

# Collaboration in an Online Environment

## Tools for Songwriting and Production

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Bachelor's thesis  
November 2018  
Degree Programme in Media and Arts  
Music Production



## ABSTRACT

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Degree Programme in Media and Arts  
Music Production

MITTILÄ, MARCUS  
Collaboration in an Online Environment  
Tools for Songwriting and Production

Bachelor's thesis 88 pages, appendices 40 pages  
November 2018

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The purpose of this study was to explore the impact of new tools for online collaboration regarding songwriting and music production. The first aim was to investigate how online collaboration is being utilized in the industry, and to probe the differences between different types of workflow. A comparison between integrated collaboration tools and a more standard workflow for online collaboration was the main focus, and to what extent such integrated collaboration tools were being used. The second aim was to practically explore a workflow using integrated tools and compare this to a workflow not incorporating such tools.

The data were collected from books and articles, and interviews were conducted with experts in different fields of the industry to explore how they utilize online tools in their workflow. Practical experiments were held with songwriters and musicians from other countries to test collaboration features and workflows. The results from the practical experiments were compared to previous projects that utilized online collaboration without the use of integrated collaboration tools.

The results from the interviews and the background material suggest that most music producers and songwriters make use of online collaboration. In some cases, it has even become the norm to work with people from around the world. The data also suggest that the tools for music production are not as integrated as the tools used for TV production. It seems like producers and songwriters shy away from integrated tools due to fear of technical issues.

The findings from the practical experiments suggest that although integrated tools are theoretically usable, there are still technical issues in practical use. The time consumed for troubleshooting the technology seems to overshadow the potential usefulness of integrated tools for efficient collaboration at the moment. As technology is developing fast, it may soon be possible to run collaborative sessions in real-time.

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Key words: songwriting, production, DAW, collaboration, online.

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**GLOSSARY**

Acapella	A vocal only version of a song
ADR	Automatic Dialogue Replacement
Amplifier modeling	Emulation of a physical amplifier, usually for electrical guitar
Avid Cloud	Avid's solution for integrated online collaboration
Comp (vocal)	Compilation of several recorded takes from a singer to make the final version of the recorded track
Compressor	Device for reducing dynamic range in audio
Cue Mix	Separate mix for musician during recording, differing from the main mix in that the performer can choose what goes to his or her monitoring
DAW	Digital Audio Workstation, software for recording, editing, processing and mixing digital audio
DI signal	Direct Input signal. The high impedance instrument level signal of an electrical bass or electrical guitar is reduced to low impedance microphone level with a DI box or Hi-Z input on a preamp unit
Emoji	Small image or icon used to express emotion or ideas in electronic communication
EP	Extended Player, a collection of songs which is more than a single song, but less than a whole album
EQ	Equalization

FAWM	February Album Writing Month
Gobo	Movable acoustic wall
Interplay	Avid's solution for a centralized storing and management of media content
Lag	Noticeable delay between action and execution within a software application
Lo-fi	Aesthetic choice to lower fidelity of recorded material
Mastering	Finalizing process in music production, usually matching loudness and tonality between songs on the same release
Multitrack	Each track of a song exported separately from the same point
Middle eastern dance	Also oriental dance, traditional dances from the Middle East spanning a variety of folk dances
Mp3	A coding format for digital audio, where data compression is used to discard parts of data from the source thus reducing file size
Norse ballads	Medieval Scandinavian ballads
Plug-in	Third party application for sound production or audio processing within a Digital Audio Workstation (DAW)
Preamp	Preamplifier, electronic amplifier to raise signal strength for microphones or electronic instruments
Progressive power metal	Guitar-driven aggressive music with experimental influences, often musically technical

Rock	Beat oriented music with prominent guitar and drums
Saturation	Added harmonics of a sound through light distortion
Singer-songwriter	Musician who write, compose and perform their own music, typically performed with piano or acoustic guitar
Soft punk	Whereas regular punk rock is usually aggressive, soft punk tones down the aggression musically while still maintaining the political edge and message oriented lyrics
TAMK	Tampere University of Applied Sciences
Topline	Lead or vocal melody of a song
Topliner	Someone specializing in topline duties for songwriting
VST Connect	Steinberg's solution for real-time integrated online collaboration
VST Transit	Steinberg's solution for near real-time integrated online collaboration
VR	Virtual reality, simulated three dimensional environment
Yle	TV production company in Finland

## 1 INTRODUCTION

For many people, music is an integral part of life. It can move you, both as a listener and as a performer. I have always been writing music in some form. I started playing the cello when I was five years old and changed to guitar lessons at the age of 10. I still remember putting my own songs together back then. In fourth grade I was sick for many weeks and missed out on a lot of school days, so I put that frustration into a song. Music helped me cope.

The process has changed since those early days of putting thoughts into songs. The digital age has given artists new tools. What could only be accomplished in a multi million-dollar studio earlier, can now be done from a bedroom with a laptop and a cheap interface. And music collaboration is no longer limited to musicians in the same geographical area. With the help of internet, a producer can record an album with a drummer in Australia, a singer in America and a guitarist from France.

For me personally, collaboration in the songwriting process has always come naturally. I have been playing in bands and have been writing songs together with other band members since I started playing guitar. Collaboration helps to keep my mind focused on the task of songwriting instead of getting lost in tweaking presets and searching out sounds. The prospect of an infinite amount of collaborators across the globe is alluring, but the process of online collaboration differs a bit from collaborating locally.

This thesis aims to explore new ways of collaborating, with a focus on online workflow and digital audio workstations (DAW). Research was made to explore how people are using online collaborations today and what possible impact the new integrated tools for collaboration would have on the creative workflow. Through experimentation, tools for direct communication through a DAW were being tested to see if they would provide a superior workflow for creative collaboration compared to a more traditional online workflow of sending multitrack files.

## **2 EXPERT INTERVIEWS**

There seem to be a lack of academic texts handling the workflow for online collaboration in the music creation process. To gather information, several experts in the field were contacted for an interview. Different positions in the field were included on purpose, such as producers, songwriters and composers. The reason for this was to get a good view of the different aspects of the online workflow and how it would possibly differ for different applications. All experts received the same questions to answer. Interviews were handled in person, over Skype video calling or over email.

### **2.1 Hiili Hilesmaa**

Finnish multi instrumentalist, producer and mixing engineer. Co-owner of Concorde Music Company. Internationally recognized for his work with bands such as HIM, Lordi, Apocalyptica, Sentenced and The 69 Eyes. Has been producing bands from more than 20 different countries, now offering online workflow and consultation for pre-production, recording, mixing and mastering. ([www.hilesmaa.com](http://www.hilesmaa.com) 2018.)

### **2.2 Antti-Mikko Immonen**

Technical development producer at Yle Production and Design, Tampere, Finland. Responsible for the development of the production platform at Yle, studio operation equipment and supervising post-production equipment workflow. Previously a musical supervisor for 20 years. (Immonen 2018.)

### **2.3 Patric Sarin**

Professional songwriter and the creative director for the publishing company HMC, owned by Warner Music. Sarin has been writing music for many participants in the Finnish version of the TV show Idol, such as Antti Tuisku and Hanna Pakarinen. He focuses mainly on vocal productions and toplining. (Sarin, 2018.)

## **2.4 Lenny J. Morales**

American guitarist, songwriter, producer and mixing engineer based in New York. Involved with the band Pros & iCons as well as a freelance songwriter and engineer, Morales has quickly embraced the opportunities of online collaboration. (Morales 2018.)

## **2.5 Stefan Pommerin**

German music producer and mixing engineer, now based in Finland. Co-founder of Illusia Productions focusing on voice overs and audio production for commercials with clients such as Google and Spotify as well as the band oriented services of Illusia Studio focusing on recording, production and mixing. (www.illusia.studio 2018.)

## **2.6 Fredrik Nordström**

Swedish producer, recording and mixing engineer. Founder of Studio Fredman in Gothenburg and guitarist of the band Dream Evil. Internationally acclaimed for his work with bands such as Arch Enemy, Dimmu Borgir, In Flames and Hammerfall (www.studiofredman.com 2018.)

## **2.7 Heikki Vihersalo**

Finnish music producer, mixing and mastering engineer. Founder of VPro Audio, with a focus on production and mixing, as well as Helppomasterointi which is a streamlined mastering service. (www.vproaudio.com 2018.)

## **2.8 Alexey Soloviev**

Russian composer, songwriter and producer. International collaborations with artists like Elize Ryd and Mike LePond as well as a composer of trailer music has him working largely with online clients. (www.alexeysolovievmusic.com 2018.)

### 3 MODERN SONGWRITING

In an analysis of the top 100 singles from 2016 it was concluded that most of the songs there were written in collaboration. There was an average of 4,53 writers per song, and only five songs on the top 100 list were written by one songwriter. (Connors 2017.)

Collaboration is not only limited to the writing process. It is highly likely that there will be more than one performer on a song. If it is not a full band, then perhaps a session drummer or session guitarist is needed. Previously they would have to be hired and brought to the studio for a recording session. But today the decreasing budgets for record production has made it more attractive with remote collaboration because the work can often be completed quicker and at a cheaper rate. (Pejrolo 2014.) Even in the movie industry remote work is increasingly popular, with Automatic Dialogue Replacement (ADR) work being done with remote tools (Immonen 2018).

Internet has opened up new possibilities for music production, and the perceived distance between collaboration partners is decreasing (Vihersalo 2018). Use of cloud services, increased connection speeds and easier ways to communicate makes writing, producing and mixing for people across the globe not only possible – but a reality. The process varies depending on the task and the people involved. It seems that music collaboration today is mostly done by sending files through Dropbox or Google Drive (Morales 2018; Nordström 2018), but there are possibilities for sharing sessions in real-time as well depending on the platform (Immonen 2018; Pejrolo 2014; Pommerin 2018).

#### 3.1 Process

While producers and mixing or mastering engineers favor online workflow due to a vastly increased clientele (Hiilesmaa 2018; Pommerin 2018), songwriters seem to suffer more from the inability to be in the same room for a writing session (Morales 2018; Sarin 2018). However, a project that has started in the same room can quickly be tweaked and completed through continued work on a distance (Sarin 2018).

When so much work is done online, it can be easy to have some of the emotion missing from the music (Hiilesmaa 2018; Pommerin 2018). Communication becomes very important, and the process for communication differ a lot. Some are comfortable with only email communication, while others prefer video chats to get the message across. Music is a personal creative process, and this is why it can be very sensitive to technical issues with new technology (Sarin 2018).

