Designing Intent: Defining Critical Meaning for NIME Practitioners

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ABSTRACT
The ideation, conception and implementation of new musical interfaces and instruments provide more than the mere construction of digital objects. As physical and digital assemblages, interfaces also act as traces of the authoring entities that created them. Their intentions, likes, dislikes, and ultimate determinations of what is creatively useful all get embedded into the available choices of the interface. In this light, the self-perception of the musical HCI and instrument designer can be seen as occupying a primary importance in the instruments and interfaces that eventually come to be created. The work of a designer who self-identifies as an artist may result in a vastly different outcome than one who considers him or herself to be an entrepreneur, or a scientist, for example. These differing definitions of self as well as their HCI outcomes require their own means of critique, understanding and expectations. All too often, these definitions are unclear, or the considerations of overlapping means of critique remain unexamined.

In this paper, I offer five broad cultural categories for understanding contrasting histories, as well as creative and technical discourses surrounding musical HCI production, specifically relating to the New Instruments for Musical Expression community. These are offered to spur conversation toward a more complete and complex definition of the self as a designer and the objects of creation within this context, and are not intended to propose hard limitations or boundaries within the community. To the contrary, they are for consideration as porous and available to permutation and change as circumstance and the community at large sees fit.

Author Keywords
Design methods; design ethics; intent

ACM Classification
H.5.2 [Information Interfaces and Presentation] User Interface – Theory and methods, H.5.5 [Information Interfaces and Presentation] Sound and Music Computing – Methodologies and techniques, J.5 [Arts and Humanities] Media arts.

1. INTRODUCTION
Ewa Callahan's 2002 text "Interface Design and Culture" offers a framework to identify and outline issues of culture within the interface design community. Callahan defines culture as a complex social construction that encapsulates shared values, group behavioral patterns, mental models, and communication styles [3]. The definition of culture is important in framing a context in which the delineation of membership and shared historical background can be better understood. The following takes inspiration from Callahan's text and offers an application of cultural definition to the New Instruments for Musical Expressions (NIME) group, beginning with a brief historical outline of the organization.

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2. ORGANIZATIONAL BACKGROUND
NIME was founded in 2001 as a workshop of the ACM SIGCHI annual conference. The workshop focused specifically on the production of digital musical interfaces and was successful enough to continue on its own as an international annual conference that continues to the present. Although NIME was directly spawned from the SIGCHI community, its formal standing on its own self-description and the cultural effects of its activities seem murky in contrast to the clearly articulated official gestures of social relevance put forward by ACM SIGCHI.

In its rather lengthy public bylaws, SIGCHI describes its purpose as including questions regarding "...human factors in the interaction process" as well as "The role of computing and communications technology in social organizations and processes" [10]. NIME, by comparison offers no publicly available bylaws and only briefly describes itself as a conference that "gathers researchers and musicians from all over the world to share their knowledge and late-breaking work on new musical interface design" [9].

SIGCHI's bylaws in relation to NIME pose some intriguing questions: how and why did an organization that intrinsically involves the engagement of humanistic and ethical assumptions directly enable the formation of a group that seems to lack any official public expression of these perspectives? If NIME as an organization does not have a publicly expressed ethos, what are the intentions of the NIME members toward the devices they create and toward each other?

One answer poses NIME's framework as being a direct reaction to SIGCHI's organizational model. Many in the NIME community believe that the high cost of attending ACM SIGCHI events, as well as the rigidity of their categorical system to be an obstacle for creative inclusivity. In other words, although ACM SIGCHI's public-facing ethos seems to elicit a clear expectation of the functioning of the group, the realities of it publication requirements rely on categories that are outdated or poorly suited for work that does not fit into the established paradigm, thus limiting the inclusion of important perspectives that could provide growth within the organization. It is in part a rejection of these perceived inflexibilities that contributed to the creation of NIME and the NIME community.

