Diverse Instrument Symphonic Ensembles as a Strategy for Sustainable Innovation
By Jason Palamara

If the Anthropocene is characterized by human-driven ecological transformation, the traditional Western-instrument orchestra was founded as a musical analog, cutting trees into violin bodies, animal flesh into drumheads, and even digging up copper and nickel to fashion into flutes. While little research has been done to evaluate the total ecological impact of large musical ensembles (Prado-Guerra et al., 2020), it is logical that if traditional orchestral instruments (instruments used and continually valued over decades or even centuries) have any detrimental ecological impact, non-traditional, electronic instruments such as computers, speakers, mixers, and MIDI controllers – each with their requisite complement of cables and adaptors – must present an even more significant detriment to the environment. Moreover, suppose the central instrument of the computer music is to remain the computer. In that case, the field must address the problems inherent in using a technology intentionally manufactured to be momentary, expensive, wholly toxic to the environment, and, worst of all – short-lived due to purely capitalistic incentives which drive manufacturers into planned obsolescence (Aladeojebi, 2013).

The proposed model, a Diverse Instrument Symphonic Ensemble (DISEnsemble), is the musical inverse, not seeking to change the landscape but instead seeking increasingly environmentally neutral solutions to the task/problem of forward-looking musical innovation. The sustainable focus of a DISEnsemble exists throughout the "food chain," from repertoire to instruments to production; the technologies must be sustainably sourced (Trott, Even, and Frame, 2020).

This practice contradicts the general thrust of traditional technological musical pursuits, which generally require the best (not to mention expensive) cutting-edge technology powered primarily by lithium batteries and chips composed of similarly rare earth metals. Sustainably sourcing technological instruments and equipment solves many problems,

not the least of which is economic. As with academia writ large, many large ensemble leaders are undoubtedly finding that budgets are being stretched thin as enrollments are similarly declining (Fulk, 2023) at a rapid pace. By contrast, sustainably sourced technology is cheaper and may save the host institution money.

Background

Indiana University – Purdue University Indianapolis IUPUI's DISEnsemble was started in 2018 during more favorable economic conditions to meet the educational needs of a fast-growing department. While enrollment at IUPUI's Department of Music and Arts Technology has continued to grow steadily even throughout the past three years of upheaval, the evidence nationwide is that since the COVID-19 pandemic, enrollment at higher education institutions has been decreasing rapidly in the U.S. (Fischer, 2023).

With this prognosis in view, the outlook seems dire for large musical ensembles of all varieties, as they are traditionally the most complicated and expensive musical endeavors to support. Technology-focused ensembles may suffer even more tremendous strain, as they require more significant funding for expensive equipment and, often, lower enrollment than the traditional ensembles. The IUPUI DISEnsemble began with a mission of investigating hardware hacking and musical instrument development as a method for innovative music-making, so sustainability was built into the group from the beginning.

Methodology

Developing a methodology for the success of a group such as DISEnsemble is a radical and continual process, much more so for the uninitiated. This group has many of the traditional problems of a more conventional laptop orchestra but also some of the difficulties of a performing big-band jazz group (assuming it grows to the size of IUPUI's DISEnsemble). Some of the issues encountered by large orchestras, and yet more problems one might only encounter while trying to perform at televised awards shows like the Grammys. IUPUI's DISEnsemble has succeeded for the past five years by utilizing the following principles:

1. Engage in radical acceptance of any diverse instrument the student plays, assuming it is logistically possible and their skills are acceptable. Never place the needs of a chosen repertoire above or below the technological forces available at hand.

2. Approach all aspects of this group less as a music-performing ensemble and more as a musical production company, which employs performing musicians, sound engineers (mixing live and for documentation), visual media designers, lighting designers, instrument designers, and personnel who document the ensemble's activities for later dissemination. A DISEnsemble is less of a band or an orchestra and more of an ecosystem.

