Making Music Together: An Exploration of Amateur and Pro-Am *Grime* Music Production

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ABSTRACT

This novel research presents the results of an ethnographic study, which focused upon the production of an EP created by an amateur and a pro-amateur producer. The research presents their production practices across the production workflow, from inception and ideation through to completion. The paper describes the distinct processes that occur when collaborating on the production of the EP. The exploration here discusses the use of software systems to facilitate production of a series of music tracks. We further explicate the use of technologies in the production settings, and these range from mobile devices (smartphones) through to digital audio workstations. Further to this, we start to map out how the technology used affords and supports collaboration and communication across a distributed context. We respond to our findings by presenting a series of design implications that address the research.

Keywords

Music; Production; Ethnography; Amateur; Professional; Co-production; Collaboration; HCI, Creativity; Innovation; Audio; Digital; Workstations.

ACM Classification Keywords

J.4 Computer Applications - Social and Behavioural Sciences: *Sociology*.

1. INTRODUCTION

This research focuses upon a specific group of users, amateurs and pro-amateurs, both with differing experience of creating and producing music using digital technologies. We present the collaborative efforts of an amateur and a pro-amateur in their endeavor to create music. Individuals here work within the space of an emerging genre of music, grime. We placed our focus upon this emergent scene, as we had previously worked in the area and had developed an insight into some of the existing production practices, this is a key element of our research methodology. The scenarios afforded us the opportunity to examine production practices that revolved around sampling digital audio from an eclectic range of sources in their writing and production practice. Ethnographic methods enable a rich exploration of context and have been used in this space to uncover the intricacies of working practice [1] and go beyond prevailing assumptions to explore social and contextual issues therein [5].

Draft doc, with other MRL audio papers tagged on the end for reference

We were also able to explore issues relating to both distributed collaboration and the application of different levels of technical (music knowledge) and technological (production) skill. We recognize that new web technologies have changed the way that people engage with music socially [3] and also consider this an important factor in our work. This research offers an insight into the aforementioned themes that has yet to be fully rendered in an ethnographic way, in respect to the fields of HCI or CSCW.

The design and development of software systems for musicians has been explored in context [13]. Much of the research within this space considers the important factor to be the context of use [14,26,30]. While novel insights into these particular cases are useful in informing the design of future systems, the world of grime music production is still largely unexplored. With the rise of bedroom producers [21], this research offers an insight into an evolving, vibrant and important section of the music production community which has thus far been largely overlooked. The themes used to frame professional production research often focus upon efficiency and effectiveness. These are certainly relevant in a professional studio setting, as both time and resources are allocated to a project, and as the old adage goes "*time is money*". As part of our research we visited Abbey Rd Studios, where a studio can cost £3500 (excl. VAT) a day, with studio engineers costing up to £1000 a day, and the use of Avid's Pro Tools[1] and operator is an additional £500. The amateur and pro-amateur context presents a unique set of research challenges that differ greatly from that of a professional production scenario [20]. In order to fully understand and appreciate the world of the Am/Pro-Am producer in a detailed manner we have taken an ethnographic approach to both explicate and appreciate the practices associated with music production, which provides a rich contextual account and help in informing the design and development of production and performance systems [1,5]. The work here aims to build on existing research into designing and developing information systems for amateur musicians [25]. It is also important to tease out some of the challenges presented in using modern computer systems to create music in a collaborative and cohesive way [8,15,27]. Ethnographic approaches enable the exploration of complex social structures and environments through participation and involvement of the researcher [22,23]. Ethnography enables the exploration of context through observation and presents opportunities to ask questions and discuss motivations and reasoning, offering a 'way of seeing.' [31]. Ethnography provides one with the tools to begin to untangle the complexities of working practices and provides a social understanding that moves beyond objects and environments [22]. Through this contextually rich method of exploration, a holistic view of working practice can be considered, highlighting issues that other approaches and methods may fail to explore [11] Here the aim is to utilize

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techniques such as observation and discussion [28] to define and describe the working patterns and behaviors taking place [10,11,12,16].

