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## DESIGNING AND DEVELOPING USER-CENTRED SYSTEMS

*Sean McGrath*

iSchool, Department of Languages, Information and Communication  
Manchester Metropolitan University  
Manchester, UK.

s.mcgrath@mmu.ac.uk

### ABSTRACT

Our work explores the implications for the design, development and deployment of interactive music production tools through the lens of user experience design. We offer a toolkit for those interested in building human-centred software within the audio production and performance space. The work is enabled through identification of key concerns and challenges for designing software that is both usable and useful - through the exploration of in the wild engagements. We explore the rich context of music making in-situ, highlighting the roles, features and complexities of making music in a modular, disparate and often non-linear way. The work identifies three key roles within the space and discuss the interplay between said roles. The work relates these roles to key agendas within the music production process, discussing how agendas and tools to support said agendas must change over time, supporting not only stereotypical production practice but fringe cases on the periphery of what we consider to be traditional practice. The culmination of the work proposes an updated set of heuristics, loosely based on those proposed by Jakob Nielsen and Donald Norman. The proposed design implications relate specifically to music making activities and offer a framework to produce more usable, accessible and aesthetically pleasant digital technologies in supporting production and performance.

### 1. USER EXPERIENCE DESIGN

#### 1.1. Exploring Complexity

We recognise that complexity exists within the given context of music making [1]. However, we propose that through careful design and development, technology can craft user experiences which manage this complexity and prevent technology from becoming complicated. If we take traditional instruments as an example, they afford a multitude of opportunities while limiting technical scope. This limitation may be a physical one for example in the properties of a percussion instrument or may exist in the musical form of limitations of key, tonality, mode and such. These constraints by proxy afford creative opportunities wherein the technical usage (ie playing) manifests as a creative endeavour. In this sense the activity does not necessarily constitute a prescribed workflow. When we compare these traditional systems to modern digital audio workstations, the embedded

creative practices albeit fundamentally different, remain a creative challenge. Efforts such as mixing, balancing and equalising are examples of activities which require both implicit technical knowledge and explication of techniques to afford the manifestation of these skills in an end product such as a well-balanced mix. While a workflow may exist in this process that would be loosely similar to an individual taking part in deliberate practice of an instrument, there are still creative decisions to be made. In practice this might involve exploring a new technique such as double thumbing a bass guitar or a pinch harmonic on an electric guitar. Similarly, engineers engage in these sorts of creative practices on a daily basis, exploring new and interesting methods of interaction. In this sense we must explore similar questions to those proposed to luthiers, ie how do we design pleasant experiences?

#### 1.2. Finding a Balance

In exploring user-centred design through the lens of music technology we can look at previous examples of work in how they have encapsulated these issues. The work by McGrath et al [2,3] provides a good foundation in understanding some of the challenges that are present in music making environments, from on the road musicians to social music making and contemporary grime production. This work explores the complexity of human-computer interaction through the identification of dynamically adaptive workflows and explores the manifestation of practices associated with a complex and evolving method of production. This is not to say that the commercial interests of DAW producers is invalidated, nor that the enhanced functionality within these settings lacks utility. Our work aims to explore a holistic approach in appreciating the complex and evolving needs of users against an ever changing landscape. In essence the work can be likened to offering a painter an unlimited choice of canvas, palette and techniques. The tools offered are very effective and there is at least one appropriate tool for each task in the settings explored. With that said, we shift back to the perspective of complexity vs complicated and try to envisage a holistic solution that would fall in line with traditional usability goals, that is to be effective, efficient and enjoyable to use. Are these goals tangible in any given setting or are the goals at odds with one another in the setting of music production?