3. Wherever possible, acquire materials needed to pursue ensemble activities from sustainable sources. Donations, second-hand stores, and institutional surplus are all excellent sources that will contain practical options for music-making. For reference on music-making options from dilapidated or seemingly obsolete technology, see Nicholas Collins' book Handmade Electronic Music (Collins, 2009).

4. Since circuit-bending, hardware-hacking, and instrument design takes a very long time to produce successful results, encourage the long-term development of reproducible novel instruments, which will stay with the group as students move on and graduate. Students interested in this type of work may be shunted into a separate course (such as IUPUI's DISEnsemble Content Creator section) to avoid bogging down the performing ensemble's rehearsals with time-consuming (often failed) experiments. Use this separate course as a research and development lab for the main ensemble's activities.

5. Identify and promote promising ensemble members who exhibit natural leadership tendencies. A group in this manner is too complex to be run by one individual, which is why traditional orchestras and wind ensembles often developed to have section leaders. Leadership roles can take many forms in a group with this much instrumental diversity, but leaders must be clearly identified and promoted early. Leadership tasks and responsibilities must be delineated and standardized at any level possible.

6. The group must spend a significant amount of rehearsal and performance time improvising, which aids in the development of novel instrumental performance practice.

IUPUI's DISEnsemble (which has a continual open-door policy regarding technological donations) has often been gifted a device erroneously believed to be unusable when a simple workaround or hack was only a Google search away. Similarly, much of what ends up at a university surplus department is perfectly useable for various musical situations. Older PCs or outdated desktop computers can be wiped, cleaned, optimized, and used as musical instruments. Past examples of instruments and equipment successfully redeemed by the IUPUI DISEnsemble include The Apocalypse Piano (a novel method for piano preparation, electrification, and amplification using old speakers and almost-dead batteries), the Squish controller (a MIDI controller played with palms and fists), and a new kind of instrument cable called a DIS-cable (which facilitates easy amplification of nearly any RF-emitting device).

Once the DISEnsemble takes ownership of a new item, an exploration of its musical usefulness usually follows. Sometimes this process takes considerable time, leading to several devices sitting in a faculty office until the right opportunity presents itself. This approach reduces waste and carbon emissions associated with new instrument manufacturing and promotes the reuse of materials, extending their lifespan and minimizing their environmental impact (Brennan, 2020).

The DISEnsemble / University Surplus Bartering Pilot Project

Those involved in this musical pursuit must continually seek exciting devices or supplies. It is possible to take this practice of material scavenging too far. Some devices, products, or surplus items are too far gone to be musically redeemed. For this reason, the IUPUI DISEnsemble has recently devised a pilot program as a bartering partnership with IUPUI's University Surplus and the Office of Sustainability, hopefully serving as a pivotal new component of DISEnsemble's regular practice. Under the new initiative, DISEnsemble will no longer seek out musical

and audio equipment for its own needs but for the needs of the IUPUI community. Accordingly, DISEnsemble personnel will work with University Surplus staff to identify musical and audio equipment which is still useable, and these items will be placed in a lending library managed by the University Library Staff and loanable to any student or faculty member. In this way, the university will support the needs of its diverse students (many of whom are under-resourced) and cut down on the technological waste the university system produces. This initiative will also establish a sustainable exchange system within the university community, allowing members of the Music and Arts Technology Faculty to trade their unused equipment for new, usable equipment from the University Surplus. If this method of inter-departmental bartering proves helpful, it should be rolled out by the IUPUI Office of Sustainability soon. This initiative will not only make musical instruments more accessible to artists but will also reduce waste by repurposing idle equipment from university inventories (Cooper & Gutowski, 2017).

Future Prospects

Looking ahead, DISEnsemble aims to expand its reach and impact. The bartering project outlined above will hopefully cut down on university waste to such a significant degree that it will warrant scaling up the project's scope to the university community. By continuing to champion sustainability and creativity innovation in computer music, DISEnsemble seeks to inspire similar initiatives worldwide, fostering a global movement towards environmental awareness and action. Dissemination of these ideas could be a good thing for the environment and a way for computer musicians to continue innovating sustainably.

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