2. METHODOLOGY

A key part of our ethnographic analytic relates to what is termed, "*vulgar competence*", that is to say in order to understand the practices of participants/members, one must first become a member[16]. Two researchers were involved in these studies; both had skills relating to music production, both had worked in music production research. Both had written on the grime scene [7], amateur music production [19], digital instrument design [4][24] and music consumption [6]. Visits took place up to three times a week. Each visit typically lasted between half an hour and two hours. Participants were observed in their working environment over the course of the development of their EP. Informal interviews also guided the work, taking place at the end of the week - discussing events of the week and future plans. The location varied from week to week. Often the visits are in one of the participants' homes and sometimes, involved being with the participant while travelling. This enabled us to capture the practices surrounding the music production process such as supporting activities, including; discussions about production, planning and ideation.

Multiple forms of data were captured. Notes, photographs, audio files and telephone conversations are used where visits cannot be organized. The researcher has access to a private discussion group on WhatsApp. WhatsApp is a cross platform instant messaging service for mobile phones. Messages can contain text, media or a mix of both.

2.1.1 Participants and Production

Our attention was focused upon the work of two participants who worked collaboratively on the production of grime EP. The participants were know to the researchers and sampled in a purposive manner. The study was not based in explicating the differences between Pro-Am and amateur production, but focused upon their 'working' practices. *Participant 1 (A)* is an amateur rapper, with some experience playing the bass guitar and keyboards and some production experience. *Participant 2 (P)* is a pro-amateur electronic dance, grime, Dubstep and old school Garage music producer, working in a semi-professional capacity. The amateur and pro-amateur complete much of their work in different locations; therefore there is a need for technology to mediate between both parties. Much of their communication and collaboration happens online, through various social media tools and via e-mail and telephone conversations. Each individual uses their own laptops for production, including different digital audio workstations. The amateur and pro-amateur have worked together for several years, culminating in the production of multiple tracks and collaborative efforts manifesting in music videos on YouTube and productions for pirate radio stations. They have previously produced two records and several music videos. The amateur performs live in a number of settings, ranging from open-mic nights to digital radio and in collaboration with popular YouTube personalities. The pro-amateur works part-time as a DJ in the evenings and at weekends he works as a mix engineer in a small, independent studio. During live performances, the Pro-Am integrates many of his compositions and remixes into his set list of tracks. The amateur features on a number of projects in collaboration with professional artists and producers. Both the Am and Pro-Am profess a passion for producing and performing music in this setting, with a varied set of skills and experience. Each grew up listening to the emergent genre in various forms:

dance, old school garage, dubstep and eventually grime. Their motivation for working together is that the partnership has yielded successful productions in the past and that their workflows, "do not conflict". They listen to a similar library of audio therefore they have what they describe as a, "shared vision" of good production in this space.

3. PRODUCTION OVERVIEW

The artists typically work in different physical spaces and at different ends of the workflow. The amateur focuses on creative production and editing practice, wherein he writes lyrics and fits them to an appropriate melody. Through a series of iterative edits and feedback from the Pro-Am, the production is then, 'handed over' to be mixed and in some cases re-produced using more advanced tools and capitalizing on the broader skill set of the Pro-Am. For the purpose of this work, we follow the work of the amateur in describing his workflow and the mediation that happens between him and an external party, the Pro-Am. The term workflow hereafter will refer to the process undertaken by the amateur.

3.1 Workflow

The work here discusses management of a collection of sounds (library) and the process of creating a track (workflow.) Much of the work here explores the use of the digital audio workstation (DAW.) In the context of this study, the amateur producer's work is the main point of focus. We explore their use of FruityLoops[2] for the purpose of production in a commercially available DAW. We also explore the workflow across multiple technologies, where collaborations often end up in a social space. This includes the use of WhatsApp[3], an instant messaging platform, to produce music collaboratively. The research aims to unpack the workflow and describe creative practice in this context [9,17,29].