This relational history is an important concern and one that bears careful thought from the outset: i.e. any effort at categorization should be sturdy enough to provide meaningful distribution of consideration and critique, but be plastic enough to adapt to communal and technological changes. Carefully considered categories, then, can be fluid enough to aid in providing touchstones for constructive self-criticism, and to avoid becoming mandatory round holes into which square pegs are expected to be placed.

3. Categories and Intersections

Adnan Marquez-Borbon and Paul Stapleton approach these questions by means of Jean Lave and Etienne Wegener's sociological framework of 'communities of practice.' They define this in terms of situational learning environments that are enacted primarily by means of social relations or 'knowing through practice' [8]. The varied nature of NIME practitioners presents complex multiplicities of these situations, which may be more aptly described as a 'community of communities'. This is the situation described by Gerhard Fischer as a 'community of interest,' in which people of different disciplines engage in a common task. This construction is illuminating in terms of a general approach to understanding the NIME community, but compels a more precise investigation of the nature of this commonality. To wit, there are more than one 'common tasks' present in a given practice and their goals often are at cross-purposes. Bringing these complex intentions into sharper focus can help to achieve a more meaningful engagement within the NIME community.

In order to begin clarifying and addressing these issues of intentionality and functionality, I put forward five areas of intentional practice within the NIME community, based on the published proceedings of the conference, publically available documentation, as well as my own observation of activities during the NIME conference. These areas are, broadly: Practical Research, Artistic Performance, Hacking/Making, Commercial Production, and Self Reflexivity.

This five-part framework is offered as means of highlighting more focused parts of a complex whole. They are not intended to set apart, but to bring to light new ways of interpreting and providing critical feedback for NIME practitioners. They are in no way presented as exclusive or absolute in their distinctions, as it is not uncommon for a practitioner to be in one or more of these camps simultaneously. The areas of concern are not proposed to separate individuals, but to allow many specific critical discourses to be enabled simultaneously. In this way, changes in evaluation criteria of work is shifted in relation to intended modalities of operation put forward by practitioners.

For example, a NIME could be extremely successful on a functional level, but the performance that results can be aesthetically ambivalent. In this case, it would seem appropriate to investigate the reasons why the NIME functions well, but also to offer a critique as to how to improve the way in which the project reads aesthetically. These varieties of critiques require expertise for each area under consideration. In light of this, the self-identity of the practitioner as well as their intentions may come to bear on how the project is to be presented and considered. An innocuous performance given by one who does not identify primarily as a performer perhaps should not be judged as harshly as one who does. It also opens up critique as to whether one who does not so identify should be the person performing. In this case, it may be more effective to embrace intentional differences, and allow composers to write new pieces for previously designed instruments to be included in the conference performances. This way, the conference platform would not force the creation and performance of musical works from those whose skills might lie in the creation of devices rather than pieces.

It is in this context that these critical areas can be understood. The following gives a more detailed definition and context for each.

3.1 Practical Research [PR]

This area is concerned primarily with producing results that can be applied to a specific investigative question or application relating to sound, interaction and performance. This includes developing new methods and tools for the analysis and synthesis of sound, using NIMEs in a therapeutic context, and solving previous functional limitations, to name a few. Specific applications include the development of algorithms for digital signal processing, adaptations of established applications and processes for new hardware, etc.

Although PR activity operates within the aegis of the creation of tools for artistic ends, they are not necessarily foregrounded in importance for practices within this area. Specific artistic expressions or aesthetic forms are often deprioritized in favor of an artistically neutral vessel, into which an exterior artist can transfer creative content.

A recent work that exhibits practical research characteristics can be found in the 2015 project "ml.lib: Robust, Cross-platform, Open-source Machine Learning for Max and Pure Data" by Jamie Bullock and Ali Momeni [2]. Their documentation describes their development of a library of externals created for the Max/MSP and Pure Data audio authoring environments. The externals allow for the use of various AI techniques like Markov models to be used for creative ends. The main thrust of the project and the documentation is to provide mechanisms for expressive work to be created, rather than the creation of a particular work, a criterion that would place the intent of this project firmly within the PR camp.

