# Contemporary Practices in the Performance and Sustainability of Computer Music Repertoire

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## ABSTRACT

An UnConference UnSession on Computer Music Performance was hosted on June 5, 2010 at the International Computer Music Conference in New York to initiate a dialog regarding the past practices, current state, challenges, and future opportunities for the field of computer music performance. Reflecting the inherently eclectic make-up of computer music, the unsession attracted a diverse group of performers, composers, researchers, computer scientists, sound engineers, and technicians. The event provided a rare and honest peek into what is on the minds of those who are focused on computer music performance, which, relative to computer music research and composition, is a largely undeveloped sub-discipline of computer music.

What follows in the main text of this paper and main content of the corresponding poster presentation is a brief and organized list of takeaways from the unsession unconference along with appropriately summarized elaboration. The takeaways centered on recurring interdependent themes: effective notation of computer music, sustainability, the role and responsibility of the performer and performer-engineer, and ultimately, the rationale and final authority governing sustainability. Sustainability was the unifying theme that tied together most of the discussion. This paper will be of interest to computer musicians whose primary creative activity is live performance/interpretation/realization, performers who specialize in contemporary music, composers who want to facilitate effective communication and collaboration with performers, concert producers, virtual instrument designers, music technology educators, and musicologists. More specifically, this paper delves into the salient points regarding the preservation of computer music repertoire and discusses the best practices for the facilitation of repeated performances.

## 1. INTRODUCTION

In pursuit of creating a forum for those interested in the art of computer music performance, An UnConference UnSession on Computer Music Performance was hosted on June 5, 2010 at the International Computer Music Conference in New York to initiate a dialog regarding the past practices, current state, challenges, and future opportunities for the sub-field of computer music performance. Reflecting the inherently eclectic make-up of computer music, the unsession attracted a diverse group of performers, composers, researchers, computer scientists, sound engineers, technicians, and general enthusiasts. The forum provided a rare, spontaneous, honest, and revealing peek into what is on the minds of those who are focused on computer music performance. (Baguyos 2011)

The documentation (for purposes of future research in computer music performance) of the 2010 UnConference UnSession on Computer Music Performance was intended to be disseminated in three parts. Part I of III was an introduction to the rationale and format of the unsession on computer music performance and was documented in the short article *An Unconference Unsession On Computer Music Performance* in the 2010 International Computer Music Conference *Proceedings* (Baguyos 2010). As documented in *Array* (2011) in the 11,000-word article *A Summary And Transcript Of The ICMC 2010 UnConference UnSession On Computer Music Performance,* Part II of III was a comprehensive but verbose and inherently scattershot transcript of the unsession. (Baguyos 2011) Part III of III, *Contemporary Practices in the Performance and Sustainability of Computer Music Repertoire*, is a salient, cogent list of clear takeaways from the Unconference Unsession on Computer Music Performance. It is intended to be a usable document for composers and performers of computer music, concert producers, instrument designers, educators, and musicologists, who want to incorporate battle-tested best practices in computer music performance as it pertains to sustainability of repertoire.



## 2. AREAS OF DISCUSSION

### 2.1 Notation

An effective approach to compose and notate for a laptop orchestra, mobile phone orchestra, or work using an alternative controller is to use high-level, platform-independent descriptors to communicate a musical gesture, regardless of the technology being utilized. In this scenario, laptop/phone/alternative controller performers would be completely responsible for the implementation of the gesture communicated from the composer, on their

chosen technology. One of the primary obstacles in composing for most laptop orchestras and mobile device orchestras is that the various members show up with a variety of platforms. While a composer could write software for each device in the ensemble, that approach might prove to be very time-consuming given all of the various operating systems and hardware. Furthermore, updates (driven either by the composer for artistic reasons or by the hardware/operating system for compatibility reasons) to the work become very problematic. The solution is to shift the burden of implementation of a musical idea to the performer. The composer need not implement directly, their musical gesture. Instead, the gesture is communicated as specifically as possible to the performer (graphically, with text, with standard notation, or with other non-traditional notation), and then the performer implements the gesture on their chosen technology. For example, the composer could indicate to the performer to create a sine wave vibrating at 100 Hz that changes to 200 Hz over 10 seconds (instead of telling the performer to press this yellow button that produces a 100 Hz sine wave and changes to 200 Hz over 10 seconds on the software that the composer wrote for the performer). In placing the implementation duty on the performer, the performer would have to figure out how they will produce the 100 Hz sine wave (whether in Max, cSound, PD, Ableton, or something else) and trigger it in musical time. In a more concise storyboard example, it's the difference between "Do a 3 Hz LFO for pitch vibrato on the fundamental frequency" versus "Click the LFO button on the Max patch that I gave you and I hope the patch works on your Windows98 machine running Max 4."