### **3.2 Tools**

Most session musicians today have some means of recording themselves (Immonen 2018). It does not have to be a big scale studio setup, but a decent interface and a space to record in could be all that is needed. And while recording albums at home or on the road is nothing new (Fowler 2014), there has been such a change in the recording industry in the last few years. It is colossally cheaper to record an album today (Goldenberg 2017).

Sarin (2018) stresses the fact that it is extremely rare that a song is finished in one session, and nowadays work continue on a distance with the lyricist completing lyrics and the topliner tweaking the melodies. Everyone can add to a song from their own setup, and files for the sessions are shared over internet. The workflow has shifted from previously having to book additional sessions with the same team, to being able to complete a song on a distance. (Sarin 2018.)

I personally have a small home studio setup, used for songwriting and collaborations. It consists of a laptop with Cubase Pro 9, monitors and headphones, an interface, a few guitars, a few microphones and software synths. There is a preamplifier (preamp) and a hardware compressor for recording purposes. On this fairly basic setup, I have produced release ready songs. According to Noble (2017) it is now common knowledge that the “home recording” label does not refer to the equipment something is recorded on, but rather how it is made.





PICTURE 1, My personal writing setup (Photo: Marcus Mittilä 2018)



PICTURE 2, My personal writing setup (Photo: Marcus Mittilä 2018)

When working with music production a DAW is an essential part of the setup, although some recent tools are trying to eliminate the need for every collaborator to have a dedicated DAW (Pommerin 2018; Steinberg 2018). There are a lot of different options, ranging from free to quite costly alternatives. It seems like one of the most popular DAWs today is Pro Tools (Audio Skills, 2017), which has had somewhat of an industry standard status due to the common use in professional studios and post production facilities (Hughes 2017).

While the choice of DAW does not limit possibilities of music production in a certain way, when collaborating with others it could be a benefit to be able to share sessions if collaboration partners are on the same DAW. Remote collaboration is easier if the collaborators are on the same platform, as it cuts down on conversion time and minimizes confusion (Pejrolo 2014). When working on different platforms it seems to be common practice to export the song as a multitrack session and send it with a file transfer service to the collaborator (Hiilesmaa 2018; Morales 2018; Sarin 2018). Sharing session files directly can create some severe technical issues, and although some DAWs does allow for project sharing, this seem to be rarely utilized (Sarin 2018).

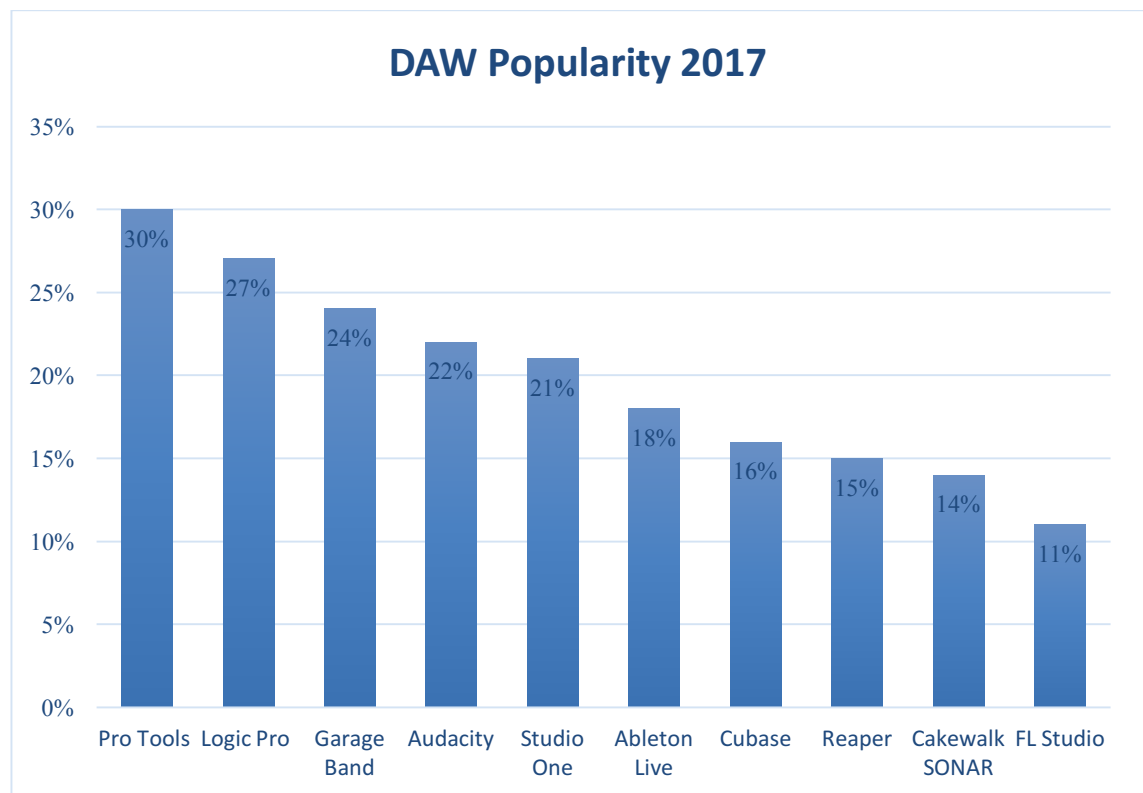


DIAGRAM 1. DAW popularity according to Audio Skills user survey of 1 230 respondents (Diagram: Marcus Mittilä 2018)

In TV production, there are servers and software in place to allow for remote access to video and audio related work. Immonen (2018) stresses the importance of cloud access to documents to keep them up to date, meetings and conferences with video chat and possibilities to work remotely with recorded media as huge time savers and a help to keep the workflow efficient. Yle (TV production company, Finland) has integrated a lot of online tools in their workflow. (Immonen 2018.)

Cutting down on traveling saves time and money and a lot of meetings can be held over video chat (Hiilesmaa 2018; Immonen 2018). For the younger generation, they are already very used to communication being held online and it is natural with chat and the use of emojis to convey emotions (Hiilesmaa 2018; Pommerin 2018). The ability to communicate easier with collaboration partners can also allow for completing projects faster, as it allows participants to finish their work on a distance (Sarin 2018).

Hiilesmaa (2018) explains that it is easy to compare the costs of production online compared to production in person. Virtual production becomes a big part of budget discussions, and it can give a band the freedom to record themselves over time. Traveling, hotels and waiting time in the studio while solving technical problems costs a lot of money. Sometimes it does make sense for a producer to meet the band and make sure the equipment they intend to record on is up to par, and there are different ways of working remotely with anything from full online production to semi-virtual production where the producer is present for recording the foundational tracks of a song. (Hiilesmaa 2018.)

### **3.3 Finding collaborators online**

There are a lot of platforms in existence for finding online musicians and collaborators. SoundBetter offers engineers, session musicians, editing and mixing where you can request a price proposal for your project. Fiverr is another site that offers different forms of freelance services. (Soundsnap 2017.) There are countless Facebook groups that allow for musicians and songwriters to find collaborators or outsource parts of a project (Morales 2018).

For producers and mixing engineers it becomes important to build a reputation and a good catalogue of work before you will be considered by potential clients. Since production and mixing is more expensive, there is more risk for the artists with these endeavors. (Hiilesmaa 2018.) Once there is a reputation however, internet does open up a lot of possibilities of work that would otherwise be near impossible otherwise.

### 3.4 Distractions

A downside of modern technology is that it brings a lot of distractions. Social media notifications, emails and text messages. It can potentially add a lot of “noise” (Hiilesmaa 2018). There are a lot of things begging for attention, and it is easy to lose a lot of time and focus that could be spent elsewhere. There seems to be a constant battle for what to focus on.

Today, with all the tools available in a DAW, the choices of what type of music to make is almost infinite. There is a plethora of sound libraries and virtual synths and samples available. Limiting your choices, and putting barriers on what you can do in a session can force you to be more creative. Forcing yourself to write a song using only four chords, or three chords, or with a certain theme, can spark new creativity. (Levi & McClusky 2018).

Turning off internet while working could be difficult if there is a direct communication link with your collaborator – but it is baffling how much time can be spent viewing phone notifications or browsing Facebook. There are recent studies around phone notifications and stress level, and it seems turning phone notifications off makes people feel less distracted and more productive (Gosh 2017). Since communication is necessary for collaboration, there need to be a lot of self discipline when working remotely (Morales 2018).

Sarin (2018) emphasizes the fact that the ability to work can create a lot of stress, since there is no time off in between sessions. The modern technology allows for work through a cellphone or a laptop, so the writing sessions never ends until a song is completed. (Sarin 2018.)

## 4 COLLABORATION IN PRACTICE

Songwriting together with others can be a lot of fun. It is hard to beat the feeling of sitting in the same room with another artist, writing a song together (Pommerin 2018, Sarin 2018). But it can be tough to find the time to collaborate with someone else in person, especially if they live far away from your location. And here the digital age has opened up the possibility for collaboration online.

“It’s now possible to access an almost endless pool of creative and musical talent that would be impossible to utilize if everyone had to be in the same room at the same time.” (Pejrolo 2014).

### 4.1 Help from others

Finding collaboration partners can fill gaps in your current set of skills, and be very beneficial for completing new songs. Karlsson (2016) emphasizes that whatever is best for the song is the best way to work – if it makes sense to collaborate then songwriters should not hesitate to seek the help from others.

When doing online collaboration, it opens up the ability to work on your own schedule. It can be possible to record vocals during a lunch break, or have a late night session for recording electric guitar. Collaborating like this makes you less dependent on the other parties involved to be present, and they will give feedback on your parts when they have the time to listen. This can also take some pressure away from the performance aspect. More freedom means more creativity, and when working with bands it is often possible that they take a lot of responsibility themselves since there is usually someone in each band who can handle the engineering (Hiilesmaa 2018). On the other hand, having a producer present to listen with another set of ears can help bring out nuances in a performance that could easily get lost when musicians self-produce (Pommerin 2018). It becomes a balance act, and different type of projects may require different type of approaches.