Figure 1 - Workflow description

The relation to context here is critical in identifying the subtleties of music production as a practice. The workflow contains the following processes:

1. *Ideation and Planning*
   - Acquisition of sounds
   - Sketching ideas on paper
   - Exploring and maintaining a library of sounds
2. *Production*
   - Composition of a chorus in the mixer
   - Composition of verses in the mixer
3. *Editing*
   - Structuring and re-structuring in playlist
   - Creating a space for vocals
4. *Talk*
   - Feedback (Pro-Am to Am)
   - Negotiation of feedback (two way)
   - Discussion (process)
5. *Iterate*
   - Professional production

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6. *Feedback*
    - Sending audio back to the amateur
7. *Vocals*
    - Ideation and editing to create ideas and space
    - Applying vocals on top of audio tracks

4. PRODUCTION PROCESS

The production begins with a library of sounds that are captured and curated by the amateur. These range from clips of birds singing to the ignition of a Honda engine. These sounds provide the basis for composition and are used in a playful way to initiate compositions. The devices, processes and locations used for capture are presented in table 1 below.

Table 1 - Tools used to capture sounds, processes, and media

Capture Tool	Source	Process	Output
iPhone	Recorded snippets (ideas)	Trimmed & stored	Audio
Microphone	Live performances (mostly vocals)	Stored in DAW	DAW file
Laptop	Internet (YouTube, SoundCloud)	Stored in library, retrieved in DAW	Audio
iPad	Improvisation & live performance	Stored	Audio/ Video

The amateur describes the practice of capturing sounds as a catalyst for creation and inspiration purpose and their importance.

"It's like, creating something new requires a new sound. I always have my phone with me so if I hear something, on YouTube or outside or something, I record it for later. Who knows when it might be useful? Like, it can spark ideas and help me to create something new. That's where new ideas come from." [A]

These captured sounds are described as, 'snippets' and 'samples.' They range from short clips of one or two seconds to whole verses, choruses or bridges from existing tracks. Commercial tools exist to capture and explore these sounds in different contexts, for instance the AKAI range of digital and virtual MPCs (music production controllers.) While these tools offer a professional platform for creative exploration, they lack the portability, flexibility, simplicity and freedom of the tools that the amateur uses. The context plays an important role in defining and describing this growing library of sounds; sound quality is of secondary importance. This is very different from the sound quality concerns, for example at Abbey Rd Studios.

"I need to be flexible and so does the thing I use. My phone is simple and always on me. I don't have time to learn how to use complicated tools or the money to spend on things like that. I have my iPad and my iPhone for recording stuff that I like. If I'm at the computer and listening to a tune, it's easier to grab stuff on that. You don't have the computer with you all the time though,

do you? I get that it doesn't sound great, but it's just an idea. That's what I need it for." [A]

Sounds captured on mobile devices are then stored on a computer. Sounds are grouped according to themes. This structure of themes is loose and fairly transient, describing audio content through elements such as length (4 and 6 describe bars for example.) Descriptions about the type of sound are also used. Terms such as 'dark' and 'vibes' offer a means to navigate to a sound particular to a concept. Sounds migrate from one folder to another, where the artists' perception about the sound changes over time. The artist gives the following response when asked about moving a sound from the 'beats' folder to the 'dark' folder.

"It's changed. When you play with a sound, like properly explore it, you can change how you think about that sound. It's not always right for something. Sometimes you have to find a place for it." [A]

The concept of finding a place for sounds is the essential process of composition. Simple manipulations in sounds often result in movement between folders or themes here to a place with a better 'fit.' These themes are personal to the artist and offer a shifting, emergent but controlled structure in which they are comfortable with working. In this context, there are also section specific descriptions, where a sound has a specified purpose or place. The folder with 'hooks' for instance, offers a simple melody. The artist uses these 'hooks' as a starting point for creation, as he puts it, "to build around." Figures 2 and 3 present a view of the library from different perspectives. The first shows the library, as it is stored on the file system. The second shows a view from a digital audio workstation.
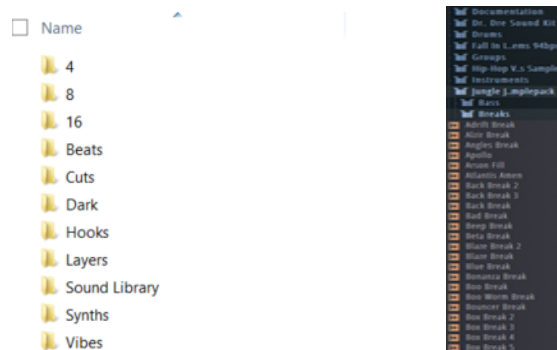

