own performance (so there will be no specific 'tutorial' feedback intention), but of other pre-existing performances from which the user can learn, whether to inform their own performance or address wider analytical or stylistic questions. Such tools may be of use to performers, practice-based researchers, musicologists, particularly in performance studies, and ethnomusicologists.

As an example I'll draw on the work of HOTBED (Handing on Tradition by Electronic Dissemination) <sup>12</sup> a JISC-funded project to evaluate the best ways of presenting networked sound material to undergraduate performance students. The materials in question included a collection of archival sound recordings from the School of Scottish Studies sound archive at the University of Edinburgh (otherwise very difficult to access), but also staff and students' own performances, fieldwork recordings, and videoed masterclasses. It was a rich mix from which we learned something about the sorts of tools that might benefit users. Thinking from HOTBED has informed

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<sup>12</sup> The HOTBED project, retrieved 26<sup>th</sup> May 2006, < <http://www.hotbed.ac.uk> >.

another recently-funded EU project, EASAIER (Enabling Access to Sound Archives through Integration, Enrichment and Retrieval) which has recently started.<sup>13</sup>

HOTBED, aimed at performance students in Scottish music began with the question of how is it possible, through making available a collection of otherwise difficult-to-access performances, to adapt, incorporate and build on the tradition in students' own performances. The ethnomusicologist Peter Cooke helped shape thinking during HOTBED about what kind of tools might be useful to our practice-based consistency.

In the Scottish-music context it is difficult to draw any line between practice-based research that has creative performance as the end aim, and research into performance for a better understanding of the techniques and style of a particular exponent. Both types call for focused, often repeated, listening that sometimes means researchers making their own detailed transcriptions of the music they listen to (whether it be to serve as a prescription or mnemonic aid for their own performance, or to help them to understand more clearly and precisely the instrumental or vocal techniques employed).

Researchers of both are as interested in such techniques and in the details that might have made a performance artistically successful, as they are in what is performed. Hence any serious study requires more than repeated listening to recorded performances delivered in real-time. Ethnomusicologists have for long taken for granted that their prime focus of study must be musical practice (or recordings of such) and that where they use notations they are usually their own, created as part of the work of analysis..<sup>14</sup>

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<sup>13</sup> The EASAIER Project: *Enabling Access to Sound Archives through Integration, Enrichment and Retrieval*, retrieved 26<sup>th</sup> May 2006, < <http://www.elec.qmul.ac.uk/easaier/>>.

<sup>14</sup> P.Cooke, *On the feasibility of a Scottish Music Performance Resource Centre as a research facility principally aimed at performers and composers*, RSAMD, unpublished report, 2003.

For HOTBED we came up with the following wish-list for analytical tools to be used in conjunction with networked collections of Scottish music, in this case often recorded in the field:

- *Fast playback* for rapid scanning and comparison of musical structures.
- *Slow tempo playback* (half-speed, quarter-speed, even one eighth-speed, but retaining pitch) to aid understanding or transcription of rhythmically dense or heavily ornamented music performances. Often performers can only really satisfy themselves that they have accurately ‘heard’ a performance, by checking at slower playback speeds. For example, fiddlers need slow playback in order to be able to note bow changes (especially if visual evidence is not available) and pipers find it difficult to perceive what precise cuttings and other ornaments have been used in bagpiping at normal playback speeds.
- *Changes in equalisation* so that audibility is preserved or/and to filter out unwanted pitch bands (for instance, noise such as hiss and hum). Boosting specific pitch bands can help detect bow changes in fiddle performances or consonants in speech and song recordings.
- *Loops* (repeating passages of music and dance) need to be readily created at will. If for instance a musical item is streamed, users need to specify exact points for the beginning and end of loops and to annotate them. This is one of the facilities already available on HOTBED.