There are a lot of Facebook groups where requests can be made to collaborate with others, and this can lead to long term collaboration partners (Morales 2018). For composers and songwriters, Facebook seem to be a huge resource for finding collaboration partners and musicians to work with (Morales 2018; Soloviev 2018). As there are groups and forums for different genres and styles, it is usually easy to find the right type of collaborators. It does not matter anymore where you are from, but more about where you want to be creatively (Kurvinen 2018).

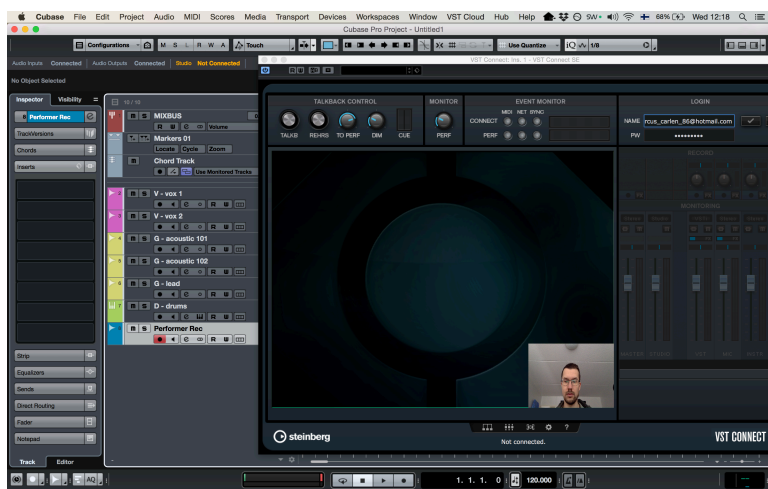
## 4.2 Online workflow

Online workflow opens up totally new possibilities to work with people in different locations. The approach is different compared to working together in the same room, and the performers have to take more responsibility (Hiilesmaa 2018, Pejrolo 2014). Despite a lot of promising development, real-time DAW-based musical collaboration has not seen much progress in recent years and it seems like it is not utilized much. Challenges of sending projects back and fourth can be a lot to handle on its own, and latency free live sessions are not yet a reality. (Bryant-King & Dahl 2018.)

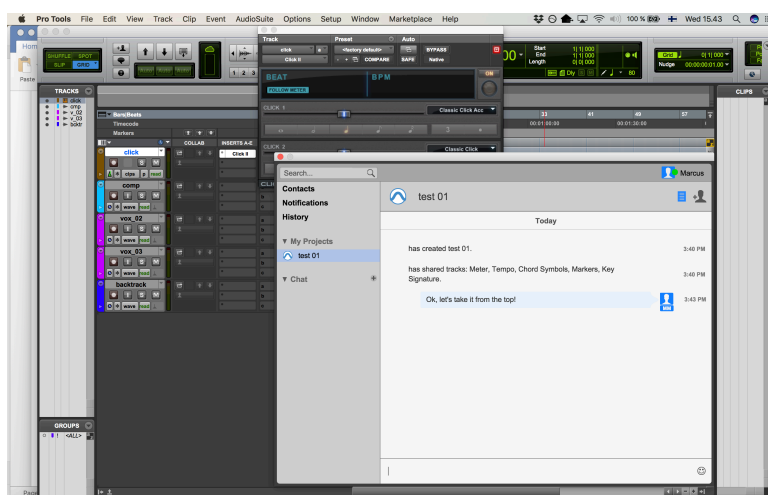
Avid and Steinberg have developed tools for sharing sessions with collaborators, and ways for a producer to engage with performers on a distance. Avid Cloud Collaboration gives multiple collaborators access to the same Pro Tools project remotely. Audio, midi, edits and mix changes are shared within the same session and communication can be done via text chat inside the project. (Avid 2018.) Immonen (2018) explains that these tools from Avid are utilized by Finnish Yle in their TV productions when working on sessions remotely. Using Avid Media Composer Cloud and the Avid Interplay system someone can edit video from their home while streaming the video over a 4G internet connection, and then export it so the Interplay system renders the video with full quality in the location where the files are stored. (Immonen 2018.)

Similarly, for the audio work done at Yle, use of Avid Cloud Collaboration makes it possible to mix a session remotely and share the same session with others. Problems arise only when it comes to heavier sessions, with higher quality video and Dolby Atmos rendering with a high track count for audio. (Immonen 2018.)

Steinberg has an application called VST Connect Performer which can be installed on PC, Mac and Apple iPad. The engineer need to have a later version of Cubase Pro, which includes VST Connect SE, but additional performers do not need Cubase at all and can use the free application. Talkback chat functions with audio and video stream is available for communication. The VST Connect Pro application (a paid service, as opposed to the free VST Connect Scores Performer Workspaces application or the Cubase integrated VST Connect SE) adds support for multichannel recording and upload servers to help tackle possible dropouts in audio. Steinberg also offers VST Transit which enables collaborations between Cubase users, as well as cross platform compatibility using the free VST Transit Join plugin. (Steinberg 2018.)



PICTURE 3. VST Connect SE, Cubase (Photo: Marcus Mittilä 2018)



PICTURE 4. Avid Cloud Collaboration, Pro Tools (Photo: Marcus Mittilä 2018)

Sharing session files can also be done if the participants are working on the same DAW, by for example placing the session file in a shared cloud storage. Problems could occur with this method when using plug-ins or third party software not owned by both parties, if samples or files are missing, or with version numbering. (Bryant-King & Dahl 2018.) This is, as of now, the method to use if same platform collaboration is desired within the session itself (as opposed to sending multitracks), and the DAW in question does not have integrated collaboration features.

How well communication streams and audio transfers work is limited by the internet connection of all parties involved in the collaborative project. A slow or unsteady connection will probably mean a poor experience, especially concerning real-time collaboration. (Pejrolo 2014.) And while integration of such tools is welcomed by a lot of musicians and producers, the technical difficulties and fear of errors ruining a session is likely what makes people stay with the more well known ways of sharing multitrack sessions and sending wave files back and fourth (Morales 2018). Yle, with their dedicated Interplay system and fast servers are able to have a lot of online integration in their workflow (Immonen 2018). Smaller studios for music production and songwriting, however, seem to be wary of stepping into a fully integrated online environment.

One of the benefits of having a real-time, or near real-time, collaborative project is that the engineer does not have to trust the engineering skills of the performer. If the session is run in real-time then microphone selection, placement and levels can be influenced and there is less risk of a great recording being ruined by poor engineering skills. (Pejrolo 2014.) A producer or recording engineer might listen in a different way than for example a musician or performer, and nuances in the performance while self producing might be different from production with a producer in real-time (Pommerin 2018).

There are a few alternatives for integrated collaboration features, and even browser based DAW-like applications for collaborating with others. The problem with these applications are usually that they are not as powerful as a regular DAW, and thus limited in application. There are also alternatives for streaming audio through third party plugins into a DAW but they are either costly, like Source Connect Pro, or they downsample the audio quality to make it stream easier. (Musictech 2015.)



### 4.3 Sharing files

For music projects, email file size limitations will quickly become a problem so other means of sharing files is preferable (Bartlett & Bartlett 2017, 408). The more common services today seem to be Dropbox, Google Drive and WeTransfer which has free options as well as fees for additional storage space. Many companies seem to prefer Google Drive for compatibility reasons (Immonen 2018; Pommerin 2018).

When sending multitrack files, it is important that everything is exported from the same exact point so it will line up when importing the files into the DAW session. High quality wave files are to prefer over compressed mp3 files (Gallant 2016). Not only does the audio quality suffer from compression with mp3 files, but some DAWs can have issues with importing mp3 files and the timing can thus be offset.

Hiilesmaa (2018) stresses the importance of having someone responsible for collecting all the tracks if the project is recorded in different locations, as it avoids a lot of headache for a producer or mixing engineer to not have to sort through unlabeled tracks and possibly figuring out why some tracks are off timing wise. If they are collected by someone in the band, files can be approved before being sent off to a producer or mixing engineer.

### 4.4 Communication

There are a lot of means to communicate, and it mainly depends on what people are comfortable with. Skype or Google video calling allows for facial expressions, and direct communication helps to avoid potential mistakes and errors. When working with people from other continents the time difference can get in the way (Nordström 2018), and in many instances emails or Facebook chat messages are good enough for the communication needed.

Getting lyrics and melody delivered over email and briefly discussing the feel of the song and the genre can be enough to allow for collaboration. In other instances, with more intricate instructions, a video call would be preferable so nothing is lost during communication. Pommerin (2018) explains that he always gives his clients the option to com-

municate with video chat, so it will be easier to communicate freely. Hiilesmaa (2018) on the other hand finds it very efficient with emails as the whole conversation is then saved and it is easy to go back over the notes at a later stage in the production.

Immonen (2018) explains that Yle utilizes the Google apps for sharing documents in real-time, syncing calendars and holding video conferences. When sharing documents in the cloud they are editable by all participants. This makes sure that all participants have the latest document available, and not an outdated document that was sent by email. This can be a good option for revision requests, or lyrics for vocal production updated in real-time by the lyricist in a collaboration (Sarin 2018).

For songwriters, WhatsApp group chats can be a good place to gather the team, book the sessions, and also discuss the song once there is a demo. The easy online communication can potentially also make it easier to give honest feedback about a song. (Sarin 2018.)

In Steinberg Cubase there are integrated tools for communication in the form of talkback and video stream, which allows for direct communication between the engineer and the performer (Steinberg 2018). Avid Pro Tools allow for text chat in shared sessions (Avid 2018). These type of tools seem more commonly used in the world of TV and video production, and less so in the music production world today.

#### **4.5 Feeling and vibe**

Something that is problematic when working with songwriting or production on a distance are the feelings. It can potentially be hard to find that real feeling of collaboration and connection when collaborating online. (Sarin 2018). There is a certain spark of creativity and magic that is missing when you are not in the same room (Hiilesmaa 2018; Pommerin 2018). Feelings are harder to explain over internet (Nordström 2018), and if there are issues it is better to talk face to face (Immonen 2018). Most songwriters and producers, however, seem willing to trade the small loss of “magic” for the massively increased possibilities internet has opened up. With the use of internet there are opportunities to work with bands from remote locations, vastly increasing the amount of work possible (Pommerin 2018).

When writing music on a distance you need to be able to trust your own abilities and make decisions. Once an idea is delivered to your collaboration partner, you can receive feedback on it. Hiilesmaa (2018) describes this process as working with Lego pieces, as the ideas are more finished as opposed to being thrown back and fourth in the moment when collaborating in the same room. Avid Cloud and Steinberg VST Connect theoretically allows for more instant feedback, as you can have ideas delivered to collaboration partners inside the open project, rather than exported tracks of the project that the collaboration partners need to import into their respective DAW.