In other words, the composer's focus is on the musical output, rather than the technology that produces the output. Much of this sentiment is already in practice. Groups such as HELO (Huddersfield Experimental Laptop Orchestra) have been aligned with this philosophy for several years. (Hewitt 2010). More recently, groups such as KUDAC (Kingston University Digital Arts Collective) have followed suit with their "agnostic" approach that rejects singular approaches to implementation in favor of encouraging students to find their own practice and platforms in realizing musical requirements within a social learning context. (Ben-Tal 2014)

Not only is this approach of putting the onus for implementation on the performer more practical in terms of live performance realization, the approach also gives the composition a better chance to be reproduced in the future, a time where the implementation technology will be different than the time when the work was composed. Interestingly, research in notation for computer music overlaps with research in sustainability of computer music repertoire, because sustainability is dependent on notation.

Currently, outside of traditional notation, there is no universally accepted notation scheme. In some ways, computer music performance is similar to Indian music in that there is a very precise oral tradition requiring strict adherence to grammar, syntax, and protocol. But at the same time, there is no universal standard to facilitate the computer music performance tradition through written mediation other than standard musical notation. Until a corresponding notational tradition that effectively communicates computer music gestures emerges, text instructions (in a language that most people can understand) allow for precise mediation of musical gesture between composer and performer. Graphical depiction, not as precise as, but more intuitive than text, has also been implemented successfully. What has to be avoided is the notation of a knob turn, a button trigger, a menu selection, a radio button selection, a slider push, or a number entry that has no obvious connection to a musical structure and no meaning to the performer outside of the immediate implementation platform.

In the pursuit of precise documentation and best practices, a composer would benefit from being very clear about what is really important in their music, so performers can be sure to focus on what is truly important and not fixate on something that is not important, because precise documentation can sometimes communicate too much information. Another challenge is that performance traditions can affect even the most precisely documented musical ideas, and recordings may not always communicate accurately the intents and ideas of the composer. Furthermore, timbre-based compositions are more difficult to port to different technical implementations (relative to the porting of the compositional intents/ideas of pitch, rhythm, dynamics to other instruments and technical implementations). In the end, clarity in documentation of composer ideas and intents (summarized to the appropriate degree) should also communicate the larger, less-detailed formal gestures.

There is occasionally the situation where the ensemble director is able to provide to each musician the same hardware with the same operating system and same versions of applications to each musician. This is a very expensive strategy in terms of funding and maintenance from the outset, and it inevitably gives way to the introduction of non-conforming machines, anyway, due to loss of original machines that can't be replaced with the original model and original software, and growth of membership beyond available machines.

### 2.2 Sustainability

Sustainability, a work's chance of surviving far into the future, in computer music repertoire can be achieved by preserving the composer's musical gestures as a precise, well-documented, and platform-independent set of intents and ideas that could be replicated accurately with any current or future technology. This would be an improvement over the practice of bundling the set of intents and ideas within a single technological implementation with the hopes that the technology would not be rendered obsolete in the future. At the very least, a composer should identify and divide their computer music work into two portions: a "composition" (or "music parameter control") portion and an "instrument" (or "sound generation") portion. The two portions would be coupled at the premiere, but at any time in the future, each portion could be modified and updated independent of each other, and thereby eliminating the complexities of modifying both at the same time. The "composition" portion consists of the composer's intents and ideas and is communicated to the

performer through platform independent descriptors that communicate the desired musical gesture regardless of technical implementation. The "instrument" portion is the sound generation module and control interface appropriate for the sound generation module and the performer. Like the decoupling of composition and instrument in the centuries before computer-mediated music, the composer's intents and ideas are preserved regardless of updates to the implementation (instrument). Bach's *Well-tempered Clavier* works are preserved to this day partly because the platform independent notation of Bach's intents and ideas were preserved regardless of the implementation during Bach's day and implemented today on modern instruments (sometimes not even on a keyboard-based instrument). In short, decoupling composition and instrument follows what composers, performers, and instrument designers have been doing for centuries in that composers of keyboard music were not the keyboard makers, and neither were the keyboardists.

### 2.3 The Role of the Performer

Composers of computer music and performers of computer music look at sustainability from different perspectives. Performers can become attached to a work and are not finished with it until they stop performing it altogether, whereas composers like to be finished with the work and consider it to be more-or-less a fixed entity by the time post-premiere revisions are made and then the composer is on to the next work. Compounding the issue is a peculiar characteristic of computer music repertoire that is generally not found in other types of music, composers are writing pieces that can't be performed unless they are in the same room as the performer(s). Ideally, and assuming they enjoy performing a musical work, performers invest a considerable amount of time learning and preparing the work. Repeat performances are only in a performer's best interests. The performer should appear to be more motivated than the composers of the repertoire to keep their repertoire sustainable, and a composition's chances of sustainability are improved more so within the performer's domain.

