Climate Change as Telematic Art

by Scott Deal

Our world is increasingly becoming a richly interconnected network where people can use computers to collaborate and communicate, creating new forms that previously have not been possible. The Internet harnesses a power so vast it enables immense numbers of online communities to play complex video games, craft innovative open source software, and perform massive group computations with millions of others worldwide. Business and economics have been revolutionized as global online marketplaces create a need for vast acres of storage complexes as new markets spring up rapidly. One of the new modes to emerge in this communications revolution combines computer interactivity with human aesthetic expression in a medium known as telematic art.

Telematic art synthesizes traditional art with media and information in a networked context. As a relatively new and cutting-edge artistic form, it presents a multidimensional experience that embodies a relevant Web-based ethos. In short, the telematic medium is an inherent art form of the Internet. The aesthetic dynamic of telematic art is centered on social intelligence processes within online partnerships. This means that performance and computer artists working remotely in real time foster a nuanced and sophisticated mode of interaction. As Roy Ascott (1990) wrote, "Telematic culture means, in short, that we do not think, see, or feel in isolation. Creativity is shared, authorship is distributed . . . enabling one to participate in the production of global vision through networked interaction with other minds."

Overview of Telematic Arts

Across North America, Europe, and Asia, artists from many backgrounds are launching exploratory telematic efforts aimed at applying new IT tools.While there are telematic creators throughout the online world, most reside within university settings. In the United States, universities such as Rensselaer Polytechnic Institute, the University of California San Diego (UCSD), Stanford University, New York University, the University of Utah, the University of Florida, and the University of Illinois Urbana-Champaign have active programs. In Europe, the Marcel Group based in France and England is developing a network of arts-minded net research- ers. In Asia, artists affiliated with universities in Singapore, Shanghai, Beijing, and Daejeon (Korea), to name a few, have also begun telematic performance efforts.

Two characteristics are worth noting at this point. Telematic efforts nearly always contain improvisational elements, and productions occur through the de- velopment of creative clusters of artists connected by the Internet. These clusters work together over time to develop a cohesive set of practices that enable execution of the performances. For example, Pauline Oliveros of Rensselaer, Mark Dresser of UCSD, and Chris Chafe of Stanford have been creating improvisationally based performances throughout the 2000s. The group is often directed by Sarah Weaver, who conducts using the Soundpath hand-signaling technique (Weaver 2009). Their work is developing ways to effectively transmit audio over high bandwidth networks such as Internet2. Of this work, Dresser (2009) writes:

> Telematics is an improviser and community medium. There is much to figure out and develop assembly and operation of the technology, multiple levels of protocol, communication, shape of the acoustics of the signal—and envisioning and experimenting with its artistic possibilities. How it will best serve music is a personal priority and an exciting, intriguing and open question.

Another active program is Syneme, a research group/studio/lab based at the Faculty of Fine Arts at the University of Calgary. It is directed by Ken Fields, the Canada Research Chair in Telemedia arts. Syneme's aim is to explore artistic practices that are enabled and enriched by networked digital technologies (particularly those that allow real-time engagement between participants). It asks, "How can we use the network itself as an artistic instrument, not merely a distribution channel?" To explore such questions, Syneme has focused on the development of Artsmesh, a platform that makes expressive telepresence on high-speed research networks possible. Syneme has collaborated extensively with artists in China, Singapore, Canada, and the United States.

Theater is another genre that has used the telematic medium with success- ful results. In 2006, collaborators based at the University of Alaska Fairbanks, in cooperation with the Arctic Region Supercomputing Center, produced Tony Award–winning playwright David Henry Hwang's *The Sound of a Voice*. Staged in a four-sided virtual reality "cave" environment, the allegorical play employed 3-D graphics and telematic music performed between musicians in Alaska, San Francisco, and Illinois. Live Internet theater has been the focus of Jimmy Miklavcic and Beth Miklavcic, co-directors of Another Language Performing Arts Company. The Miklavcics have been creating telematic "Interplays" over high-speed bandwidth since 2001 at the University of Utah Center for High Performance Computing (CHPC). These plays incorporate musicians, actors, dancers, and technicians, and all are based on a structured improvisational model of performance. An example of the kind of interactivity that occurs between performers is *Interplay: Dancing on the Banks of Packet Creek* (2006), a telematic event that consisted of simulta- neous performances from six remote sites throughout North America. Actors, dancers, and musicians interacted with computer graphics, musicians, dancers, ac- tors, video footage, data streams, and prepared audio. Each site created its own artistic performance, with all coming together via the Access Grid conferencing software 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. Participating sites included Purdue University Envision Center for Data Perceptualization, the University of Alaska Fairbanks Arctic Region Supercomputing Center, the University of Utah Center for High Performance Computing, Boston University, the University of Maryland, and Ryerson University (Deal 2006).

