

## ELECTRONIC MUSIC IS HERE TO STAY – OR IS IT?

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### Abstract

Musical composers frequently make use of new technologies in instrumentation. Whilst orchestral traditions remain strong and the instruments viable, what of the works of composers of electronic music where the sound sources have fallen into disrepair, obsolescence, or modern technology has changed the sound so that it bears no relation to the original?

Beyond collections of manuscripts and recordings, the practicalities of the re-performance of electronic music compositions have not been widely discussed, and no methodology for archiving the artefacts for re-performability exists. In time, as greater importance is placed on these works, the issue will become more difficult to retrospectively resolve.

**Keywords:** electronic music, archiving, preservation, complex objects.

### Re-performance Project

Historically informed performance bases its credibility on three main tenets –

- period instruments and playing technique offer a different timbral content to modern equivalents;
- this is structural to the culture around the composer, no less important than the musical content;
- incorporating these features rather than presenting the piece in context with the current sounds and culture results in a stronger performance.

To understand what is required to successfully re-perform electronic music that is even only a handful of decades old, an attempt needs to be made to re-perform these works, one which involves investigating the sounds within the music, the sound sources and their construction, and testing digital archiving methodologies to re-create them using contemporary technology. This paper outlines such a project. It takes a technical and practical look at the digital curation requirements of electronic instruments and sound sources using music primarily from the 1980s –

comparatively extremely recent times, while also nodding to earlier electronic musicians and composers by blending later pieces with earlier ones.

The pieces were chosen from the electronic-industrial genre, and are primarily by SPK, an Australian electronic/industrial band formed in the late 1970s and noted in more recent times due to the success of the group's mainstay, Graeme Revell, as a film soundtrack composer after the band's dissolution [1]. The selection of SPK was not based on the considered "significance" of their work, but on other criteria. Firstly, that this was an Australian group was deemed important, as little literature exists on Australian electronic music [2]. Second, the study required that the group be defunct, so that no developments of the technology used for the performance of the music had been undertaken. Nonetheless, as time passes and a new generation of composers and performers continue to develop from these roots, ongoing music and technology developments may demonstrate the artistic significance of this genre in music history.

The end result of the project was a performance of a number of SPK's works to an audience which included people who had seen SPK perform live in the past, as well as others familiar with the genre.

### Archival Methodologies

Studies in the field of archiving have long been considered purely as methodologies of arranging history, but more recently are interpreted as "a dialogue between the present and the past" [3]. This concept is a key one in the interpretation of old technologies into a contemporary context, and requires an understanding of the cultural technological context, as well as desired outcomes of the creator. Preserving the ability to re-perform works, and not simply the output of performance (such as scores and recordings), is the major element of the archiving, curation and preservation of the performing arts [4].

For twentieth century works, the process of preserving the performability of these compositions is complex, involving not only electronic instruments of many varieties, but also computer media, hardware and software, for later composers working digitally. Giaretta has proposed that each "object" that is part of the composition, or assists in providing context to the work, would need to be identified and preserved, and

this thinking is supported by a project undertaken by IRCAM and McGill University [5]. These objects might include: audio files, video files, composition notes, recordings of the work (both audio and video), details on sound generation methods (including synthesized or physical sound sources) and most importantly, details of any real-time processing, such that it might be re-developed in a later contemporary technology whilst retaining the same functionality.

For the composers of the mid to late twentieth century, these issues are compounded further by their temporal location on the cusp of the digital revolution. These musicians used analogue and early digital electronic devices as part of their sonic palette, and the archiving of these objects is more akin to museology than musicology. Much of the work already done on the preservation of twentieth century electronic music, such as the MUSTICA project [6], is principally related to the preservation of software, rather than hardware sound sources, digital data rather than analogue.

As with the preservation of digital data, three principal methodologies are available for the archiving of electronically encoded information:

- Migration – the migration of the digital artifacts to current technology. In a musical context, this might include sampling original instruments and sound sources as well as porting software source code to a new platform.
- Emulation – running obsolete software in emulation or as virtual systems on current digital hardware. This methodology would allow for the creation of analogue electronic instruments on contemporary digital platforms, including emulated vintage synthesizers.
- Re-interpretation – taking the essence of the digital information and reconstructing a version of it from that subset of data. This method could see the creation of "remixed" versions of compositions – a popular contemporary method, with successful recordings released of remixes of composers such as Steve Reich and Philip Glass.

Each of the methodologies requires a specific set of materials available to enable their success. The principal issue for this project is that of the lack of documentation on the specifics of instrumentation used by SPK for their recordings and live performances. Whilst problematic, it is also not an unusual situation with compositions of this genre, and provided a testing ground for the creation of sound sources by ear rather than authentic archival sources. This differs from a project undertaken in 2005 to convert the works of composer Jonathan Harvey from hardware instruments into software equivalents. In that instance the composer was able to provide details on the sound source hardware and configuration, leading to specific software being found or developed to produce virtualized performance instruments [7].