Although new tools for collaboration is welcomed by many songwriters and producers (Morales 2018, Pommerin 2018; Sarin 2018), very few utilizes these new tools due to technical issues that can easily ruin a session. With the increasing network speeds and new technological advances like VR (Virtual Reality) there could soon be zero latency sessions where you can interact seamlessly with collaborators like if you were in the same room (Sarin 2018).

## 5 PRACTICAL EXPERIMENTATION

The practical experiment for the thesis was performed in three parts. The first was a collaboration with Stockholm based sound artist and singer Maddie Larsson. She is a songwriter and performer, with her roots in Norse ballads and soft punk and has multiple releases under the artist signature Acousticmaddie (Larsson 2018). For the thesis experiment, four songs were written and produced over the internet, with the intention of exploring and utilizing integrated collaboration tools for the vocal production process.

The second part was a test of integrated collaboration tools together with musicians from Sweden and Finland. Integrated collaboration features in Steinberg Cubase and Avid Pro Tools were tested, along with cross platform collaboration tools from Steinberg.

The third part of the practical experimentation was a comparison of the integrated collaboration features with two online-only productions not utilizing the integrated collaboration tools. American singer Dorit is a creative performance artist who performs with middle eastern dancing, musical theatre and as a singer-songwriter (Dorit 2018). A 2018 release of hers, titled “Killer”, was produced over the internet with only email conversation as the means of communication. My Last Whisper is a Swedish progressive power metal band consisting of the singer Jens Johansson and guitarist Kristoffer Granskog (Granskog & Johansson 2017). Their debut album “Embers of Eden”, released 2017, was produced over the internet with Facebook Messenger chat, emails and phone calls as the means of communication. For this comparison the song “Shadows of the Dark” will be examined.

### 5.1 Aim of the practical experiments

The purpose of the practical experiments was to explore the impact of integrated collaboration tools in the creative workflow. The aim was to practically explore a workflow using integrated tools for collaboration and compare this to a workflow not incorporating such tools in the process.

## 5.2 Online collaboration with Larsson

While only working on a distance there were four songs written for a Swedish language EP under the artist signature Mackan å Mörkret. These songs stay within the genre of soft punk and rock. Two songs were written by Larsson while two songs were written by me. We were both singing on the EP, and the project was meant to utilize the Steinberg tools for integrated collaboration during the vocal production.

The choice of Steinberg integrated tools was made because Steinberg VST Connect Performer is a free application that would allow to record a performer on a distance, or have someone listen in on a session, with video chat and talkback features. Since I already work with Cubase Pro 9 featuring the integrated VST Connect SE application, no additional licenses would have to be purchased to explore the collaboration features.

Massive technical issues occurred when trying to incorporate the integrated collaboration tools in the creative process. During the songwriting phase we exchanged mp3 demo versions of the songs and held communication through Facebook Messenger chat, emails and occasional Facebook video calls. Some feedback was given on the songs during the writing process, but the arrangement of the music was completed individually.

VST Connect Performer is the free application that in theory allows a performer to be produced by someone with the full version of Cubase Pro. But after Larsson installed the free software on her computer, the program did not launch without the computer crashing repeatedly. Since we wanted a direct type of feedback we tried to incorporate a video stream into the process. We held discussions over Facebook video calls about how to record the songs and talked through the vocal delivery. To be able to complete the recordings we had to remove idea of using integrated collaboration tools, as it did not seem possible to work with these tools without severely damaging the creative process.

Larsson handled marketing of the project. So in addition to creating songs, we also created marketing material in the form of video updates and a website for the project. Website maintenance and video editing was handled exclusively by Larsson, as well as cover artwork and logo creation.



PICTURE 5: Mackan å Mörkret logo (Photo: Maddie Larsson 2018)

### 5.2.1 Song #1 – Våldsbrott Baby

This song was written and produced by me, with vocals performed by Larsson. In the writing process the lyrics came first, and after a bit of experimentation with the music a modern rock approach was taken. Larsson provided some feedback regarding the feel of the song, where the initial idea was a bit too calm and slow music wise. The song was reworked to have a fuller arrangement and a more aggressive approach musically.

All guitars and bass were tracked with DI signal into the Tone Beast preamp utilizing the different signal paths for a slight difference between the left and right side of the double tracked guitars. Guitar amplification modeling was handled with JST Guilty Pleasure and Scuffham Amps S-Gear, and for the bass the amplification modeling was handled with Kuassa Cerberus. Drums were produced with Toontrack Superior Drummer 3, and a few synth layers were added with Spectrasonics Omnisphere 2. The production was intended to feel like a live rock song, despite being performed by one musician using programmed drums.

Because of technical issues we had to discard the idea of producing vocals in real-time with Cubase integrated VST Connect SE. Communication was held with Larsson through Facebook video call before she recorded vocals using Reaper 5 DAW in her home studio. A guide vocal version was provided to follow for the vocal phrasing as well as a backtrack for vocal recordings.

I created a comp of the vocal tracks and requested a few lines to be redone. Written instructions were sent to Larsson with how to record the doubles and whisper tracks that would be used for making the chorus feel bigger. Since VST Connect Performer did not function on our setup, real-time discussion about vocal delivery could not be held during the recording process. We decided against a direct video stream in the form of Skype or Facebook video call during recording, as this would still not enable editing the tracks in real-time and we did not want to disrupt the recording workflow.

The vocal tracks were edited by me using Celemony Melodyne 4 Editor, and the song was mixed in Cubase Pro 9. A single vocal track was used for the verses, and additional layers with two overdub tracks during the choruses. Whisper tracks were created artificially for the choruses using iZotope Vocal Synth 2, since real whisper tracks were never delivered during this project.

### **5.2.2 Song #2 – Dom Som Blev Kvar**

This song was written and produced by me, with vocal performance by me and Larsson. On the first attempt the song was composed in a major key and it ended up sounding a bit too happy considering the strong lyrical content. After feedback from Larsson on a demo consisting of a scratch recording of just acoustic guitar and vocals, it confirmed my feel for the song as being too positive. All guitars were then re-recorded in a minor key, making the song feel more cohesive and with a clear direction. The song was written as a duet, and it is a ballad without drums.

Gobos were used while recording the acoustic guitars and my vocals, to minimize room reflections. There is a total of five tracks of acoustic guitar for the choruses. Since the Tone Beast preamp have different signal paths I utilized these differences when recording the guitars to give a wider feel to the choruses. Subtle differences in the guitars panned opposite makes them feel wider to my ears. All guitars and all of my lead vocals were recorded with the Warm Audio WA-87 microphone. There are a few synth tracks, with synth bass and synth pads using Spectrasonics Omnisphere 2. Two tracks of orchestra were used, with Native Instrument Kontakt libraries from 8Dio and Spitfire Audio.



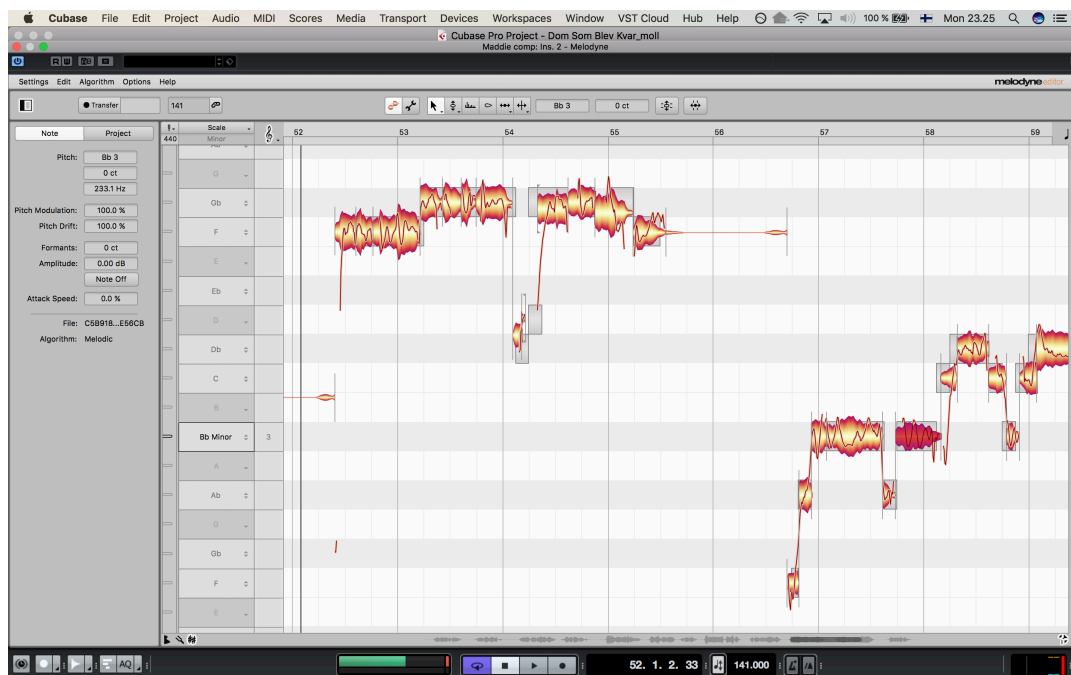
PICTURE 6: guitar recordings for “Dom Som Blev Kvar” (Photo: Marcus Mittilä 2018)

There was a vocal guide track provided for Larsson for her vocal parts, but she struggled with finding the right feel for the song as she felt the lyrics were punk but my delivery on the guide track was too nice and polished. We held some discussion through Facebook video call regarding how these should be delivered. The original idea was to produce this through Steinberg VST Connect, but since the software was not compatible with our setup we had to discard this plan in favor of Facebook video call before the tracking session. Larsson ended up muting all guide vocals while recording, singing only with the back-track. This way she felt more comfortable with getting her delivery correct.

Larsson provided two tracks of lead vocals for the song, and I created a comp out of these. For some reason, when importing wave files from Larsson Cubase activates these in Musical Mode to stretch them to the tempo of the song. This seem to be some sort of compatibility issue with files exported from Reaper 5, as this has not been an issue with other collaborators using other platforms.