- *Markup and segmentation* tools are useful also in repertories that use notation. Indiana University's Variations 2 project <sup>15</sup> has a suite of tools that allow users to create and save both visual (score-based) and audio annotations.
- *Pitch adjustments* are often necessary if performers wish to 'play-along' with the performance they are studying (bagpipes often vary in pitch and traditional fiddlers often tune their instruments to pitches other than the current standard).
- *Adding of time clicks or drones* on a parallel channel to the musical signal is useful to explore questions of timing and rhythm (rubato) or pitch and intonation respectively.
- *Visual aids* such as displaying and measuring the spectral content of notes and phrases can be useful.
- *Graphical display* of fundamental pitch in real time and ability to isolate and display specific pitches in HZ (for instance with the aid of software such as Music Mapper FOOTNOTE). The former is of particular value to singers who wish to test their own perceptions of pitch slides, vibrato and other effects. which the performers they are studying may have produced.
- *Conversion* to Midi files, and via these, conversion to printed graphical musical notations via software such as Sibelius.
- *Ease of juxtaposition* of several different performances of an item (by the same or different musicians) to compare versions and styles.
- *Source separation*, for example, separating a solo instrument from an ensemble, may be useful for close analysis of that solo.

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<sup>15</sup> Variations 2, Indiana University Digital Music Library Project, retrieved 26<sup>th</sup> May 2006, <<http://variations2.indiana.edu/research/>>.

All of these tools are available, and useful for many different genres of music – the trick is to get them all in one box and make them easy to use. This is one of the aims of the EASAIER project.

On the topic of measurements and their purposes, Nicholas Cook in his recent address to the ISMIR conference in 2005<sup>16</sup> contrasted the CHARM Mazurkas project (correlating timing and dynamic information from recorded performances with the score) with Gerhard Widmer’s OFAI project on very close analysis of pianists’ styles (beat-level tempo, beat-level loudness analysis), a ‘bottom-up [approach] giving rise to ... extremely high-level characterisations of different great pianists’ styles. Literate musical cultures, however, like that of Western “art” music, involve a constant tension between what is heard on the one hand and what is constructed or manipulated through notation on the other ...’. There may also be a tension between perceptions of good intonation in performance and the data from ICT-facilitated measurements that needs to be handled with sensitivity.<sup>17</sup> All this forms a nice contrast to our Scottish music examples, where we were working with an aurally/orally-transmitted musical culture that celebrates diversity in performance, in a format (networked provision) that facilitated aural analysis. Indeed we decided after much debate, not to include any notation at all in HOTBED.

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<sup>16</sup> N. Cook, ‘Towards the compleat musicologist?’, invited talk at ISMIR 2005, retrieved 26<sup>th</sup> May 2006, <<http://ismir2005.ismir.net/documents/Cook-CompleatMusicologist.pdf>>.

<sup>17</sup> See, for example, P.Johnson, ‘ “Expressive Intonation” in String Performance: Problems of Analysis and Interpretation’, in J.Davison, *The Music Practitioner: Research for the Music Performer, Teacher and Listener* (Aldershot UK and Burlington VT: Ashgate, 2004), pp.79 - 90.

Analytical tools for manipulating audio source materials are valuable for performers themselves (particularly for traditional repertoires where a range of recordings may not be so readily available), as well as for ethno/musicological study of performance styles. There is also significant intersection with the needs of linguistic disciplines.

### **Distribution and dissemination**

ICT enables digitised recorded music to be made available widely (for instance by providing access to archives, or shared collections) and, depending on access rights and software tools, makes available downloads and streams not just for listening, but for sampling and manipulating. It also enables recordings to be discovered and retrieved via metadata.

ICT serves a very large constituency of music learners, teachers and researchers and an even larger one of general music lovers and a generation of ‘born digital’ creative music-makers. The effect of ICT-enabled distribution and dissemination on the creative constituency is double-edged: more opportunities than ever to get creative work in the public domain lead to greater likelihood of rights infringements. There are, of course, workarounds and many artists, having embraced internet distribution, have managed to find a business model that works (see next section).

I’m involved as the chair of the user panel of a new UK sound digitisation project, the British Library Archival Sounds recordings project.<sup>18</sup> Funded by the JISC, this project will provide nearly 4,000 hours of audio content (music, actuality and sound

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<sup>18</sup>The British Library Archival Sound Recordings Project, retrieved 26<sup>th</sup> May 2006, <<http://www.bl.uk/collections/sound-archive/archsoundrec.html>>.

effects and spoken word). Music content ranges from non-western recordings such as Klaus Wachsmann's Uganda recordings (as curator of the Uganda Museum in Kampala, Wachsmann made invaluable recordings of Ugandan music and cultural activities, many of which are unpublished) and David Rycroft's South Africa recordings, to Beethoven String Quartet performances from a period of approximately 100 years. A representative selection from the wide-ranging holdings of the Sound Archive illustrates developments in popular music over a 60-year period. The story of jazz in the UK, its varied styles, venues and characters as told by musicians, promoters and the label owners is one of the oral history packages.