Whilst Giaretta in *Advanced Digital Preservation* describes a model using migration as the sole strategy for the successful archiving of digital information for the re-performance of a piece of electronic music, this has not been rigorously tested and indeed in wider digital preservation circles, there has been little comparison done of the three methodologies and their ability to produce usable, readable digital information.

Importantly, this methodology also pre-supposes that the information to be migrated is purely software, and the migration of hardware instruments may prove impossible without reference hardware to sample, or the ability to rebuild an instrument from scratch where schematics exist. There is also the possibility that the sounds in the work, whilst technology dependent, are not “synthesized”. Examples of this can be found in many of the works of John Cage which make use of sounds - or their absence- on specified radio frequencies, now altered due to changes in radio spectrum use. A review of a recent concert of John Cage’s *Variations (I-VII)* summarised the problem:

*Few works have dated as quickly as those of Cage, and the banks of old reel-to-reel tape recorders, transistor radios and theremins still in use like Cuban cars mark him as the first 20th-century composer requiring historical performance practice.* [8]

In the case of this project, attempts through local musicians, recording studios and instrument retailers to locate

vintage instruments to sample within Western Australia were fruitless, so the Migration methodology could not be investigated. Instead, pieces were performed using Emulation and Re-interpretation methods. This was extremely unfortunate, as it has left the method recommended in historically informed performance uninvestigated. However it does highlight the potential difficulties in practice of authentically re-staging a piece of electronic music from only 30 years ago.

The value of following the Migration methodology was illustrated in 2008, when composer Marc-André Dalbavie was faced with the difficulties associated with attempting a re-performance of his *Ars Electronica* prize winning piece *Diadèmes* from 1986. Dalbavie discovered that the absence of a working Yamaha TX 816 synthesizer and the lack of suitability of the software emulators, almost prevented the work from ever being presented as anything other than a recording in the future. Attempts were made to recreate the sounds using the Native Instruments FM Synthesis software synthesiser, FM7, however Dalbavie was unimpressed with the sounds and did not feel they were appropriate for his composition. A satisfactory solution was brought about by sampling a hastily repaired FM synthesizer located in France, and using the samples in lieu of the instrument. The presence of the composer in making decisions on the replacement instrumentation cannot be undervalued in this instance. It is clear that, should the composer not be present, an understanding of the context (both from a technology and cultural perspective) of the sound sources for the work at the time of its composition, and awareness of the ability of current technology to reproduce these components is central to the question of “what was the intended sound?” in attempting to curate or reproduce these performances.

Whilst much of the theory is from the appraisal areas of archives and museums, the final assessment of the success of the preservation methodologies for this project is based firmly in the study of performing arts and specifically, electronic music. To assess it as an archival project would not effectively test the theory’s ability to deliver the sought result, and would only evaluate the ability of each methodology to collect information, not on the need for the type of information to make a composition re-performable.

## **Instrumentation and Musicians**

Industrial musicians have often described their compositional process in terms of the equipment they use [9]. Tracing the instruments used by SPK was not as simple as referencing their own documentation however, as little exists today.

It was clear from listening to and viewing live and studio recordings by SPK that they made use of a variety of instrumentation – from very contemporary (at the time) analogue synthesizers and the first commercially available digital sampler, to found and built “junk” percussion. Their live show also featured electric bass guitar (though this is not apparent in their recordings).

Little documentation exists on the specifics of SPK’s electronic instruments beyond some references to their use of the EMS Synthi [10], but aural and visual investigation of their recorded output provided enough information to identify their principle equipment. Video of the group performing live in Madrid [11] clearly shows the bass guitar and assorted industrial percussion, and also includes a keyboard identifiable as a Roland RS09 String Machine. Still photographs from other performances in the mid-1980s clearly show a Yamaha DX-7 synthesizer and a Fairlight CMI sampler in their backline. The presence of the Fairlight is significant in that it would have allowed them to move from tape-based sounds to digital samples, however it also represents a puzzle. The CMI pricing was approximately \$65,000 in 1983 and was purchased principally by a small number of artists and studios with flourishing careers and sizeable incomes, which justified the extraordinary expense of the instrument. This is not an instrument that would be expected to be in the regular lineup for a band of SPK’s popularity, so this photograph was an important part of putting together their instrumentation.