The vocals from Larsson did not line up well rhythmically with my vocals, so I had to rebuild some sections using Celemony Melodyne 4 Editor. The room around her recorded vocals was also more present than in my recordings, so I processed the vocals with SPL De-Verb Plus to cut some room sound out of the recording.





PICTURE 7: vocal editing with Melodyne, “Dom Som Blev Kvar” (Photo: Marcus Mittilä 2018)

After the lead vocals were in place I recorded all backing vocals and harmonies for the song. For this the Tone Beast preamp was used but now with a Shure SM57 microphone to provide a different character vocally than on the lead vocals. Choruses were intended to grow, both with more musical elements as well as vocal elements. The last chorus has the most layers in the form of overdubs, harmonies and whisper tracks to make the last chorus have the most impact and add a choir feeling to fit the mood of the song.

While mixing, the biggest issue to tackle with this song was having the vocals sounding like they were recorded in one place due to the big differences in sound between the two lead vocal recordings. Saturation and EQ was used to add a lo-fi vibe to the vocals at the start of the song. The differences in timing between the vocal takes also made it difficult to have it sound like a duet. This is a prime example of a song where some real-time interaction during the tracking stage would have been beneficial for the vocal production.

Due to time restraints I decided that editing and mixing would have to solve the issues for the vocal recordings in this case. The song was mixed in Cubase Pro 9. The final chorus has a total of 10 layers of vocal tracks, with two lead tracks, overdubs, harmonies and whisper tracks.

### **5.2.3 Song #3 – Vår Klocka**

This song was written and produced by Larsson, with vocal performance by me. A brief chat was held about the approach for the vocal delivery after receiving the lyrics, guide vocals and backtrack. All the vocals were recorded in my home studio using the Tone Beast preamp and the Warm Audio WA87 microphone. Larsson was provided with a lead vocal comp, as well as vocal doubles and whisper tracks for choruses and an additional distortion track for the chorus lead. The distortion track was made by overdriving the Tone Beast preamp during recording.

I did some light processing on the vocal files with compression and EQ. I exported all the vocal tracks from the start of the song, and uploaded the multitrack of the vocals to the Dropbox folder. Larsson handled all the music, production and mixing for the song in Reaper 5.

### **5.2.4 Song #4 – Jag Finns Inte Kvar**

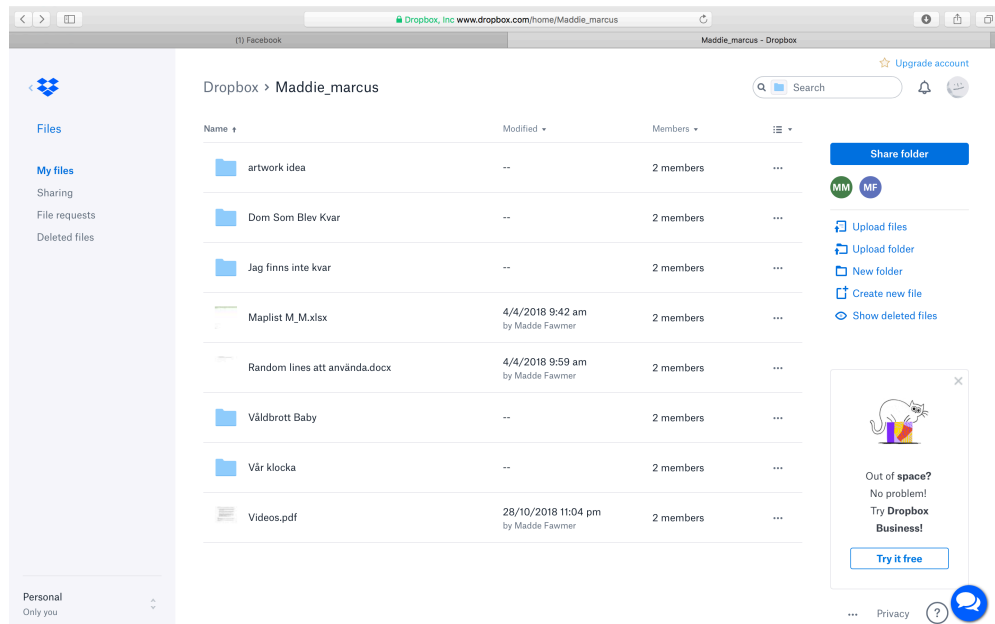
This song was written and produced by Larsson, with vocal performance by me and Larsson. The song is a duet, and Larsson requested a few lines of spoken words in addition to the sung vocals. We had some discussion both over Facebook video call as well as written chat to decide how the delivery for these lines of spoken word should be handled. After sending the initial recordings Larsson requested a few additional lines, and then I proceeded with recording my vocals for the duet part of the song.

The song initially lacked tempo information, and the guide vocal version was also offset timing wise from the backtrack. We cleared up the tempo issues through Facebook Messenger. Larsson had marked in the lyrics what parts she wanted me to sing, but in some cases her sung lyrics differed from the ones she had written down. Since we lacked a direct line of communication during the vocal production process I had to trust myself to make some decisions regarding lyrics, and potentially risk having to redo these if it would turn out to be the wrong choices.

I delivered a lead vocal comp, overdubs and spoken lines lightly processed with compression and EQ. The multitrack of the vocals was uploaded to Dropbox. Larsson finished the production and mixing of the song in Reaper 5.

### 5.3 Online workflow with Larsson

We created a shared Dropbox folder where we uploaded all material. We had a separate folder for each song, with a text document containing the lyrics as well as backtrack and a guide vocal version of each song. Instructions for recording was included in the text documents containing the lyrics. Instructions for the video creation, artwork and the finished mixes were also uploaded to Dropbox.



PICTURE 8, shared Dropbox folder with Larsson (Photo: Marcus Mittilä 2018)

After the failure with the online tools for collaboration, the communication about the production was held with Facebook Messenger in written form as well as Facebook video calling. Due to time constraints for the project we decided to not pursue the integrated tools further, but instead focusing on finishing the recordings with a familiar workflow so as not to damage the creative process. Since we did not have a common template for how to export or name files, some clarification was needed occasionally. Mostly regarding song tempo or lyrics that had not been updated in the document but existed in the guide tracks for a song.

To have the songs match loudness wise, all four songs were mastered by me in Cubase Pro 9. The goal was not to match tonality between the songs in particular (because the mixing was handled individually it also resulted in different tonality between the songs), but to make the loudness levels equal between them.

Larsson handled the marketing part of the release, creating and maintaining a website with information and photos as well as some video material from the process of making the songs. The instructions for how to record the video parts was handled through Facebook Messenger chat and Facebook video call, and the video material was delivered to Larsson using WeTransfer. The distribution of the songs to streaming platforms was handled through Amuse music distribution service, with a release intended for late December 2018.

#### **5.4 Exploring integrated collaboration tools**

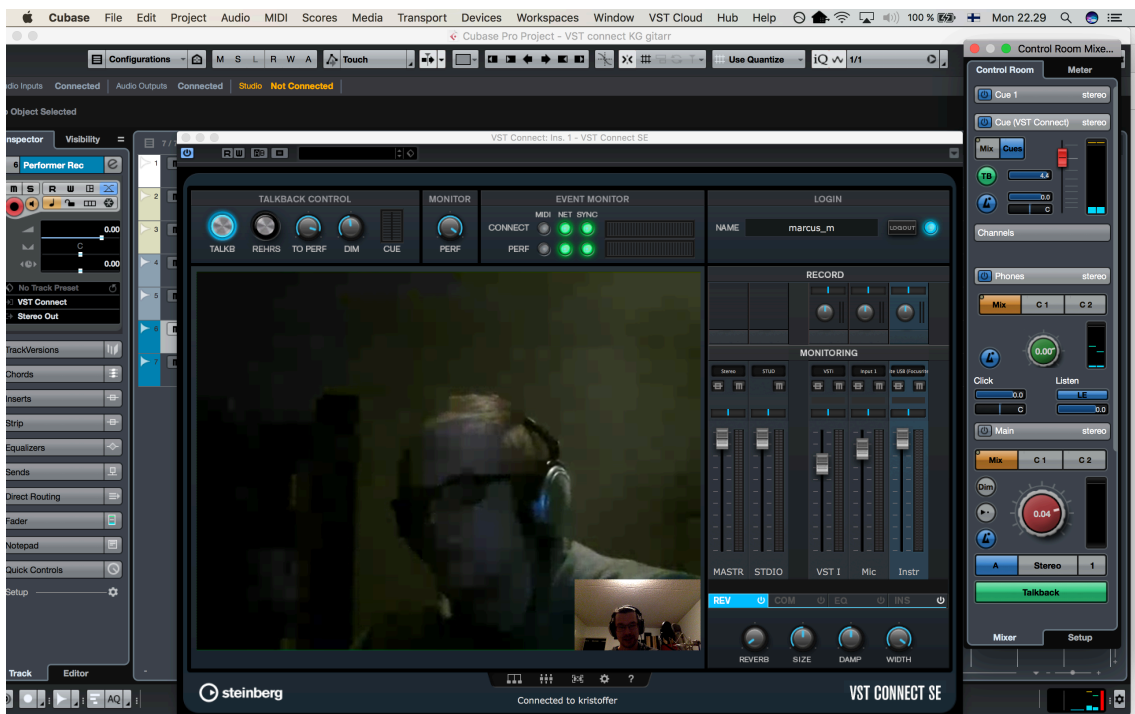
Tests of integrated collaboration tools were held with musicians and producers to see if these features in Cubase and Pro Tools would be usable if they could be utilized. The techniques seemed promising and could theoretically be a useful tool for songwriting or production on a distance. The choice for the Steinberg and Avid platforms were done due to the fact they have collaboration tools integrated in their Digital Audio Workstations. Since I have licenses for these products no further investments were needed to access these tools.

I wanted to explore the software tools in two ways. First, if it would be possible to record a performer from their studio into my Cubase or Pro Tools session using metronome click and programmed drums on my end as the engineer. Additionally, I wanted to explore if it would be possible to have a client listen to a session of arrangement and production, monitoring my orchestration and programmed drums and thus being able to give feedback in real-time.

### 5.4.1 Attempt #1, Steinberg VST Connect

Investigation of Steinberg VST Connect was done together with Swedish guitarist Kristoffer Granskog. Since Granskog does not use the Pro version of Cubase he installed VST Connect Performer. It is a free application from Steinberg and is enabling a direct connection to the engineer's Pro version of Cubase. The application connects to the integrated tool VST Connect SE (integrated in Cubase Pro 7.5 and later versions).