3.2 ARTISTIC PERFORMANCE [AP]

The positioning of the artistic gesture within the context of NIME culture immediately poses specificities and limitations. Perhaps the most immediate and obvious is the presence of the 'new' demarcation. Similar to other monikers such as 'new media,' the presence of a temporal qualifier points to an apriori limitation; that which is considered 'old' is to be excluded. In other words, the 'newness' here is technical, and the technical is prioritized. As a result, the nature of the performances and installations presented at NIME vary widely in content and intention.

It is indeed difficult to specifically define what characterizes a successful NIME performance, or indeed a NIME artist outside of the other three areas. Considering this, I have opted to delimit this group to those projects whose intent is to create a *specific* piece of music, musical practice, or sound-related art. This focus cedes issues of functionality and research to concerns over aesthetic effectiveness.

Activities that fall within this area include those who create NIMEs to extend their own performance practice, say, as a new method of obtaining sounds on an instrument that is already the main focus of their creative output. Also included within this region are those who approach NIME creation for an expressly artistic purpose in which the technological focus is a means to a more prioritized aesthetic or political statement, such as sound art installations.

Reinhard Gupfinger and Martin Kaltenbrunner's project *Urban Crickets* provides a clear illustration of the AP category. This work consists of small, inexpensive sound generating modules that create sound similar to the chirping of crickets. They are linked together by a cord and are designed to be tossed into telephone lines in urban areas. The devices intend an intrusion of simulated ecological life that mimics the localized action of tossing shoes into overhead lines [4].

As such, *Urban Crickets* does not solve a practical problem, nor does it provide a framework for others to generate creative work. Instead, it exists as a work in which the engineering detailed is intended almost entirely as a means to a specific expressive end.

3.3 Hacking / Making [HM]

A third territory of NIME practice relates to associations to more informal activities of 'hackers' and 'makers' that comprise an avowedly amateur technological practice. The implications of this more populist practice are important in that although they may resemble the more technically focused concerns of the PR region, maker-centered activities do not look to the technical validation mechanisms involved in PR practice. Neither do they overtly embrace any of the aesthetic pretensions or criteria of academic high art.

Instead, the MH practice occupies a sort of liminal space between PR and AP pursuits. The activity of makers in essence positions experimental amateur research practice as an artistic practice. Here, the result of the project is less important than the act of doing it.

Success in this case may not be measured by the creation of a meaningful aesthetic experience for an audience or to expand scientific knowledge, but to promote and explore a communal egalitarian embrace of trial and error and an embodied focus on technical and artistic learning.

Explicit MH examples are more difficult to locate in the proceedings, but there are direct references in the corpus of the NIME publications, most often highlighting the accessibility of low-level microprocessors. This can be seen in Ivica Ico Bukvic's 2014 text "Pd-L2Ork Raspberry Pi Toolkit as a Comprehensive Arduino Alternative in K-12 and Production Scenarios," which offers a microcontroller hardware alternative for formal K-12 and informal learning environments like the Maker Faire [1].

The relative lack of presence of the MH area in the NIME written corpus may be due to the nature of the proceedings format itself, as it tends to mimic the validation mechanisms present in academic art and science institutions. The results produced by MH activities tend not to be the type of knowledge production that can be easily quantified and evaluated in an academic conference proceedings format. More public reviewing methods, such as CHI's alt.chi area may provide some food for thought as to how to better include activities such as these within the NIME textual history.

That said, the overall structure and climate of the NIME conference tends to nurture these endeavors. The open nature of the performance and paper criteria enables a sort of 'big tent' to exist and within the NIME group, allowing the inclusion of amateur and non-academic works. The seeming absence of direct artistic critique can be viewed by some as a lack of rigor, and by others as embracing a non-judgmental atmosphere that allows a sort of variation on Kim Cascone's 'aesthetics of failure' as outlined in the NIME primer given numerous times at the conference [6].