Notably, with the exception of the Yamaha DX-7, none of their electronic instruments included MIDI capabilities, though they would have been able to implement basic control voltage triggering from the drum machine to the EMS Synthi. Also aside from the dedicated sample based Fairlight CMI, no computers can be identified in their setup. The majority of the electronic instrumentation would have been played by hand with the ability to trigger some pre-prepared sequences on the EMS Synthi in real time. Whilst the Synthi and the String Machine were both

analogue synthesis instruments, they differed in one important area: the String Machine had a limited number of preset sounds not unlike an electric organ, whilst the Synthi was a truly flexible analogue synthesizer, potentially giving an artist the unlimited sound palette dreamed of by composers such as Russolo and Varèse.

This project made extensive use of computers and software to recreate the pieces, as suits the methodologies of Emulation and Re-interpretation, making use of tools common to contemporary times. Two major Digital Audio Workstation products were used, Ableton Live and Cubase, on Apple MacBook Pro laptop computers.

Many software instruments were auditioned for use in this project, with the following chosen –

- PureMagnetik MachineKits (Linn Drum model)
- Soniccouture Synthi AKS
- PureMagnetik String Machines (RS-09 model)
- FXpansion DCAM Synth Squad (Amber, Strobe and Cypher models)

The FXpansion DCAM Synth Squad software stood out from the other software instruments. It models in software the hardware of a number of synthesizers and synthesis technologies – Amber is an Additive Synthesis plugin, Strobe a String Machine, and Cypher and FM Synthesizer. Whilst the other software synthesizers provided a collection of created patches, they offered few ways in which the user could alter those sounds or presets. DCAM Synth Squad, whilst authentically modeling vintage synthesis methods, gives the user full control over the sound produced. FXpansion are quite descriptive of their process of literally disassembling old synthesizers and rewriting the circuit in computer code. [12].

Consideration was given to why SPK had used a bass guitarist live, but there was little in their recordings of the instrument. Upon reflection it was realized that in the studio they may have multi tracked the EMS Synthi to provide both bass and lead lines in their music, and this was not possible to replicate live with only the one synthesizer.

The research on SPK's instrumentation is unique, but there was no opportunity to collect information on the specifics of sound patches that were used on those instruments.

In his blog, Stephen Mallinder of the band Cabaret Voltaire [13], provides responses from a number of music artists to the question "What do you feel has been lost as we have moved to predominantly digital forms of performance / playing live/ DJ'ing?" which include:

- *"The risk of technical failure. Living on the edge of the sequencer."*
- *"Theatre"*
- *"We've lost that big performance experience, where you need many musicians / instruments to create all the individual elements. All this can now be done in a single box by a single musician."*
- *"Spectacle, seeing somebody hunched over a laptop is never very interesting"*

To address these issues, though much of the music for this performance would be generated and played by laptops, it was necessary to have a substantial amount of the music played live to provide theatre, and for the performers to play not just the instruments, but roles within the group. The risk of technical failure was still apparent (perhaps heightened in terms of complete failure being a possible end result) in the use of computer-controlled material, and in the inclusion of live instruments.

### Archive This!

Though the intentions of the project were to investigate the requirements for archiving electronic music, the artifacts that might be left behind by this performance may not be useful for anyone in the future wishing to recreate it. Whilst the software files used in the project are available, they are in proprietary formats that realistically may not be readable in as little as 10 years.

Even during the development of the tracks, the two principal technologists of the project were unable to share files between two popular contemporary Digital Audio Workstation packages successfully. Whilst the software synthesizers worked in both DAW packages, again the format of these files is proprietary and changes are made to the codebase regularly to enhance functionality. Whilst documentation could be produced indicating exactly all of the settings of each part of the software synthesizer, this is complicated

largely because of the painstaking nature of the process and the potential for errors in transcription.

Unless substantial effort is expended in creating this documentation it would seem that while it is possible to utilise the Emulation methodology to re-create a performance, the methodology is reliant on the ears of the new performers without specific technical, documentation of the sounds to re-stage works. This indicates one type of documentation that is needed but not often included with scores of works for composers to be confident that their compositions will sound as they intended into the future.

Re-interpretation of electronic music works also relies on sympathetic performers and though it is perhaps not intended to deliver sonically accurate renditions, this methodology requires a broad and detailed understanding of the culture and technology surrounding a composition to deliver a performance that is not simply a work played in out of time, but takes something of the original and re-interprets it for a contemporary audience.

Migration may then be the only current methodology that could deliver verifiably sonically accurate performances, though this methodology also comes with a potentially high level of difficulty to undertake. For the purposes of this investigation, it was not possible to source working instruments to sample and migrate, and this speaks to the chief difficulty faced when adopting migration as a methodology: the reliance on functioning original instruments from which to create the base sounds. However, assuming this barrier can be overcome, it points to an intriguing situation - where synthesis offers a limitless world of sound possibilities, sampling of these sounds to rebuild them may be the most promising technology to capture the ability to perform their music.

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