Figure 2 – Windows Explorer library.   Figure 3 – DAW library

While each library points to the same audio content, the descriptions in both differ. The structures act as gateways for storage and retrieval. The view from Windows explorer for instance stores all sounds under a single descriptive term, where new captures can be named quickly under a generic title. The structure imposed in the DAW presents a broader range of terms and breakdown of categories, where importing the appropriate sound for context is important. Effective decision making is key in this space. The increased complexity of the work here presents a greater range of creative choices to be made. The work of storing sounds in Explorer is described as "quick," and "simple." Equally, finding a sound to fit a particular context relies on effective decision making, largely through trial and error. The producer here describes the importance of "*mapping*" and "*finding the right sound*." This is clearly an important task, as the

composition process is fundamentally about finding and fitting a sample. In some cases, the context of using FruityLoops extends to multi-party collaborations on the same laptop. The Pro-Am may intervene if he happens to be in the same space, though this is rare. In this way, it is also important that descriptors are not overly personal, here and during the hand over phase where the Pro-Am takes creative control. This is highlighted in the naming conventions of the two structures. In the first, terms like 'cuts' and 'hooks' present an individual and personal meaning to the producer. In the DAW, descriptions pertain to a genre (jungle, hip hop) or artist (Dr Dre Sound Kit.) Elements in the DAW are divided by instrument and named according to an intended section of use (break, chorus, verse.) While there are some similarities between the two libraries, there is evidently more need for structure in the DAW. Richer semantic descriptors present the opportunity for further exploration in search. In the context of being able to explore a broader structure of categories, particularly where the producer is exploring a sound against a pre-defined narrative, the formal structure offers further opportunities to make creative decisions about their working processes. The amateur spends most of his time working in finding a suitable sample from an ever-growing library of sounds. This task is largely a manual one, though his self-imposed structure offers some support in the creative decision making process. There are two distinct processes that can be identified here. Firstly the process of finding an appropriate sound and secondly, the task of editing that sound to make it fit a section of a song. We will explore the latter in the next section.

4.1 Writing a song

The amateur producer begins with a concept and central theme. In the example presented here, the amateur selects a theme of anti-establishment. Once a sample has been selected the amateur can then migrate to working with a pen and piece of paper. Sketching out keywords, rhymes and phonetically related sounds under columns without headings provides a basis for structure. The artist starts with the folder name of the sample and sketches out words under columns. These groups of words then provide a starting point for further creative triggers. The narrative that forms is largely based around the words and tapping or gibberish to fill gaps and build further structure Associations are defined horizontally (themes) and vertically (rhymes). Table 2 presents an example. While planning, a section may be looped anywhere from three to twenty five times while composing lyrics for the section. We present an example of a sketched work structure in the following table.

Table 2 - Example of a related words sketch

Away	Vision	Game	Rain	Strings
Pay	Position	Play	Pain	Thin
Wage		Way	Hate	Fraying

4.1.1 Refinement

The artist then moves to the playlist to define the structure of the song. Here, tracks or segments are imported, labeled and cut or extended to match the rehearsed structure. This is where the blocks of music are built and the first evidence of a song having structure within the DAW. This process also takes into account where gaps for vocals fit and placement of music in time. Gaps are often added once the space is "full" as in figure 4. The mixer offers a similar way of working, through restructuring and refinement, but for levels (amplitude, panning.) The artist moves between these views during the process of refinement. The DAW

is configured to loop the section being worked on in iteratively. This allows the artist to work in isolation. Much of the initial work takes place in the playlist, as the artist describes it doing "high level tasks." Towards the end of the refinement process, he relies largely on the mixer as his tool of choice, focusing on low-level manipulation, as he describes it "tweaking." In this space, the artist clearly defines where the track is meant to be heard and mixes according to a pre-conceived notion. This space is usually reflective of the lyrical component and in the case of the anti-establishment composition; the artist describes a vision of it being played on pirate radio in the evening.
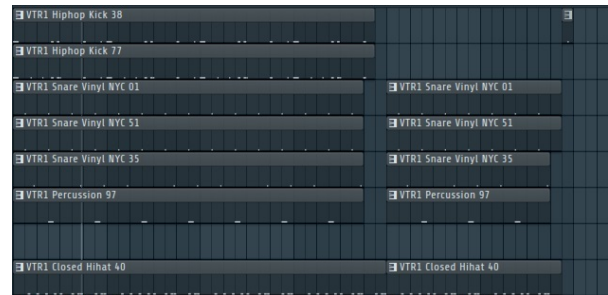

Figure 4 - Instrumental Sections in the Playlist

The artist describes the process of selecting and editing a sound for a specific purpose.