The video feed and talkback suffered from occasional dropouts, but Granskog was able to hear the metronome click and drums (using Toontrack EZ Drummer 2 with midi loops) from my session. Playback and record controls were handled from my Cubase session, as well as options for cue mix and the metronome.



PICTURE 9, VST Connect SE in practice (Photo: Marcus Mittilä 2018)

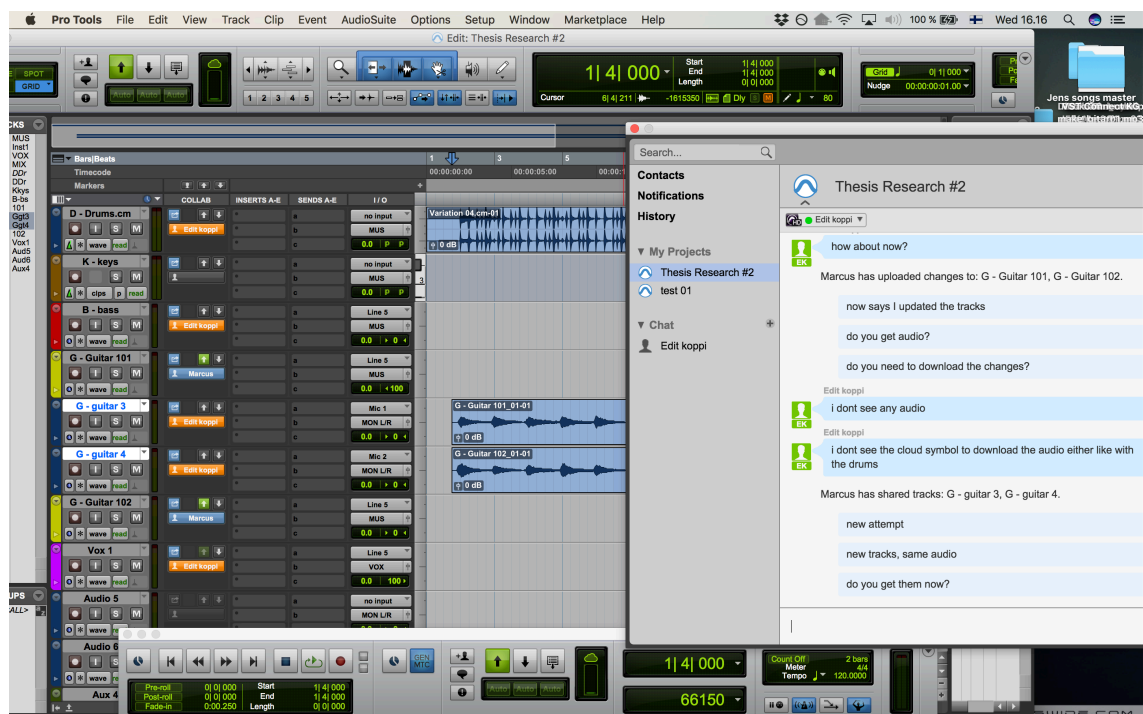
Recording Granskog playing acoustic guitar resulted in bad artifacts due to audio dropouts. Because of the real-time nature of the setup, any dropouts during the recording is printed on the received files. We experimented with changing the upstream audio quality from the performer end, but the dropouts were consistent on all settings. The quality of the received audio files was not satisfactory.

We explored if the software could be used by a client to monitor the arrangement and production process. The audio playback, however, was bottlenecked by the poor internet connection. We suffered from lag and audio dropouts when playing back audio using a few tracks of orchestral patches with Native Instruments Kontakt 5 and a few midi loops with Toontrack Superior Drummer 3.

#### 5.4.2 Attempt #2, Avid Cloud Collaboration

The integrated collaboration features in Pro Tools was explored together with Finnish bass player Ville Pelkonen. For Avid Cloud Collaboration all collaborators must have a later version of Pro Tools (12.5 or later). Communication is held through text chat inside Pro Tools.

For the midi instrumentation we used Toontrack EZ Drummer 2 and Native Instruments Kontakt 5. To be able to send the audio to Pelkonen it was necessary to consolidate the tracks in my session. Midi files allow for the collaboration partner to edit and send the changes back to be rendered through a virtual instrument, but not to monitor the outcome. Every time changes are made to a track the engineer making the changes need to synchronize this with the Avid Cloud servers. This is done from within the Pro Tools project.



PICTURE 10: Avid Cloud Project in practice (Photo: Marcus Mittilä 2018)

I recorded two tracks of acoustic guitar and Pelkonen added electric bass recording over the provided drums and guitars. There was a frustration building up due to a slow workflow and some technical errors. The Avid Cloud server was disconnecting me, which forced me to log in constantly. Some changes did not synchronize properly, but needed to be placed on new tracks that were then shared again within the session to synchronize them with Avid Cloud. The text chat suffered from a lot of lag, with what seemed like a dropout in the keyboard commands making the chat cumbersome to use.

### **5.4.3 Attempt #3, Steinberg VST Transit**

Similar to Avid Cloud, Steinberg offers another type of collaboration feature called VST Transit. It is integrated into newer versions of Cubase Pro (7.5 and later), and there is also a beta version of a plug-in for cross platform collaboration called VST Transit Join. These features were tested with Finnish-American multi-instrumentalist Jari Laitinen.

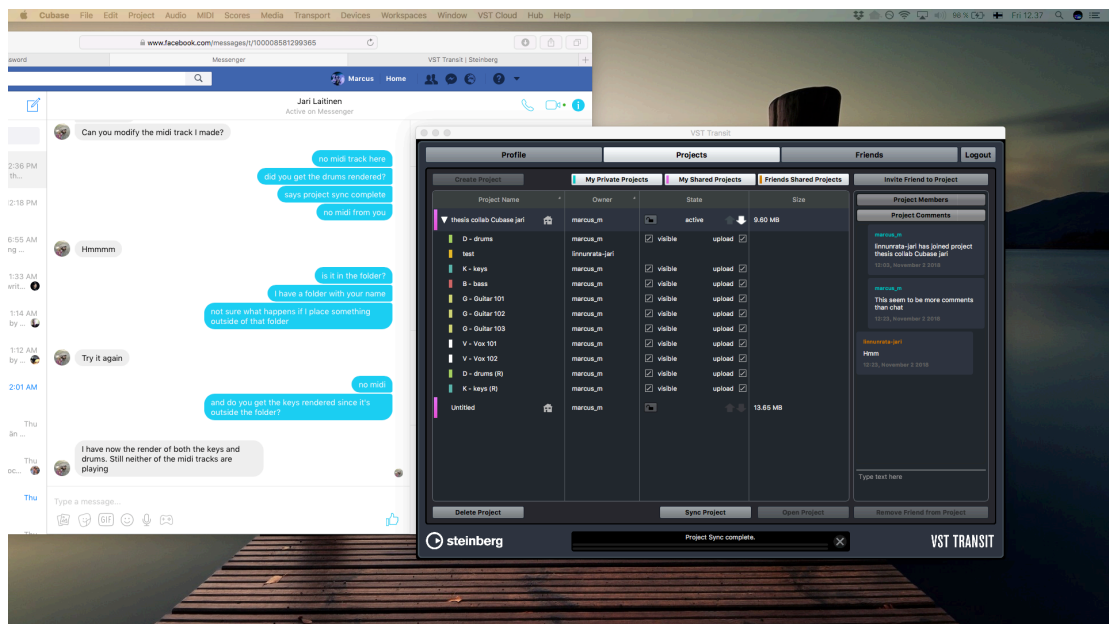
There are no direct communication links between the collaborators, and content need to be synchronized to the VST Transit servers to be available to collaborators. We kept a chat open in an internet browser window with Facebook Messenger while testing these collaboration features. Using VST Transit inside a project seem to block the use of VST Connect SE, which would allow for video communication inside the Cubase session.

Drums were created with Toontrack EZ Drummer 2 and a keyboard pad using Spectrasonics Omnisphere 2. I recorded two tracks of acoustic guitar and an electric guitar (DI signal) was recorded by Laitinen. An amplifier simulation with Scuffham S-Gear was added for the electric guitar and then rendered to make the changes audible by Laitinen.

The VST Transit interface does not stay on top of the session window. Due to the workflow inhibitions of having no communication streams and having to switch to the VST Transit interface for the synchronizing, the browser and VST Transit interface were placed on a second computer monitor.



PICTURE 11: VST Transit in practice (Photo: Marcus Mittilä 2018)



PICTURE 12: VST Transit communication (Photo: Marcus Mittilä 2018)

Editing of audio and midi files is locked to the creator of the track, but can be copied to a new track by a collaborator to allow for editing. VST Transit allows for collaborators to see the plugins added on a track, even third party plugins, if installed on both systems. Third party plugins only installed on one system, however, are not visible for a collaborator. Plugin settings, panning and volume decisions are only editable by the creator of the track.



#### 5.4.4 Attempt #4, Steinberg VST Transit Join

The beta version of the application VST Transit Join was explored with Jari Laitinen. Theoretically the application allows for cross platform collaboration between different DAWs. For this experiment we used our previous collaborative Cubase session that was already synchronized to the VST Transit server.

Playback of the audio inside VST Transit Join is synchronized to the host DAW application. There seemed to be no way of recording audio into VST Transit Join from Pro Tools 12.5 or Logic Pro X.

In Pro Tools, drag and drop of audio from VST Transit Join was not functional. The Pro Tools Commit function can be used to render an audio file on the track hosting VST Transit Join as a plugin. Using the VST Transit Join audio as a backtrack (from the plugin, without printing the audio into Pro Tool) was fully functional, and I could record vocals on top of the music with the playback synchronized correctly between Pro Tools and VST Transit Join.



PICTURE 12: VST Transit Join in Pro Tools (Photo: Marcus Mittilä 2018)

In Logic Pro X it was possible to drag audio into Logic from within the VST Transit Join interface. However, the audio was out of place and out of time as varying amounts of silence was added to the start of each audio file despite the audio files playing back correctly inside VST Transit Join. When trying to record vocals using the VST Transit Join

audio as a backtrack (from the plugin, without printing the audio into Logic) there were trouble with latency and buffer size causing skips in the backtrack audio. As soon as a track was record enabled there were dropouts in the VST Transit Join audio playback. No changes to audio buffer size or Low Latency Monitoring mode resulted in a difference with these dropouts and stutters.