Our user panel is currently engaged in very positive discussions with the British Library about what else we need to make these collections of recorded music most useful. For example, we're hoping that in the popular music track collection we can have a significant amount of enhanced data such as record sleeves and labels. For western classical performances, scores are an obvious extra and in the case of vocal music, texts and translations. The question of the value of enriching user's experience with "peripherals" in sound archives is also being addressed in EASAIER which is also set to work with large collections such as the British Library one to add value with the sort of tools described in the previous section.

It may seem obvious, but complete performances are important. However interesting 'sound-bites' might be for browsers, they are of little use for serious study of musical performance. In Scottish music content, researchers may need to discover, for instance, how a singer develops a song and handles or develops a strophic melody from verse to verse (often it takes a couple of verses for a traditional singer to arrive at his/her

‘normal’ version of a melody - if there is such a thing as a normal version). This is a particularly valuable aspect of HOTBED.

Lastly, there is a need for rich documentation of the performance (and recording) context in helping the listener better to understand the performance under consideration. Again, in Scottish music, we need to know as much as possible about performers’ interactions with listeners and with each other (whether it be in concerts, at dances and ceilidhs, festivals and competitions, in one-to-one interviews in their homes, or in recording studios) as it can directly affect the nature of the performances.

This is quite specifically education-orientated dissemination of recorded music (although our experience with HOTBED indicated a strong feeling from the wider community that it was their right and entitlement to be able to access their own musical heritage via digital means). The elephant in the room is the commercial (right side of the law?) and informal (wrong side?) networked distribution of music. The effect of networked distribution on the music industry and on music consumers and the phenomenon of easily-available and easy-to-use software for creative manipulation of networked music is touched on in the next section.

### **Making music**

The use of ICT is so ubiquitous, standard, vital and important to so many creative musical constituencies that it’s beyond the scope of this map to try and catch them all. ICT has a range of functions in this category. They include the ICT tool acting as both a musical instrument and a tool for playing/interacting with/composing for it; adding onto acoustic instruments extending their ranges and capabilities (such as Jonathan

Impett's 'Metatrumpet'<sup>19</sup>) or working in conjunction with other sources/signals – such as movement/gesture tracking via RFID tagging); and providing a vehicle for dissemination facilitating particular types of interaction (such as internet music)

Professional commercial and art performers and composers, research-led, practice-based performers and composers, through to amateurs and 'bedroom' performers and composers – all interact with ICT in their creative activities. As mentioned above, not just new music, but quite different types of musical behaviours arise from the opportunities that ICT provides creative music makers, for example, how communities of musicians of every sort can be created, promoted and enabled through the web.

An example is internet music, defined by the DMU EARS (ElectroAcoustic Resource) website as

Music in which the internet is integral either to its composition, or dissemination, or both. Currently, the main distinctive characteristics of internet music are:

- \* Asynchronicity
- \* Interactivity
- \* Multi-user
- \* Co-operation
- \* Emergence

Whilst the last two may also be said to be characteristics of conventional music making, the medium of the internet requires a special notion of social intercourse and co-operation which is peculiar.<sup>20</sup>

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<sup>19</sup> J.Impett, *Metatrumpet*, retrieved 26<sup>th</sup> May 2006, <<http://www.uea.ac.uk/mus/research/metatrumpet.html>>.