"I tweak each track. I'll go back later and make changes, but for now I need to get the right sound for each part. I'm going through my library to find the right sound for each part and later I'll do things like mess with the pitch and chop it up. I need to get a feel for how this will sound as a full song before I make small changes. It's like with lyrics. You need a theme before you can start writing. The mixer is where I compose but also where I put the foundations down. I'll tweak it later when I'm happy with the sound I get." [A]

This process is distributed between the device (capture device and laptop) and the tools used to express lyrical components (pen and paper.) Many of the early ideas that the amateur has on pen and paper do not work out in production. The artist expresses a desire for flow in the sense of acquiring a sound and cutting it digitally, then moving to a piece of paper and pen to sketch idea that relate to the sound, then moving back to producing a track from the ideas. He relies on listening to the sound over, while sketching out a narrative. This enables the mapping of sounds to potential lyrics and helps to define the structure of the lyrical components by having a basic sound to work from. The amateur describes this in the following way.

"It's about flow. I need it to keep looping over so I can see how it fits. Like, how am I going to fit this idea in the right place? I can change the levels later but it's good to start with a full track (all instruments at maximum level.) Working from there gives me the opportunity to be creative. I need to be creative. If I lose my flow it's done. I can't leave that place and if I do then I have to stop. I can come back to it later if I like it, but usually I don't. Sometimes I just scrap it and start again." [A]

Tweaking sounds to fit plays an important role in the decision making process of composition and production. The producer here migrates between the mixer and playlist in order to iterate. While the playlist offers the opportunity to work with a track holistically and tweak levels, the mixer presents a different layer of abstraction. The mixer plays a pivotal role, when fixing individual components and making small changes, particularly in early compositions. As the compositional process progresses, the producer leans more towards the playlist as an opportunity to tweak the overall sound.

"I'm tweaking [using the mixer.] I'll move to the playlist once I'm happy with the sound, but I still need to find the sound I want here in the mixer." [A]

Figure 5 offers a view of tweaking levels in the mixer. This shows the volume of each sound and how they are connected and chained across channels.

Figure 5 - Configuring levels on the mixer to explore the sound

4.1.2 Implications for collaboration

Much of the important metadata attached in this view is lost when migrating between tools or technologies, reflected in the handover stage wherein the Pro-Am takes control of production. The structure presented in figure 7 for instance, with clearly defined labels and sections, is lost once the track is exported and sent to the pro-amateur. In this example each of the sections are named by sample in use and can therefore easily be mapped back to the library of samples. This only works well in this case because of the knowledge between system and user. The loss of metadata when transitioning between tools presents obvious difficulties in terms of talking about the compositional process and communicating useful information about structure. The pro-am can load the FruityLoops project up to get an idea about the composition, though he relies on a distinct set of tools which do not closely match those used by the amateur. The difficulties must then be mitigated through discussion in WhatsApp. While some elements of the structural components remain intact, such as timbre, bpm, tempo, chord structures and order, the rich descriptors herein, including motivations and creative decisions are lost as soon as the tool in use changes. In this case, moving from FruityLoops to Cubase[4] or Pro Tools causes a loss in much of the metadata and implicit knowledge. The knowledge stored

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[4] Cubase - http://www.steinberg.net/en/products/cubase/start.html (2016.)

within this structure becomes redundant when tools and people change roles.