3.4 Commercial Production [CP]

Paul Théberge offers French economist and sociologist André Piatier's working definition of innovation as when an: "idea or group of ideas (is) transformed into something that is used or sold [11]." The word usage here implying a widespread acceptance, presumably through commercial means. Théberge puts the impetus of innovation squarely on the shoulders of capitalism, as it requires a constant stream of new commodities. This necessity for the new fosters an environment of constant 'innovation' to create marketable goods [11].

Considering its role in the cycle of capital, innovation for Théberge is less about genius than a fortuitous alignment of social forces, technical effort, and timing. He gives many examples of potentially innovative designs that remain obscure because the inventors did not take mass production and market forces into account from the onset [11].

Théberge's framing of the discourse that surrounds innovation provides a distinctive criterion for the NIME commercial production discourse. That is, a direct intent to create NIMEs that reach a mass audience and to have their NIMEs produced on such a scale can be cause for inclusion in the commercial area.

Commercial intents can be differentiated in part from MH or PR production in that the creations of the latter two tend to be too idiosyncratic or costly to ever have a strong potential for innovation, at least not in the sense that Piatier describes.

For this area, mobile platforms may offer the most accessible route to the possibility of commercial innovation. The musical application company Smule, founded by NIME practitioners Ge Wang and Jeff Smith, evidences this. Smule creates high-visibility mobile NIME apps easily available for general consumption [12]. Although offered free of charge, Smule's Ocarina application is a clear instance of a NIME design that is intended from the outset to reach as large an audience as possible, falling in line with commercial requirements [13].

3.5 SELF REFLEXIVITY

This is an area that occupies a smaller portion of the overall NIME activities, but is nonetheless an important and exciting region of practice as it describes work that holds a mirror up to the NIME community and provides necessary critique and fresh evaluation of the group's activities and goals.

NIME is by design encouraging of practitioners with diverse intentions that allows for a constant state of self-definition and re-definitions, often seemingly contradictory. This dialectical tendency in terms of identity makes the community at once vibrant and hard to define. As such, the actions of those who work to identify trends and changes in the direction and makeup of the group provide important feedback to the systemic functioning of the group.

4. CATEGORIES IN COMPLEX ACTION

In many NIME projects and performances, divisions are not always clear. It is these situations that perhaps present the best opportunity to interject meaningful critique and dialogue surrounding NIME intentions and function. Applying critique based on each of the preceding areas in turn can point up strengths and weaknesses of NIME projects and afford the improvement of the collective output of NIME in toto.

Based on these categories we can pose five general critical questions when evaluating a specific category of intent in a given work:

1. Is it a system that solves a particular problem and/or affords only exterior creation?
2. Is it a specific art piece and/or extends a personal artistic practice?
3. Does it function as a method for trial and error or embodied learning?
4. Is it intended to be a mass-produced product that potentially could go to market?
5. It is intended to inform and/or or question the community about aspects of itself?

By comparing the strengths and weaknesses in these categories, a well-rounded critique can be offered that falls in line with the intended functionality of each work.

5. CASE STUDY No.1: GESTES PROJECT

To illustrate the possible operation and intersection of these categories, I will examine the *Visor*, *Rib* and *Spine* controllers by Ian Hattwick, Joseph Malloch and Marcelo Wanderley. These interfaces are designed to act as prosthetic instruments: enhancements to the body that act as synthetic extremities, enabling a performer (specifically a dancer) to control sound production. The prosthetics are constructed of clear plastic (with the exception of the *Spine*) and technologically extend the head, rib cage and backbone respectively. In performance, the sensor-laden prosthetics produce a blue glow that permeates through the transparent plastic of their construction [5]. The following is an examination of this project in terms of the five areas described, with an additional paragraph of resulting assessment and critiques.

