THE STUDENT TELEMATIC ENSEMBLE

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Overview

Technological innovations over the past decade have enabled the Internet to be used as a compelling medium for exploratory and experimental telematic performances. At the University of Alaska Fairbanks professors Scott Deal (music) and Miho Aoki (Computer Art) have been collaborating with the ART GRID Consortium to since 2003. ART GRID is an international consortium of universities and research centers comprised of artists, musicians, actors, dancers and technicians who create multi-media, multi-disciplinary concerts and performance events. Recent ART GRID performances include SIGGRAPH 2005 in Los Angeles and Super Computing Global 2005 in Seattle.

In 2006, Deal's and Aoki's research lead to the establishment of the student-based UAF Telematic Ensemble that performs on the Internet2 Access Grid Network. Performances discussed in this paper include *Dancing on the Banks of Packet Creek,* a work performed with Another Language Performing Arts Company (in Association with ART GRID); *Net Jam,* a distributed concert between UAF and the Sibelius Institute-based Helsinki Computer Orchestra under the direction of professor Shinji Kanki, and a distributed performance at this year's College Music Society *Videoconferencing Boot Camp* of James Oliverio's *Drumma,* performed by musicians at the University of Florida Digital Worlds Institute, University of South Carolina and the University of Alaska Fairbanks

Projects

"Dancing on the Banks of Packet Creek" was a real time multi-faceted telematic event consisting of six simultaneous performances occurring in six sites throughout North America. Actors, dancers, and musicians interacted with computer graphics and audio. Each site created its own artistic performance – with the six performances all coming together via the Access Grid to create a single integrated performance. Audience members were able to see and hear the activities taking place at all of the remote sites in addition to the action at their own local site. Participants included Purdue University Envision Center for Data Perceptualization, University of Alaska Fairbanks Arctic Region Supercomputing Center, University of Utah Center for High Performance Computing, Boston University, University of Maryland and Ryerson University.

Net Jam was an collaborative, improvisational concert performed between the Helsinki Computer Orchestra, under the direction of Shinji Kanki of the Sibelius Institute Center for Music and Technology, and the UAF Telematic Ensemble. In Finland, members of the the Helsinki Computer Orchestra performed with computers and an array of mixers and processors. In Alaska, 3 percussionists and one electronic musician received Helsinki's mix and improvised to it, sending their collective performance back to Finland to be heard and seen by a live audience.

Drumma, by James Oliverio was the composition used to showcase the live performance of a percussion ensemble whose members spanned over 5000 miles at this year's College Music Society "Pre-Conference Bootcamp" (Videoconferencing Workshop, September 13). *Drumma* is a rhythmically complex work that was performed using the *NetroNome Online Music Environment* (NOME), developed at the University of Florida's Digital Worlds Institute. *NetroNome* is an synchronization application that enables realtime high-precision performance without the distraction of latency. *NetroNome* syncs signals from remote sites before releasing the composite mix to a live performance space. Musicians from the University of Alaska Fairbanks, University of Florida, University of South Carolina and University of Texas San Antonio worked with the *NetroNome* throughout the summer leading up to the CMS Conference performance.

Important Issues

1. Internet Platform
It will be somewhat difficult to have multiple sites, or very high AV quality without access to the Internet2 network. The commercial, or commodity internet transfers information at roughly 10mps, where Internet2 will transfer at around 100mps. Many musical performance endeavors will be at a minimum of around 20mps, and could approach 60-70 mps. Within Internet2, the available platforms include H.323, Mpeg2, DVTS, and the Access Grid (AG).
Currently the two most most attractive options are the Access Grid and DVTS. DVTS is an uncompressed, ultra-high speed transfer mode that is the newest mode of file transfer. **Advantage:** relatively inexpensive and very effective. **Disadvantage:** eats up large volumes of bandwidth. The Access Grid is perhaps the most widely used videoconference mode in science and research communities, capable of hosting upwards of 100 sites in a single meeting. **Advantage:** available using free, open source software developed by Argon Laboratories, is easy to use, and requires a relatively low amount of bandwidth. **Disadvantage:** the AV quality is not as good as MPEG 2 or DVTS.

2. Equipment
In addition to high-speed connectivity (and assuming appropriate computer support), all sites need a good quality mixer, audio interface, good microphones, audio compression and expansion capability, an array of headphones and headphone mixer, multiple digital video cameras, video mixer, and appropriate studio lighting.

3. Personnel
This of course depends upon the kind of performance that is going to take place. Some participating sites have consisted of only one person operating on a desktop computer. However, when all sites are working together, a representation from the following areas should be involved from the beginning of a project: information technology specialists, artistic director, technical director, sound engineer, camera/ lighting person. Then of course there are the artistic participants who will determine what the nature of the performance shall be.