PICTURE 14: VST Transit Join in Logic Pro X (Photo: Marcus Mittilä 2018)

## 5.5 Impact of integrated collaboration tools for online collaboration

The project with American singer Dorit was one that sparked my interest for online collaboration features and if production in real-time would bring potential benefits to these type of collaborations. The album production for My Last Whisper was my first full length album production on a distance. Both of these projects were executed with online collaboration, but without featuring any integrated collaboration tools.

I wanted to compare the workflow in these sessions with the workflow using integrated collaboration tools. Impact of the integrated tools for online collaboration was the focus of the comparison.

### **5.5.1 Dorit**

We initially came into contact through February Album Writing Month (FAWM), where she had uploaded a few songs with only guitar and vocals. After agreeing to collaborate I downloaded one of her mp3 demos and worked out the chord structure for the song. I built a production around her vocals and guitar.

The initial demo from me only contained midi instrumentation in the form of heavily processed drums and synths, using Toontrack Superior Drummer 3 as well as Spectrasonics Omnisphere 2 and Plugin Boutique Carbon Electra synth. After approval of the production idea the project proceeded with recording of guitar and bass in my home studio and I instructed Dorit of how I wanted the vocals and her guitar recorded and delivered. Dorit recorded these parts in a local studio with the engineer Spektor Baal, and I received a WeTransfer link with the files.

The vocal comp contained a few issues in the form of double breaths and other oddities editing wise. The performance, however, was excellent and by using a few lines from one of the overdub tracks I was able to create a new lead comp. I delivered a first mix, received some requests for changes and delivered a new mix and master which was then approved. All communication for the project was held through emails.

### **5.5.2 My Last Whisper**

For the album production with My Last Whisper I produced programmed drums and arranged keyboards and orchestra for the entire album. The band delivered mp3 demo versions of the songs for the arrangement part, and recorded the final vocal takes to the produced versions of the songs. The band delivered reference songs for the drum sound they were aiming for and feedback during arrangement and production was held over Facebook Messenger chat as well as phone calls with Johansson. For the final mixes of the album we opened a shared Google Document where the band could add their notes about corrections and requested changes on the mixes of the entire album.

The band recorded vocals, guitars and bass in their home studios and sent the multitrack recordings to me using WeTransfer. There were no additional engineers present for the

recordings. During the process, mp3 versions of the songs were delivered to the band using email attachments but the final versions of the songs were delivered using Dropbox due to file size limitations. The drums on the album were programmed using Native Instruments Kontakt 5 with Get Good Drums Matt Halpern Signature Pack as well as XLN Audio Addictive Drums 2. Keyboards were created with Spectrasonics Omnisphere 2 and orchestral arrangements with Kontakt 5 and patches by Spitfire Audio.

For the song “Shadows of the Dark” there were midi files provided by the band with ideas for the keyboard arrangement, and these were used as a basis for my arrangement of the song. Guitar and bass sound was created with the provided DI tracks using amplification modeling from TSE X50 V2 and Scuffham Amps S-Gear. Vocals were edited with Celemony Melodyne 4 Editor and the song was mixed and mastered in Cubase Pro 8.5.

### **5.5.3 A workflow comparison**

Comparison wise, because the integrated collaboration features were a total failure for the experiments with Larsson the biggest take away from this endeavor was that not trying to incorporate any integrated collaboration feature avoided unnecessary hassle with technical problems. Working on the songs individually, with feedback on completed steps and a trust in the others ability to complete the song, made the collaboration easy. A familiar workflow coupled with written communication through email and a shared Google Document made it easy to reference requested changes and keep all communication in one place.

With Dorit the issues with the vocal comp, and a few parts of the performance that needed some editing, could have been avoided if I had been able to deliver instructions in real-time. But since the vocals and guitar were recorded in a studio with an engineer present there were no big issues. The collaboration was smooth and we were both happy with the final result. The song was self released by Dorit using Distrokid distribution service in 2018.

With My Last Whisper there were parts of the vocal takes that were uneven in distance from the microphone, making it occasionally hard to match tonality between different parts of a song. Bass performance required a lot of editing. These are, again, issues that

would have been easier to handle with real-time instructions during recording. Adjusting distance from the microphone, possibly microphone choice, delivery and timing could be done to get the desired results and avoid excessive editing. If the singer delivers the recordings, then re-recording parts takes a lot more effort than if the adjustments could have been done in the first tracking session already. But the problems were not overbearing, and everyone involved were happy with the final result of the album. The album was self released by My Last Whisper using Distrokid distribution service in 2017.

## 5.6 Results

With Larsson, we were not able to utilize integrated tools for our collaboration as we had planned initially. Due to time restrictions, and the fact that we wanted to complete the songs rather than sorting technical problems, we prioritized the music over exploring technical advancements with collaboration tools. In retrospect, with the issues present in all integrated tools during other experimentation, this turned out to be a good decision. The songs were completed, and the collaboration process with sending files over Dropbox while communication being held with Facebook Messenger and video calls was a valid method for completing the collaboration. The songs represent our personal touches for production and mixing, but cohesion in the form of our distinctive voices, Swedish language and staying in the same general genre. The process differed from the collaboration with Dorit and My Last Whisper in the fact that we each took care of producing and mixing two songs, but otherwise the workflow was similar with a lot of individual responsibility to make the final product complete.

It seems that on anything but a stellar internet connection VST Connect is unfortunately a nightmare of technical issues. It is not usable on my system, with a 12 Mbit mobile Wi-Fi connection. During the experimentation, Cubase crashed multiple times when trying to change settings within the VST Connect interface and the poor audio quality renders the software completely useless in any sort of professional setting. The manual does state that a reliable internet connection is vital for functionality.

With the Avid Cloud model there were no quality issues with the audio transfer, and this seem like a model that would actually allow for collaboration if both parties are on Pro Tools (12.5 and later versions). The uses for the current Pro Tools collaboration feature

would probably not allow for a perfect songwriting setting, even if it does allow more direct access to the tracks and exchange of ideas. This would potentially work well for having a client listen to a mixing session, or for production purposes where the client could come with direct feedback about orchestration and arrangement decisions. The near real-time experience allows for transferring high quality audio files at a speed the internet connection will handle.

With VST Transit, the connection to the Steinberg servers were lost occasionally. Having no notice of changes being made to the session, as well as having to access the VST Transit interface for synchronizing to the server, made the workflow feel cumbersome. The lack of communication inside the session does hinder the workflow, but audio transferred using VST Transit does not suffer from dropout issues. The collaboration was somewhat limited when the files were locked to the creators account, but the ability to collaborate within the same session was intriguing and this concept has a lot of potential for development into a concept that could work for songwriting and production over a distance.

The VST Transit technology seem promising as long as the collaborators are using Cubase Pro. As of now, the beta version of VST Transit Join seems to be riddled with too many problems to be usable in practice. Audio recorded inside Logic Pro X and Pro Tools 12.5 did not seem to be transferable to VST Transit Join in any way, so it seems to be usable only for playback at the moment. This somewhat defeats the purpose of cross platform collaboration. All versions of VST Transit would theoretically be suitable for a client to monitor production and give feedback about arrangement decisions, but less usable for real-time production that would require a direct communication link. The collaborative workflow was cumbersome due to the fact that tracks are locked to the creator rather than being shared between collaborators.

For vocal production it would be preferable with a video stream to be able to talk directly, but if that communication can be held with another application at least the files can be quickly accessed and edited by an engineer to get ideas across when using VST Transit or Avid Cloud.

None of the models for integrated collaboration were perfect during our tests, but on the internet connection I have today there is no doubt that the only valid option for now is the near real-time workflow of Avid Cloud or VST Transit. Actual real-time recording on a distance was very sensitive for dropouts in the audio transfer. There is another alternative from Steinberg with VST Connect Pro, where a temporary lower quality file is transferred in real-time while a high quality audio file is transferred in the background similar to the VST Transit method. This seem like a good trade off, but the technique is something Steinberg is charging for and it was not within my budget or timeframe to explore these features at this point in time.

## 6 DISCUSSION

Internet has opened up massive potential for collaboration and opportunities for people from all over the world. And while integrated tools for music collaboration is great in theory, it seems to not be utilized by music producers and songwriters today. Technical errors interfere with the workflow, and internet connections are not strong enough to support real-time work for most musicians.

When producing or songwriting over internet it would be of great help to have a direct communication link with a collaborator, and be able to coach performers through a recording session. Receiving direct feedback from a client of how they want their drum production or orchestral arrangement to sound like would also be helpful. So there is a lot to gain from the techniques, but it seems to not be ready for today's engineers and producers.

Since music is a creative endeavor it can potentially be very sensitive to delays and technical problems, and creativity could be hampered by having to spend a lot of time troubleshooting. I know from my own experience that when you sit down to write or produce, it is important to get started fast or that initial spark of creativity can quickly wane and disappear. Most songwriters and producers has an established workflow with DAW templates to get started quickly and be able to fast forward the setup process to maximize creativity.

Bigger corporations, like Yle, has the capacity to utilize a more integrated online workflow. This is probably where music production is headed as well. All musicians and producers I have been talking to are using online collaboration at least to some extent, and the online workflow is likely going to improve at a fast enough rate to soon make use of more integrated tools. Setting up an integrated system for online collaboration could potentially be a time consuming effort, and it seems it really does require a fast and reliable internet connection to be able to put the collaboration features to good use. Furthermore, the existing tools for an integrated near real-time collaboration would need more development time to enhance the workflow instead of altering it and get in the way of creativity.



It can be no coincidence that all the songwriters and producers interviewed unanimously reported to not use integrated collaboration features in any DAW, but instead sending multitracks to keep the sessions free from errors. During my practical experiments, all attempts at using integrated features failed due to internet connection speeds and a general lack of compatibility with the software. Spending all that time troubleshooting really deterred from the creativity, so it ended up hurting the sessions a lot more than it potentially would have helped to integrate those features in the creative workflow. The time spent testing the integrated collaboration features for the research of this thesis did not result in actual songwriting, as most of the time was spent trying to troubleshoot and solve errors.

Most music creators seem to agree that there is a certain vibe and spark when writing in the same room, and I also feel like you do connect in a different way during songwriting when you are physically in the same place. It gets easier to throw ideas around and truly create something together. When writing music with others over internet a lot more emphasis seem to be on responsibility over your own parts. Maybe the new tools for collaboration are on their way to tackle this problem, but they are not yet there with a valid solution. When the techniques have developed more and internet connections are more reliable, I believe there is a real future for seamless online sessions for songwriting and production.