Music software is now freely or easily available (especially to Mac users) that would have been at the cutting edge of research not very many years ago. One such software product, *GarageBand* that is packaged with Macs has been used by the band Nine Inch Nails in an interesting way. Trent Reznor comments on the band's website:

well, the experiment of releasing the hand that feeds in garageband format was a resounding success. for those of you unaware, i essentially gave away the master multitrack sessions for that song for you to remix / reinterpret / ruin. last I checked, there were hundreds of remixes ... posted here alone.

i've enjoyed and cringed at what you've done with my song. thank you (i think).

again, there is no agenda here other than for you to explore, experiment, and have fun with it. depending on how this goes we may construct a more formal community for remix postings and/or possibly some sort of "official" endorsement by means of an EP or something.<sup>21</sup>

This says a great deal about a world in which communities of creative music makers are, in this instance, being aided, abetted and encouraged by the copyright holder. In the academic community we now have access to another collection via the JISC which is similarly completely rights free and can be sampled, manipulated,

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<sup>20</sup> L.Landy, *Internet Music*, from EARS, the ElectroAcoustic Resource Site at De Montfort University, retrieved 26<sup>th</sup> May 2006, <[http://www.ears.dmu.ac.uk/rubrique.php3?id\\_rubrique=139](http://www.ears.dmu.ac.uk/rubrique.php3?id_rubrique=139)>.

<sup>21</sup> T.Reznor, *Nine Inch Nails Only Remix Downloads*, retrieved 26<sup>th</sup> May 2006, <<http://www.nin.com/access/only/>>.

pushed, pulled and used however we want to. This is the so-called Culverhouse collection of mostly mainstream Western classical repertoire.<sup>22</sup>

Sophisticated manipulation of an “insider” community of users on the web has been used recently in a clever promotion of the currently much-hyped band, the Arctic Monkeys. One site puts it like this:

The Arctic Monkeys are what we call a phenomenon. Built on a mass hype of no hype, word of mouth, downloads and official bootlegging has seen them championed as outsiders whilst manipulating the media. It’s a clever move since the Artics are no more than a very good next step in the contemporary zeitgeist of pop music. You know – smart-arse lyrics, Northern sensibility, drilled and frantic guitar riffs recognisable to followers of fashion.<sup>23</sup>

The effects of collaboration and co-operation, and construction of virtual, insider communities for music making and music consumption, and of technology on musicians more generally are far-reaching<sup>24</sup>. They present some radical paradigm-shifts in creative musical behaviour.

## Conclusions

The map itself was always, rough provisional, tentative. So are any conclusions to be drawn from it.

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<sup>22</sup> EMOL Culverhouse Classical Music, retrieved 26<sup>th</sup> May 2006, <http://www.emol.ac.uk/collections/culverhouse.shtml>.

<sup>23</sup> R.McGibbon, *Arctic Monkeys @ Blank Canvas, Leeds*, 2005, Vanguard Online Gig Reviews, retrieved 26<sup>th</sup> May 2006, <<http://www.vanguardonline.f9.co.uk/0511LAM.htm>>.

<sup>24</sup> See, for example, T. Taylor, *Strange Sounds. Music, Technology and Culture* (New York: Routledge, 2001).

The main outcome is an acknowledgement of the breadth of the field. I would like to see the AHRC ICT programme concerning itself as much with the effects of the web on musical culture, as, say, a mainstay of the humanities-computing approach like score-based music information retrieval; as much with new-build creative software as with repertory searching techniques; as much with supporting new communities of researchers, researching new musical practices as ICT-facilitated, but ‘old’ research methods. A conspicuous omission from my map that would have been glaring for colleagues in cognate areas such as drama and performance studies is how to use ICT to support and document practice-based research.

Another outcome stems from the intersections, both among the various branches of musical study and research and in interdisciplinary thinking. ICT opens up possibilities for working with other disciplines such as engineering, computing and information science, psychology, education, cultural studies. For example, a new research group in Glasgow, n-ISM,<sup>25</sup> aims to produce significant and novel results in all its participating disciplines. Its maxim in its first *microtonal-ism* project is that

- Only a composer could have done the composition;
- Only a performer could have performed the piece;
- Only a software engineer could have implemented the software;
- Only a signal processing engineer could have made the measurements.

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<sup>25</sup> n-ISM, the Network for Interdisciplinary Studies in Science, Technology, and Music, retrieved 26<sup>th</sup> May 2006, <<http://www.n-ism.org/>>.

This acknowledgment of the vital and independent contribution of every discipline involved seems salutary. We in music should now be confident in striving for music ‘pull’, rather than (as has been the case for so long) technology ‘push’. If we know where we are on the map that might be easier to achieve.