5.1 Practical Research

The project documentation concentrates primarily on questions of manufacturing the instruments. They outline four distinct methods of manufacture: 'artisanal' (handmade by the artists themselves), 'building block' (which combines existing forms), 'rapid prototyping' (processes such as CNC routing and 3D printing), and 'industrial techniques,' which are the most expensive, but the most robust [5].

These manufacturing subdivisions are connected to the design process of the prosthetics in what the authors call 'artist spec,' which the authors compare to military specifications in terms of functional rigor [5]. They further illustrate how each of their previously outlined

subsections applied to specific focuses and problems associated with the manufacture of their own instruments.

Due to the preponderance of material devoted to manufacture and functioning, this project exhibits PR characteristics most strongly. This region of the project is clearly the most developed and displays a high level of lucid, direct detail.

5.2 Artistic Performance

The authors make it clear that any discussion of conceptual and aesthetic values that informed their design decisions will not be included in the NIME text and instead can be found elsewhere [5]. The reader is referred to co-designer Joseph Malloch's PhD dissertation for information regarding the design philosophy of the devices. In his dissertation, Malloch details some of the aesthetic concerns that went into the design process. These include the intent to design objects that do not mimic human flesh, but that seem to evoke "an existing … cultural and practical context and are not merely props or costumes [7]. "

Despite this, there is some effort to address aesthetic concerns within the NIME text. The authors illustrate a change in design from their initial intention of having the components visible. Clear plastic designs were chosen in order to achieve a "…desired visual impact [5]."

This area stands in contrast to the PR area as it is not as clear, nor is it (partially by design) as complete. Despite the authors' redirection of artistic conceptions, there is evidence that there was a good deal of aesthetic effort put into the project, but the critical artistic positioning of the authors is obscured. A more robust explication of this effort in terms of the authors' intended socio-historical function, influence, and context would go along way toward clarifying the aesthetic expectations for potential users and audiences.

5.3 Hacker/Maker and Commercial Production

The authors are clear in the type and status of performer and performance with which they intend their work to be used. In their introduction, Hattwick et al locate their objects within a clearly Western art tradition by indicating their instruments are designed to be utilized "within a professional artistic context, including a series of high-profile performances [5]."

Despite this, the methodology used showed many aspects of the trial and error characteristics of the HM area. Their inclusion of rapid prototyping techniques as well as their hands-on activities is also indicative of HM practice of embodied learning.

These ambiguities of position are further complicated with an appeal to 'professional' quality standards and references to commercial production methods as being a superior, desirable manufacturing standard. These would indicate a partial intention toward the CP area and points toward questions of how the project is foreseen as existing physically in this context – are the techniques and objects here presented as a progression from DIY prototyping to mass-produced objects? If not, a more specific presentation of how the authors understand 'professional' within this context would do much to clarify how the project is meant to function in terms of localized production, mass market manufacture and its effect on the aesthetic meaning afforded by the process.

6. CASE STUDY No.2: CORONIUM 3500

In contrast to the more practical research focus of the *Gestes Project*, this work is intended from the beginning to function as a vehicle of personal artistic expression for the author. Although he has distinct activity in other areas, the vision of this projects stems, in a large part, from specific aesthetic as well as historical interests of the author. The work is an installation of an array of semi-autonomous sound-producing units that rely on solar power for their functioning as well as their interactivity. The piece is site-specific and the aural content is carefully curated to fit its installation area.

6.1 Practical Research

Smallwood's research areas include what he terms 'solarsonics,' that is, the utilization of solar energy not only as a sole power source, but as a point of interaction as well. The concept originally came from an attempt to power a laptop orchestra entirely from the sun. When the solar power necessary for laptops proved to be too great, he investigated what types of devices *could* be enabled and what that might mean in terms of aesthetics and control [14].

The technical requirements of designing and implementing the software and hardware to enable this seemingly simple concept are laid out in detail by the author, who describes the components and software involved, as well as the process of creating functional devices and sounds.