In the planning and ideation stage the producer works away from the computer and uses a phone, pen and paper to plan and create. At the point in which the producer sits down at the computer to work on the track, they begin to create music in a tangible and iterative way. The lack of tools to integrate planning as part of the songwriting process is potentially flow breaking. Much of the implicit knowledge is embedded in the composition: beats per minute, choice of sounds and structure. The logic and reasoning behind the choices here though are not easily stored or retrieved. This implicit knowledge can be lost when sharing between multiple entities, for instance a session musician who is unfamiliar with the genre and typically bpm. We have already discussed the importance of making appropriate decisions. This problem is further compounded when the decision making process must happen in a collaborative, distributed yet inclusive way.

4.1.3 Flow

In cases where tracks cannot be aligned by time or made to fit a particular section, the artist makes a conscious decision to delete a project, "scrap it." The process of production, particularly in the ideation and planning stage, relies on efficiency. If the artist perceives it to be too difficult to make corrections in a piece, there is a breakpoint. The processes are time critical and a fresh production offers a new chance at creating something without the structural constraints. This break in the workflow is detrimental to the creative process. The artist makes the comparison to building a puzzle, where elements are uncovered and discovered systematically. In the example of a puzzle, the structure is not immediately obvious, but emergent over the course of a series of iterative processes. In the example of a puzzle, this happens through putting pieces that are similar together, until a broader image emerges, while recognizing that some pieces do not work well together. The artist describes this work in the following way.

"Verses for me are where the art form comes in to it. I always try to be conscious about how layered my verses are with double meanings and conscious thought. The wording in verses for me is very important and I am often caught in balance between keeping a rhyming pattern and saying something clever, meaningful or just funny. Therefore I build my verses line by line, often like a puzzle, where I know the structure it needs to keep to sound easier on the ears; I just need to find the right words to fit in this structure to express my point." [A]

The artist recognizes the value of efficiency in a creative workflow and the role of efficient workflow in quality control. The theme of quality emerges later in the paper where we discuss social media usage and the dialogue that takes place assessing quality between parties. The participant expresses their view of flow in this state.

"I need to know that my music is good enough. If I send this out, I want to know that it is complete. If I put something bad out there, that's on me. That will always be related to me. If I don't come back to it and feel it, there's no point trying to fix it." [A]

The narrative and flow is a constant concern in this process. The amateur describes a production process as similar to writing a standup comedy sketch, a piece of media that manifests as a

performance. In creating an uncomfortable set of lyrics that match a consistent theme, we can begin to see the value of these compositional structures in the songwriting process.

"They tell it how it is. They explore life, the difficult parts of it and make observational humor out of it. For me, that's my inspiration. Taking life and looking at it through a lens. Music gives you that opportunity, to talk about things that people are uncomfortable with. They talk about a problem, a situation, an area of life. That's how I write my music." [A]

It is possible here to think of the music as two separate elements in terms of composition. While the music is composed on the computer and lyrics are written using paper and pen, the structuring of folders enables the artist to find a sound which is appropriate for a given narrative. A meaningful composition with lyrics matching the theme of the sound is important. The artist describes verses as the 'art form' and justifies the use of multiple instruments with the same sound as 'layered.' The structures presented in the operating system and in the DAW offer explicit knowledge in this domain about storage and retrieval, including which sounds might be a good fit for the musical context. Much of the knowledge herein is internalized and managed through a process of trial and error. The structure provides a basis, a point of entry for discovery, though is not always appropriate for context. The tools make it relatively efficient to add, remove or change a sound in the space of a few drags or clicks of a mouse, so that as the artists' perceptions about certain tracks change, so can the structure of his library. This process is critical in managing the flow of the producer and ensuring that their focus is on the narrative and emergent flow, as he describes it 'art.' This also presents concerns. A sound can be used in multiple ways but has to be ascribed a single descriptor. The characters and features of the music are not considered here. There is a process of discovery where tools could provide an additional level of support in discovering music, which is compositionally similar. Suggestions could be offered by matching samples according to musical elements of the track and presenting an additional layer of knowledge beyond loose semantic descriptors. Sounds that are 'darker' for instance, may share qualities in tonality or timbre, which offer opportunity for automation and a series of iterative suggestions to support the flow of work.