4. Space
Ultimately, performance space is not an issue. Some participants have used multi-million dollar "black-box" performance spaces, others have used their cubicle offices. Obviously if there is going to be a live audience, then a space should be a appropriate, but Internet is blind to the fact that the performer is not on a "real stage".

5. Scheduling
Scheduling is a formidable challenge. There is a direct correlation between the size and sophistication of a project and the difficulty in scheduling rehearsal times. At the local level, different class schedules between various departments involved can be complex. When working with sites in other time zones, the problem leaps by several orders of magnitude. In our work, often rehearsals were conducted as sectionals, with small groups working together. Total group rehearsals required careful planning weeks in advance, with compromises made by all sites.

6. Rehearsing the Technical Aspects
The success of of a performance rests on a carefully choreographed and well-rehearsed technical execution. Details of sound reproduction, transmission, cues, camera moves and lighting must be worked and re-worked until there is a consistency that is an acceptable level of professionalism.

Lessons Learned

1. Student Reaction
There was a very positive and enthusiastic student response. The post-course IAS (Instructional Assessment Survey) forms revealed a great deal of excitement about the concept of the ensemble, and this year there are more participants from a broader range of disciplines. Students commented upon the way that the experience opened up their thinking on the potential available to them, the interaction and relationship building with individuals from other sites globally, and the way that participation in the ensemble changed their relationship with more common music technology tools. For instance, proficiency with a program such as Logic would enable them to propose a broader range of tools for a telematic production.

2. Performance Dynamic
There is an intangible element to working live and online that is compelling for all involved, including the audience. This has been written about and expressed ever since artistic activity with live telecommunications have existed. This dynamic has much to do with the homogenization of artistic expression, conducted personally yet amplified collectively. As Roy Ascott (1989) wrote:

> "Telematic culture means, in short, that we do not think, see, or feel in isolation. Creativity is shared, authorship is distributed, but not in a way that denies the individual her authenticity or power of self creation, as rather crude models of collectivity might have done in the past. On the contrary, telematic culture amplifies the individual's capacity for creative thought and action, for more vivid and intense experience, for more informed perception, by enabling her to participate in the production of global vision through networked interaction with other minds..."

3. Latency
One of the real highlights over the last several years is the discovery that latency does not have to be a block to performing high-speed, high precision ensemble music over the Internet. A structured improvisation between Professors Deal and Charles Nichols (University of Montana) at the 2005 SIGGRAPH and SC Global conferences, between Alaska and Montana, were performed without the use of any synchronization. At the recent CMS performance, a more rhythmically complex work with larger forces was executed with a sync with very positive results.

4. Scheduling Rehearsals and Performances
The biggest challenges were not in the technology or in the difficulty of using software, hardware, or navigating the Internet2 network. The real challenge in coordinating a telematic ensemble lies in the the

cluster of individuals involved. Foremost among the relational challenges was in scheduling times to work together, as mentioned previously.

5. Forming a Creative Cluster of Artists

Another formidable challenge involved ensuring that the right kinds of experts were invested in the idea of creating a telematic performance and committed to a project. Busy schedules, unfamiliarity with the concept and lack of bandwidth access all contributed to making the assemblage of a working group a daunting experience. Yet, the inherent nature of telematics requires a collective sensibility. Therefore, identifying skilled individuals who are willing to invest time and energy in a project is a fundamental imperative.

6. Choosing and Developing a Concept

Determining the content of a work can be another difficult matter. A process of choosing a concept, then fitting pieces together from various sites grows in difficulty as the size of the project grows. Many productions tend towards a free-form, esoterical style requiring little precision or cohesiveness. Yet the author found this to wear on the enthusiasm of students and audience alike. Even though certain improvisational aspects are intrinsic to the telematic medium , careful planning of a concept well in advance of production work is nevertheless called for.

Conclusion

Telematic performance in a university student ensemble context, while not without dramatic logistical challenges, is a dynamic educational endeavor. The multi-disciplinary approach of forming a team of experts and supporters appears to be the most effective model. Issues of scheduling, access to bandwidth, equipment and other Internet sites are a constant. Students find great value in the experience, and it is a positive tool for developing their abilities to work with others outside of their discipline as well as their own environment. The development of these skills will be critical after graduation as they pursue professional work in the creative arena.

Reference

Ascott, R. 1990. "Is There Love in the Telematic Embrace?" *Art Journal.* New York: College Arts Association of America. 49:3. pp. 241-7.