Beyond the issue of sustainability is the overall expectation from performers regarding electronic music and musicianship. Emerging from the unsession was a collective notion that mirrored an idea that Mari Kimura had attempted to establish in her 1995 article regarding computer music performance practice in the *Computer Music Journal* where she stated, "Electronic music developed extremely rapidly in tandem with the development of technology, and we can expect performance problems in electronic music to continue emerging as technology continues to advance. My experience in performing electronic works has made me realize that a performer is accountable for *all* the sound that the audience hears—even the electronic sounds that might not be directly under the performer's control. Any performing artist intending to play before an audience in any "space" is responsible for learning about sound, in order to convey his or her art as effectively as possible." (Kimura 1995)

If performers are the ones who are accountable for the live realization and sustainability of a work, then there needs to be more formalized training for performers who are interested in computer music performance, so they do not get discouraged. If performers are the ones to implement platform independent ideas, they will need to understand digital audio theory, digital music programming, and synthesis techniques. This is in addition to their music theory. They will need to know about the performance tradition of computer music in addition to the performance tradition, literature, and history of the western art music genre. To date, the Peabody Conservatory is the only institution where performers can avail themselves of formal specialized training in computer music performance that results in a degree in computer music performance. However, the proliferation of music technology courses in college and secondary school curriculums makes computer music performance training (in all of its forms) available to performers who may be interested in the art and responsibilities of sustainability in computer music performance, regardless of the primary focus of a credentialing program. Another proposed idea is the creation of a computer music conference or forum for computer music performers where the aesthetics of performance drive the conference (versus the current paradigm at most conferences where the content of compositions drive the conference).

### 2.4 The Performer-Engineer

One emerging solution for more self-sufficient, efficient, and sustainable computer music performance is pairing the performer with a "performer-engineer" who also learns the repertoire like the performer and is responsible for making the technology work and who would be considered and recognized as an equal artistic partner to the performer and the composer. The performer-engineer is the one responsible for the successful facilitation of technical mediation between a composer's platform-independent intents and ideas and a performer's implementation. A performer-engineer would need to possess training in all the facets of the realization process such as composition, software development, software maintenance, hardware procurement and maintenance, systems integration, live sound reinforcement engineering, audio/visual support technology, concert production administration, and performance. Unfortunately, in many genres and arenas of various concert performance, the engineer is subordinate and relegated to a secondary status to the composer and/or performer. Under this arrangement, composers and performers cannot expect performer-engineers to invest themselves into the production of a work to the same level as a composer and performer. For starters, composers and performers, in their daily interactions and in concert performance, need to recognize the contributions of the performer-engineer and also recognize that a performer-engineer might be equipped to do more in the realization of a work and its sustainability for future performances. After recognition, the performer-engineer needs to be appointed as an equal partner to the team consisting of the composer and performer. This is not currently the paradigm, as the composer often doubles as the performer-engineer, and in some cases the performer doubles as the performer-engineer in a self-

engineered performance environment. However, in the interests of sustainability of computer music repertoire, a separate and distinct performer-engineer appointed as part of a performer's capacity (or part of a work's capacity) is paramount.

If a composer and/or performer does not have access to technically proficient performance engineers, then one suggestion for the composer is to explore the possibility of reducing interactivity to tape wherever possible. Currently, many computer music composers have fond notions of interactivity in their works, but this feature may come at the expense of sustainability.

### 2.5 Rationale and Final Authority

Discussions of sustainability in repertoire inevitably bring up the larger discussion of whether or not it is worth preserving a computer music work like classical music tries to preserve Beethoven. Is sustainability really an obligation? Furthermore, who really "owns" the musical work after the composer has passed away? The composer? The performers? The listeners? The musicologists? The teachers? Everyone seems to have a hand in what Beethoven is supposed to sound like. Who is going to say what is the pristine and ideal version of a work and how will that be achieved, since so many are involved in the realization of Beethoven, many of whom claim authority? Also to be considered is that some music is created for the moment and not meant to be preserved for replicable performances in the future (ephemeral music). It would be foolish to attempt to resolve this issue within this paper considering the scope of the discussion, but nonetheless, it is a consideration that should inform any discussion about sustainability in computer music repertoire. Like the discussion in the larger western art music field, the aforementioned questions went unresolved among the participants in the unsession. However, two points relating to obligations to sustainability in computer music repertoire emerged: 1) the main reason we perform a computer music work is because we like it, and 2) music made only for the moment can coexist beautifully in performance spheres alongside music made for the long-term, and that music made for the moment is not necessarily considered second-class because sustainability is not part of the intention of the composers and/or performers.

## 3. CONCLUSIONS

In an ideal setting, the discussion initiated at the UnConference UnSession on Computer Music Performance and this article's identification and elaboration of salient themes and topics will contribute to the establishment of performance and technical production practices, codify a lexicon of terms and techniques, solve some current challenges like sustainability and notation, and promote computer music performance as a legitimate artistic and professional endeavor within the academic computer music community, the broader mainstream classical community, the underground experimental community, and the commercial music communities.

Perhaps at the very least, a regularly scheduled conference (or unconference) of computer music performers could be established. If interest and resources are sustained, an academic society and journal that mirrors the academic societies and journals that promote computer music composition and research could be established as well. Given the very collegial atmosphere of the unsession, many great ideas were introduced and discussed, and if the unsession were any indicator, future forums (formal format or unsession/unconference format) would probably yield further progress and insight. Overall, the unsession experience was very optimistic in outlook as current challenges were addressed head-on, and demonstrated what Guy Garnett described about computer music in his 2001 article in the *Computer Music Journal*: "interactive computer music takes the fullest advantage of the ideas and technologies of today and unites them with a vision of what they could be." (Garnett 2001)

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