5. THE ROLE OF SOCIAL MEDIA

At the stage in which the amateur is happy with a core concept or idea, the work then becomes collaborative, offering a platform for conversation and further iteration. This happens in a geographically distributed setting wherein the amateur and pro-amateur are situated in different locations. Meetings typically happen fortnightly to refine productions that are seen as valuable. The majority of their workflow happens online, conversing and sharing sounds through WhatsApp. The back and forth that happens enables the track to be structured in a collaborative way while each artist works with their chosen set of tools. The amateur relies heavily on FruityLoops as a commercial DAW. The Pro-Am works in a variety of DAWs, including Cubase, ProTools and Logic Pro. Unlike the amateur, the Pro-Amateur relies on extensive banks of commercial, pre-compiled sounds such as Native Instrument's Komplete. The pro-amateurs library of sounds is several hundred gigabytes larger than the amateur's. These sounds are of a professional standard and sample a variety of instruments and effects.

Social media plays an important role in how producers talk about their music. Each section is worked on iteratively and sent backwards and forwards using WhatsApp. The process here relies on the formation of ideas and structuring, with a rich set of semantic descriptors about the intention. The pro-amateur is largely responsible for mixing and mastering, while the amateur has the responsibility of planning and creating. This continual feedback loop offers the amateur the get feedback on his creations. The pro-amateur provides measures of checks and balances in his role. The amateur has a say in the composition. The pro-amateur will typically respond to a clip on WhatsApp with a re-composition of the clip, according to their narrative. This back and forward process can take the form of multiple iterations, with a discussion forming around: style, structure, narrative, flow and authenticity. We see evidence of both the amateur and pro-amateur using language about how the sound is authentic to the genre of music and how similar it sounds to music that has been categorized from the same genre. Understanding and analyzing the language used in production can offer real insights into the culture and practices of the producers [28].

Though tools exist within DAWs to enable collaboration, these tools require both parties to be using the same version and offer access to their production. As this presents its own unique challenges, the artists instead choose to work with their preferred technology and use WhatsApp as a tool to share thoughts, media and track progress. The amateur relies on terminology that pertains to a process. The pro-am relies more heavily on descriptions of the sound. An example of the types of language used is shown in table 3. Further examples have been highlighted in bold in the quotes from participants.

Table 3 – Differences in type of language used

Participant	Semantic terminology
A	*widen, crop, trim, centre, clear, more space, deep, true, old school*
P	*sweep, darken, drop, deeper, verses, flow, beat, fuller, richer*

The type of language used here highlights the challenge of presenting a universal set of semantic descriptors in the context of collaborative music production. Terminologies such as 'sweep' and 'darken' for instance, do not have an obvious mapping to other terms such as 'widen' and 'crop.' With that said, there is inherent meaning attached to these terms as part of a workflow. This dialogue plays an important role in the two workflows converging on concepts and enabling representation of context specific goals across multiple workflows. The challenge of using different workstations to produce a track, which meets both participants' unique criteria, is presented in their shared workflow.

Where the amateur (A) has identified a sound of an acceptable standard, a bartering process then begins with the pro-amateur (P.) This bartering process encompasses both the acceptability of the snippet itself and an intended direction. This manifests as either a change to be made by the amateur or a handover to the Pro-Am for production.

A: This is the kind of sound I'm going for.
*P: I like it. I think you should make it **sweep** across, sonas to make it **darken**.*
*A: I'd like to **widen** the intro a bit so it sounds more real. I'll start at the **centre** and **crop it down**. I might **trim the end**. I don't think it's clear yet.*

*P: Sure. It also needs to have a **drop**. I'm not feeling it. Let me show you some bass. <media clip of a bass guitar playing a 4 bar riff>*
A: Ye ye that's what I'm sayin. Lemme see if I can do that in Fruity.

In this context, the participants talk about what they hope to achieve with a sound. The Pro-Am accepts the offering, but then presents a set of suggested changes. The amateur uses language, which pertains to specific functions in the application (*widen, crop, trim*) whereas the Pro-Am focuses heavily on perceptions of the sound (*darken, deeper*) and structural elements such as the drop. Media is used to mitigate this discussion, as something tangible. This offering of an audio snippet enables both individuals to understand each other's views. The next set of discussions presents issues around access and ownership.