A common telematic performance environment is a small lecture theater or blackbox studio in a university setting. This is because telematic productions often rely on research-grade bandwidth such as Internet2 (Dresser 2009), which is rarely found beyond the grounds of large universities. In the future, high bandwidth access will spread into many kinds of performance venues: theaters, concert halls, are- nas, clubs, art galleries, and beyond. In fact, this process has been ongoing for some time, albeit through low-bandwidth networks. For example, Chicago Calling, an annual telematic festival directed by Daniel Godsen, occurs in schools, clubs, and many other locations throughout the Chicago area (http:// www.chicagocalling. org/). High-bandwidth Internet will remain a favorite mode of telecommunica- tions because it brings expressive potential and increased fidelity. Low-bandwidth Internet is compelling in a different way. Slow speed notwithstanding, it is *the* meeting place for an enormous number of collaborators throughout the world.

The precise coordination of music and other dynamic components of production points to one of the biggest challenges of performing telematically—the issue of timing, or latency. This arises because in all telecommunications, signals take time to arrive at their location. For example, latency between two cell phones is short because the audio-digital "packets" are small and compressed. Video packets are much larger and travel slower. An example of video latency is TV news, where two people can be observed holding a live conversation that is filled with noticeable pauses. There are many ways to deal with latency that won't be discussed here, but it is an ever-present issue in telematic art. Similarly, the better the quality of audio and video, the larger the latency factor. Since the performers are spread across a vast distance, the latency will generally fall within one or two seconds when using high- bandwidth lines such as Internet2. In the case of *Auksalaq*, all of the music will be notated rather than improvised, so precision techniques that operate naturally in a telematic environment are required.

Achieving synchronistic accuracy in telematic performances is a matter of combining good musicianship with practical networked realities. For example, performing rapid and rhythmically intricate passages between musicians is an effective musical experience with a popular heritage throughout music history. However, while possible in a telematic work, this is not naturally inherent over networks due to latency. In a telematic score, the same passage *could* be performed over networks, either by keeping the number of performers small or by employing synchroniza- tion software such as Netronome, developed at the Digital Worlds Institute at the University of Florida, to link players together (Deal 2006). However, a more inher- ent approach would be to perform the passage in one location between musicians, then send it over the network to be mixed or otherwise processed before reaching an audience. This is not to say that one cannot perform rapid musical passages with other online performers. In the 2005 production of *Interplay: Loose Minds in a Box*, the author successfully performed long, rapid passages in a percussion-electronic violin duet from Alaska with Charles Nichols at the University of Montana, for a performance at SIGGRAPH 2005 in Los Angeles. However successful this kind of performance is between two performers, the odds of successful execution dimin- ish with each added performer or production element.

Fundamentally, telematic art is an expressive action involving human-com- puter and human-computer-human interaction, where verbal and graphic narra- tives, musical concepts, data, and feedback combine with gestures to create a vivid information environment possessing media-IT dimensions. To be certain, there is a trade-off between the tried-and-true traditional artistic modes and more recent activities intended for the networked, media-enriched environments. On one hand, tested norms can be relied on to help ensure artistic success. On the other, distilling new creative processes in media environments illuminates emergent ideas.

Creation of *Auksalaq*

In 2007, while living in Fairbanks, Alaska, I considered the creation of a large telematic work that would draw content from the phenomenon known as climate change. The resulting project was given the working title *Auksalaq*, the Iñupiaq Eskimo word for "melting snow." *Auksalaq* is a live telematic piece performed si- multaneously in select venues worldwide.The libretto incorporates fragmented and conflicting perspectives about climate and environmental change in the Arctic and subarctic regions of the world. These accounts, portrayed in the form of a scientific commentary and interviews with residents of the North, are woven into a rich counterpoint of media, music, and data.
As a resident of Alaska from 1995 to 2007, I wanted to draw on my experience of climate change from the northern perspective, which, to be sure, differs from that of most other areas of the world. Climate change is simultaneously a scien- tific, cultural, political, economic, and social issue of global significance. A strong argument for creating the work is that the complex body of information being pro-duced about the phenomenon corresponds closely with content harnessed in the telematic medium, using many of the same tools and processes. To observe climate change is to deal with supercomputer models analyzing remote sensing, satellite imagery, native customs, and land-based observations spanning many decades.

For years, inhabitants of Alaska and related regions have been exposed to a steady drumbeat of media accounts of warmer winters and drier summers. Forest fires of epic proportions occurred in 2004 and 2005. It is not unusual to read news of the melting ice cap, the northward migration of flora and fauna, and retreating glaciers. Yet an interesting mix of constituencies in Alaska holds disparate views on climate change. Alaskans present opinions across the spectrum about the impact of climate change and how it should be dealt with. Additionally, a sizable indigenous population faces legal and economic issues associated with their changing lands. Neither scientists nor anyone else truly knows what will happen to the weather, but most people concur that something *is* happening and that the time for warn- ing about *possible* climate change may have passed. Going forward, adaptation will be the mode of thought when dealing with the climate. This collective of diverse views creates an environment where the climate is a "hot" and frequently debated topic in Alaska.

The elements in *Auksalaq* will include the before-mentioned social dialogue of the North, the changing nature of the climate, and the artistic use of scientific data. Artistically harnessing scientific information by running and manipulating large databases has been a popular mode of artistic expression in the electro-acoustic arts medium. Artists use algorithmic modeling, xy data, motion tracking/sensing, and a host of other functions to create original audio and video mixes. They also glean inspiration for those processes and exploit their intrinsic qualities.