6.2 Artistic Performance

For Smallwood, this was specified as a primary concern. The piece was designed from the outset as one that would work within a predefined technical specification, but would also achieve four specific aesthetic goals: 1. It should "celebrate full, direct sunlight," 2. Its interactivity should be based on discovery, 3. The piece should appear to 'belong' in the area in which it was installed, and 4. It should honor the life of electronic music pioneer Lucie Rosen [14].

By 'celebrating sunlight' Smallwood aligns his artistic concerns with his technical research goals, in that the technical system that enables the project's functioning should not only be activated by sunlight, but must be an active participant in its installation environment as well; the piece must appear to be a 'joyful' part of its surroundings.

The placement and interactive functioning of this system is also designed to maximize aesthetic concerns. Because the units rely on solar power exclusively, their power supply can be interrupted and altered by persons interacting with the piece. This, combined with a stated desire to hold the natural space of the installation area in high regard, prioritizes the personal interaction with this piece in the specific place in which it is installed.

6.3 Hacker/Maker

Although there are no overt intentions posited toward the HM subgroup of activities, elements of its influence are observable. The author relays that his previous efforts at creating a solar power system for laptop orchestras had failed, but inspired a further exploration of the creative potential of this failure. In other words, he has converted a technical failure into an aesthetic quality, which is directly in line with the 'aesthetics of failure' at play in the NIME community.

Smallwood describes that the housing materials used to construct the *PVC Peepers* devices as being repurposed junction boxes found at any hardware store. This action seems as much a nod to convenience as it is to intentional material up-cycling, but it is certainly not an aesthetic hindrance. Considering the importance of aesthetic concerns to the author, it seems reasonable to conclude that functional 'hacking' impulses played some role in the decision [14].

Other links to HM activities can be seen in Smallwood's description of the CMOS logic and AVR chips that he used to provide audio synthesis in the piece. He references Nicolas Collins in noting that the components involved are ones that are "widely used in the hardware hacking world for lo-fidelity audio sources [14]." Here he indicates that the project itself relies and expects a lo-fi experience, which points to an influence of the HM culture on the overall aesthetic, even if the

goals of the HM subgroup are not the primary concern of the work.

6.4 Commercial Production

This area is perhaps the least emphasized in this project. As it is designed to be a singular sound installation, the author does not explicitly express any intent toward mass or commercial production. That said, there are several mass-produced devices used and it might be conceivable for the project to be adapted to a kit form, although he lays out no overt plans to this end.

6.5 Self Reflexivity

Although there is not much overt dissection of the meaning of the piece in relation to the NIME community, this project does exhibit self-reflexivity in a number of ways.

First, the author openly reflects Lucy Rosen's legacy in the context of gendered technological production. Rosen was an early advocate for and performer on the theremin electronic instrument. This was done at a time where electronic music was in its infancy and when the association of women with electronics and technical proficiency was not taken seriously by a male-dominated society. In this way, the piece makes an effort to address the continuing tendency for the work of women in electronic music to be marginalized.

The piece is also reflexive to the space in which it is installed, as the author seeks to use tones that blend in with the natural soundscape of the installation area, and made extensive recordings of same to produce sonic material influenced by sounds pulled from aural cues of the area.

7. CONCLUSION

In sum, by comparing the relative strengths within and between the initial five critical areas presented here, a given NIME work can be assessed based on criteria drawn from the areas of practice generated from within the community. Furthermore, the consideration of how the intention and design of a project functions across these five areas will help to initiate a critical standard that speaks across divisions of subcultural disciplines, enriching the discourse within the NIME community.

The critical framework offered here is not intended to introduce any sort of hierarchy or valuation between groups, or to highlight unnecessary divisions. Nor is meant to be a complete account of a very complex culture. Rather, it is put forward as a point of entry into a heightened awareness and conversation about intention, identity and the NIME community. Its intent is to begin a conversation around critical specificity with the hope that by limiting ambiguity and ambiguous criteria for critique, it will lead to a questioning of the reproduction of limited norms, and allow for new critical and performative practices to emerge.

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