A: This is what I've done. <media clip of a 45 second composition>
*P: Yeah. I'm **feeling this**. I'll start building this up and make it **sound bigger**.*
A: Cool. Let me know if I can help.

At this stage, the offering of the amateur is sufficient to enable the Pro-Am to begin producing. This acts as a hand off, the initial idea presented in a media clip and formally accepted by the Pro-Am as a production in practice. The amateur opens up the opportunity for further discussion, 'Cool. Let me know if I can help.' The pro-amateur then works through a series of iterative steps to compose the track, eventually passing the musical element back to the amateur. For the purpose of brevity, the working practices of the pro-am in production are not documented herein.

P: Here it is. You can spit (rap) over this. Let me know when you've got your flow. <media clip of musical composition>
A: Sick. I'll hyu (hit you up) when I'm done.

Here the musical element of the track is complete and presented to the amateur to produce vocals for as an audio file. The amateur offers to 'hit you up' (initiate contact) when the vocals have been added to the track. The amateur then works on restructuring the vocals and associated narrative according to the new composition, where changes are present. Here, he reverts back to pen and paper to redefine structure and adjust to the changes made in the new version of the track. As the sound is complete, there is now a job of matching a narrative with loosely associated words to fit the context of a melody. He explains his motivations for choosing to work with pen and paper once again.

"This is free. I can move things around, cross stuff out, you know. It's like, in Fruity there's no room to move stuff sometimes. How am I gonna say what I'm trying to say there? It's too much work. This way is easier." [A]

The process is similar to that of early planning. Reverting back to pen and paper offers freedom of creative expression. When the amateur producer reaches the point of being sufficiently rehearsed, he then creates a note of structural constraints on his iPhone. This enables the opportunity to practice later and offers a reminder of the structure of the song that he can use when practicing. The recording acts as a voice memo with lyrics/audio. The structure has a row for timing (bars) and a row for words that trigger a phrase. This movement from the DAW back to pen and

paper again breaks flow. Enabling the tools to talk could maintain this flow. There is a lack of support for creative exploration in the DAW. The amateur describes pen and paper as having more "room" and being "more free." We have already explored the importance of flow in this space. The emergence of tools to support flow here could enable metadata to remain across the production chain.

6. CONCLUSION

In this paper we explore the workflow of creating music from the perspectives of amateur and pro-amateur musicians. We identify three distinct processes of planning and ideation, creation and refinement. Each of these processes has attached to it a working set of procedures, some of which are unique and some shared. While the tools provide support for creativity, innovation and a standard set of procedures for working, they are limited to a production context. When we consider technology in terms of supporting processes, such as planning, songwriting and management of shared libraries; the technology fails to support such contexts. The lack of content management tools and version control technology in particular proves problematic. While convergence on tangible, measurable goals proves accessible (bpm, timber, chord structure and sequences,) there is a lack of support for more creative requirements to be expressed in such a context [18,29]. Requirements engineering techniques speak to both story and scenario oriented approaches [2]. Tracking progress against a pre-conceived narrative or managing the context of flow for instance, proves difficult with the current set of tools in place. The importance of representing ideas in a creative way has been stated [9]. Managing flow in this state is along the critical path to success (or failure) and therefore should be considered as important to design for. A key finding was that, although both parties worked together, they used very different systems and the tools they used did not interface. It was a case of having to work in order to make the system work. Through communication, they were able to successfully work in different ways; technically, temporally and in respect to their own workflows, which together form a larger workflow. It was also clear that social media played a part in the production and that as much work was discarded, and used as 'sketches' as came to fruition. This is an area that we aim to investigate in the future.

Communication and collaboration remain an issue in production, with the disparate nature of tools and technologies proving challenging. Issues such as communicating status, semantic descriptions, tagging as seen in other work [8] and the loss of metadata across channels of communication present a major communication breakdowns. The lack of support for musicians working in remotely secluded settings presents an additional set of problems to be solved in future research. Many of these issues are caused by a lack of standardization – both in the set of tools available and accessible, the defined terminologies used to describe musical compositions and compositional processes. Working versions of tracks often have to be translated to a different technology, tool or transmitted with a series of notes, communicating system status and intended purpose.

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