Working plans call for the performance to occur simultaneously in selected venues in North America and Europe. While exact parameters have yet to be es- tablished, a theoretical lineup of performers includes a solo pianist, soprano solo- ist, percussion quintet, singers, wind ensemble, and dancers. Additional content will include scientific and social commentary, data feeds, and audio/video content prepared for live processing and manipulation. The performance will occur in a distributed fashion, meaning each of the sites will begin at the same clock time and will be connected via Internet to all of the other sites.
Since the multidisciplinary approach would be the working model, experts with differing skill sets were needed to co-create the foundations of the work. In my role as creator and producer, I felt that composer Matthew Burtner was the right person to pen the music and libretto. Currently an associate professor of composition at the University of Virginia, Matthew is a composer of electronic computer-based ecoacoustic works. The son of school teachers, Burtner grew up in the Alaska Bush. As good fortune would have it, when I approached Matthew, he had already conceived the idea of an opera on the Arctic himself, and so we decided to co-create the piece. Because the project also needed a strong scientist involved throughout, I asked my good friend Hajo Eicken, professor of geophysics at the University of Alaska Fairbanks, to be a consultant. We also collaborated with a spectrum of experts in diverse fields: scientists, graphic artists, computer techni- cians, engineers, and videographers. In the libretto by Burtner (2008), one of the primary narratives is:

> [the] story of a boy who left his village in the Arctic to travel the world, only to hear disturbing rumors about his home over the years, and so he returns. Simultaneously an environmental drama set at the North Pole plays out on a different stage. Here, char- acters personifying wind, sun, shifting ice, and clouds portray an ecology of ephemera and transition. The multimedia evokes the alien quality of the North Pole, a place where each day lasts one year, where all directions face south, and where floating ice and clouds create a constant shift of real place.
> The composition conveys "remoteness" by creating a spectacle that is both complete and incomplete in each location. This perception of both embodied and disembodied place creates a unique sense of attachment and intimacy to the per- formance. In this way *Auksalaq* captures a feeling experienced by people living in the Far North, a centered feeling of deep attachment to the land but also an uncomfortable sense of isolation. The people of the Arctic call this profound attachment to the land *Unganaqtuq Nuna* (Burtner 2005).

The performance of *Auksalaq* will render an effect of layering each site onto another, with overlapping entries of musical lines and media. Scientific data will be computer processed, enabling the artistic realization of the data feeds. While audi- ences at all sites will be able to observe the entire opera in performance, no site will have the same experience. Additionally, interactive elements will be built into the performance for observers as much as for performers. Audience members will be able to hold discussions with other viewers and performers at the end of the opera, and a virtual wall will enable them to post thoughts during the performance from their own computers or personal handheld devices. This allows the performance to continue after it has ended. Audiences will become participants in the performance as their interactivity continues to generate discussion and thought.

Figure 8.7.1. Singer Joan LaBarbara in performance of Auksalaq in New York at the Ear to the Earth Festival, with musicians online in Indianapolis, October 2010. Photo credit: Jill Steinberg LLC 2010.

Two musical sections of *Auksalaq*, as well as prepared electronics and media content, were premiered on April 24, 2010, at the Intermedia Festival held in Indianapolis, Indiana. *Six Quintets* for percussion was performed by Morris Palter, assistant professor of music at the University of Alaska Fairbanks, and the UAF student performing group Ensemble 64.8. *Iceprints* for solo pianist was performed by Los Angeles–based pianist Lily Popova. The event was produced by the IUPUI Telematic Ensemble.
A special concert version of *Auksalaq* was presented in New York at the *Ear to the Earth Festival* on October 31, 2010. This performance included selections from the *Six Percussion Quintets, Windprints, Cloudprints, Iceprints,* with arias sung by Joan LaBarbara that included *Auksalaq* and *Unganaqtuq Nuna*. Performers in- cluded musicians at New York University's Frederick Loewe Theater, connected via Internet2 high-speed bandwidth to musicians at the Donald Tavel Arts Technology Lab, IUPUI, located in Indianapolis.

References

Ascott, R. 1990. Is there love in the telematic embrace? *Art Journal* 49(3), 241–247.

Burtner, M. 2005. EcoAcoustic and shamanic technologies for multimedia performance and composition. *Organized Sound* 10(1).

Burtner, M. 2008. Auksalaq telematic opera proposal. Indiana University New Frontiers (Deal 2008).

Deal, S. 2006. Performance beyond place: Musical applications on Internet2. College Music Society National Conference, San Antonio, September 2006.

Deal, S. 2008. Telematic performance in an Internet2 environment. ANET II Conference, Banff, Alberta, Canada, April 2008.

Dresser, M. 2009. Telematics. All about jazz. Retrieved from http://www.al- laboutjazz.com/php/article.php?id=30198

Weaver, S. 2009. Telematic music performance practice: Transforming the sounds of time and space. *Leonardo Music Journal* 19, 95–96.