## 2. DESIGN PATTERNS

While there is clearly a mismatch between the functional, creative, aesthetic and workflow oriented goals of users in this setting, we have to explore strategies which allow these intentions to be mitigated against one another. For instance, when exploring aesthetics through new and interesting designs, we lose out on the functional goals of effectiveness in efficiency by changing the flow and interactions between human and machine. If we were to propose this new design as an analogy to a new concept of an instrument, we would likely take some inspiration from an array of existing options [4]. Most instruments fall into defined categories e.g. string or wind instruments and all instruments fall into the realm of being capable of producing sound in one form or another. Whichever design we choose in this setting is likely to offset issues and create problems for specific groups of users. The size of the instrument in relation to the performer for instance may begin to create issues. How then can we begin to explore the DAW as a functional, aesthetic, workflow oriented tool without losing the flavour of what it means to be creative? We do not necessarily assume in this instance that creativity is about exploring opportunities for innovation, but instead as a means to offer a contextual limitation in order to provoke creativity within a user or use case. In reference to our previous analogy, the thought of an instrument in being creative is proposterous. However, when we see the instrument as a tool with limited range, interaction modes and methodologies, these limitations inspire creativity through exploration and play. However, an instrument does not simply exist as a tool to promote creativity. It also serves a functional purpose with individual characteristics such as tone, warmth, ambience etc. If we were to compare acoustic guitars, their functionality remains similar though the user experience of engaging with said instrument for an intended purpose differs vastly.

## 3. DEFINING USERS AND USE CASES

Through a series of workshops we were able to elicit a multitude of goals, intentions and usage. These are defined as follows:

### Performer

- The performer is defined as a musical individual, where they may or may not have technological knowledge about the systems they are using.
- The performer is described as someone who has an intimate understanding of the music they write and perform.
- The performer has particular goals in either live performance (playing,) composition or to communicate with other members of the overall system.

- Other members that they may wish to communicate with include performers, producers or agents. In some instances, the performer and producer can be the same individual or group and are not mutually exclusive.

### Producer

- The producer is defined as someone who works with technology, in some instances exclusively.
- Musical knowledge is not imperative for this role, but the producer must have a thorough working knowledge of how digital audio workstations can be used.
- Here the focus is on taking input from performers and agents and working on a compromised version of a solution that matches the requirements of both agents and performers.
- Live producers and sound engineers are also included in this definition.

### Agent

- The agent is described as any user which does not directly contribute to the production or performance element of music, but has a supporting role in the process.
- Here, the agent may be defined as a representative from a recording label, the management of a band or an external stakeholder such as a financier or even a fan.
- The agent relies on technology for more general usage scenarios such as communication, time management, planning and project scheduling.

## 4. ADAPTIVE ROLES

In understanding and appreciating the complexity of these systems, we now have a framework by which to identify both users and use cases. In some instances, individuals may fall into none, one or all of these categories. In this case, we can explore each working setting and backpropagate through both design and evaluation in exploring these contexts through newly defined roles. For instance, when we are building a system to support songwriting, the performer is the core user designed for within this setting. This is not to say that we can ignore the role of the producer in bringing these visions to reality or in the role of the agent in financing or supporting the product. Indeed there are a number of contextual focus points and agendas at play [5,6,7]. In the single use case of the performer, we may identify design goals for our system which utilise flow, emerging patterns in interaction and encouragement of creativity. These goals however may be at odd with the workflow of the overall

process and in relation to the stakeholders we have defined. For instance, what if the performer writes a piece that is never performed or recorded? This choice might conflict with the objectives of the engineers and the record label involved in marketing the material. In the same sense, if fans were unable to engage with the performer in some manner then they may become disillusioned or may fail to discover new music by their favourite artist. In the sense that systems are no longer secluded, neither are parties involved in this process. As such, technology can be used as a vessel to improve communication, exploration of ideas, concepts and engagement. The overall aim here is to offer a framework to improve the overall user experience of music making as a process [7, 8]. As presented in the examples, there is also value in looking at isolated contexts and designing systems with a greater vision and clarity.

## 5. CONCLUSION

The framework presented is a first pass at a system to consider in the design and evaluation of musical systems through a user-centred perspective. Through considering a broad spectrum of users and use cases, even from the potential situation of a single user with multiple goals, we can begin to understand the complexity of the working space. In this effort we can begin to mitigate the challenges and concerns herein to design pleasant user interfaces and experiences [9]. For instance, in supporting the inefficiencies that exist in a production space, we can identify each use case from these three roles and consider, through this contextual lens, the weight to give to each issue. While the work offers utility in identifying issues, it does not yet hold value in contextualising and categorising issues in formal cases [10]. The work that is present suggests a first pass at identifying issues in design and evaluation, preferably before implementation, in order to substantiate a more usable system. The aim here is to drive wider contextual focus and consider the implications that design features might have on users and usage. Future work expanding in this area would cover a broader spectrum of issues and offer a means by which to evaluate or code issues according to severity.

## 6. REFERENCES

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