The prospect of cross platform collaboration within the same session is intriguing, and with more development this could be a real alternative. The technique seems to be in the baby stages, and it will be interesting to follow the progress and development. As the internet speeds and technology improves, the distances of the real world will grow even smaller. For now, the vast majority of music makers will be staying with a system that is familiar and as safe from errors as possible. The integrated tools for online collaboration are still in early development, and there will likely be some time before the collaboration tools have reached a potential for being useful to the vast majority of online collaborators.

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## APPENDICES

Appendix 1. Interview with Hiili Hiilesmaa 12.10.2018 (1)

Transcribed by Marcus Mittilä

### **Briefly – who are you, and what do you do for a living?**

I am Hiili Hiilesmaa, Music Producer. Also mixing engineer, mastering engineer, musician (16 albums with own bands) and over 300 registered songs in Teosto where I have different kinds of shares.

Hobby recorder and musician during 80's. Freelance engineer and recording artist 1992-1999. Own production company Hiii Music since 2000. Own record label Concorde Music Company since 2014.

### **How big part of your work is done collaborating with people using internet?**

100% of the projects are some way connected to internet, especially when working with foreign projects. Usually the whole business side is managed via internet. Preproduction can be done 100% by sending demos via internet. Recordings can be checked in certain "spots" by sending clips via internet when I work as a virtual producer. Multitracks can be sent to mix and the checking of the mixes with client can be done via internet.

Mastering was the first production phase that was done by using internet for me. This is because there are only small stereo files to be sent. Around the millennium I started with the online work, and this was when I moved to Hämeenlinna from Helsinki and got bored to drive two hours a day with car. So I started little by little with some editing work and then it became mixing and mastering too.

As a mastering engineer it's easy to have an online workflow, with mixing there's more material and more "risky" for the artist because it's also more money. You need to have some kind of reputation when you start offering mixing or producing online, it's not enough with nice gear – you need references.

**How has internet changed the way you approach your work?**

I can prepare a lot better to each project. Risks are also smaller when everything is in emails. Earlier some agreements were done by fax... that sounds like the Middle Ages today!

In the late 90's people had to meet in person to make a plan of the project. That took a lot of effort to travel around. For example, I did preproduction trips to Norway, Russia and Portugal. So it took a lot of time and money to just to sit down with the artist and visit the rehearsal place!

**In your experience - over the past 10 years, how has internet based collaboration developed?**

Internet is way more stable and faster nowadays. Cloud services are very useful to transfer files. At first it took couple of years that older bands got used to working virtually. In the beginning there was no culture of how to work virtually.

Even today some bands are unable to work virtually, which is understandable. There is no "one fit all" system in album making. Younger bands are born into new systems, unlike the older ones.

**Can you describe what online tools are used in your workflow?**

At the moment I prefer WeTransfer for sending files. It has worked nicely. Dropbox fits better when working within a team that works more permanently.

It's a bit about personal choice, and I have been using Skype in some sessions. It works well to meet people and build the trust, or brainstorming for throwing ideas. But notes about the arrangement, and feedback on mixing levels it's good if it's written down. For written conversation I stick to emails. I have colleagues who use Facebook groups for communication, and it adds a lot of "noise". WhatsApp can also become too messy for me, so that's why I keep it all in email. I copy the most important emails and store

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them in a folder. With all the information available you can go back and check what was the budget and timeframe etc. I have tried cloud services and document sharing, but it did not work well for me. I have an older system and that is why emails are the most stable system for me.

In the pre-production phase, as a virtual producer it all starts from music. I always ask for demos from the bands, be it iPhone recording or produced demos. Then I take a listen, for example while driving or walking. It gives me an idea of the music, and where it could be recorded – should they come to Finland to record or should they record themselves.

I have templates for different studios setup, formed during previous sessions. Last but not least is the budget. You can make an album with 2000 euros or 20 000 euros. It can be frustrating when asking a band about the budget and they say that they don't know. I have been trying to suggest for a band different pricing options, and what sounds closest to their budgets – 3000 euros, 5000 euros, 7000 euros. Then they start discussing among themselves how much they can spend.

Virtual production is a key in budget discussions too, it gives a band freedom to record themselves over time. If they track themselves they send me examples of how they will be recording, and I am in touch with the band after checking the multitrack they are sending. I try to form a team with the recording engineer, but nowadays most bands have someone in the band who can be engineering. Tracks should be sent to me edited, and I can check the quality in different checkpoints – one after recording drums, one after instruments, then third one after vocals are recorded. When there are a lot of tracks I also ask the band to bounce a rough stereo mix as a reference.

Also important is the system of how an artist will send you the tracks. I send them instructions of how I want the tracks delivered, because it can vary so much. Starting softly with having the band send one song first is great, sometimes I even send the band a multitrack and ask them to open it and then send me a song in the same way. If there's no labelling of files just sorting through the tracks and figuring out why some track is off timing wise can take a lot of time.

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If the project is recorded in different spots it is very important that there is one person collecting all the tracks and making sure it's all lined up before the band is sending files to you. A band member, or the composer, should be collecting it all and approving it before it is sent off. Having the band include a rough mix (monitor mix) as a stereo file with where everything is supposed to be timing wise is great, and can help you figure out if something has gotten misplaced.

**Are there any problems when working with others remotely?**

I wouldn't call them problems, but if the project needs face to face contact, then its better to arrange the sessions that way. Some projects need more pedagogy and some projects need more referee style work, for example. If the virtual production system is in condition, there shouldn't be problems just because its virtual.

If the band doesn't get a long together, fighting over arrangement, then you need to be there as a problem solver. I have done sessions with each members tracking separately, if they are all present they start fighting.

At the end of the day, its about the people and their chemistry. Some persons can make problems with any system while some people are very flexible with any kind of working methods.

**Are there certain things you can do with online collaboration, that is not possible locally?**

First of all, many of the sessions would be left unfulfilled without internet. It saves so much money, time and energy. In mixing or mastering you can really tend to mixing itself better when you are alone. In preproduction you can listen to the demos while walking in the forest, instead of sitting in the rehearsal place. You and the artist can have very flexible schedules, no need to sit behind the mixing desk at the same time anymore. More freedom means more creativity.

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You can quite easily compare costs of producing in person when you count on hotel nights, travel expenses etc. The benefits in costs become obvious then.

**Are there certain things you can only do locally, and not with online collaboration?**

Still today it is impossible to record real-time with someone in different location. But soon it can be done, I guess. Also brainstorming is difficult to arrange online.

Sometimes it would be good to be "hands on" when tuning the drums, setting the guitar sounds etc. Usually there is an engineer who knows what to do with microphones, but the actual sound settings can't be done online. Re-amping can help a little, but that's still not the same. You can get more into details in person, and push the musicians a bit more for the perfect takes.

When producing virtually it is a difference from in-person production of course. I am very strict with groove and quite strict with tuning. Also for example, when bass player is playing I always check what string he's playing and trying different things, zooming in on the details. There is more responsibility for the band when they record without me, but it gives totally different possibilities. Traveling to Rovaniemi, living in a hotel, waiting to solve technical problems in the studio etc – there's a lot of costs involved.

If it makes sense you can meet in person and create a demo in two days. Then you can check out amps and strings and drum skins, and band can track themselves. It becomes semi-virtual production then. Another options would be to make the foundation tracks together with the band, that I am present for drums, bass and rhythm guitars. Then the band track leads, solos and vocals themselves with virtual consultation.

**How do you experience communicating with people over internet, compared to being in the same room?**

Internet means you have everything written which is very good in many ways. Agreements, schedules and so on. You must build the trust between each other more carefully.



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It takes more work, because you can not build it face to face. Also, with internet you can not communicate with your face, you must use emojis.

I understand online is more difficult for the artists than it is for a producer. It's like a virtual doctor, people give more trust to a doctor in the same room, no matter if that doctor can tell the diagnosis as well virtually or in the same room with the patient. People are different.

### **How do you see online workflow developing in the future?**

Real-time recording via internet will come soon. 5G is coming soon. The band can be in Japan and you press the record button in Tampere. This will be very nice, but it will cause a huge hassle at the beginning, when musicians and producers try to make their set ups work together. Also new working culture has to be built from zero. But that can give nice possibilities.

### **Any other thoughts on the subject?**

Online is the future. Musician can press the record button by themselves and they can have feedback from the producer via internet. This saves everyone's money, time, energy, nature and nerves.

When you work with art and artists it becomes very personal. That might be why it can be trouble working online with some projects. Artists are often not the handiest ones with the technical stuff, and you need to build your own "bubble" when working with art. Maybe in the future it becomes easier because people are used to online communication.

I don't believe that songwriting with totally unknown people online works well, even if some people are actually working like that today. Sending demos works fine, but it becomes more like putting Lego pieces together. If you would be in the same room you can be more in the moment and throw stuff back and fourth faster.

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So what I try with virtual production artists take a lot of responsibility themselves, and with rock bands that usually works great. People want to do their own thing. If I try to be too involved with each detail it gets more difficult online.

I have been developing this online workflow for 10 years now, and I really believe in it. I can do what I do the best, focus on the main things instead of waiting for band members being late etc. It saves money and everyone's time. This is great in a time when records are not giving much income to the bands anymore, because it allows for a high quality product even for a smaller budget.

Transcribed by Marcus Mittilä

**Briefly – who are you, and what do you do for a living?**

My name is Antti Immonen and I am a long time Yle employee. I have been in this company since 1985. I have been a sound supervisor for 20 years as my main duty, then I was working as a manager for the sound department and the post-production department. Nowadays, after many phases in my career, I am a technical development producer and I am responsible of the development of our production platform here at Yle Production and Design, Tampere. Everything from studio operation and studio equipment to post-production equipment workflow.

**How big part of your work is done collaborating with people using internet?**

As a technical producer I do more manager type duties. I am not a content producer. We as managers or producers are using online collaboration all the time. Our meetings are mostly online meetings and we use the Google apps for everyday work. Google Hangout video conferencing system sees a lot of use. This frees you up, not having to be somewhere at a certain time, and you can remotely attend the meetings. That is my current situation.

Our documents and pictures etc. is in the cloud, so it is accessible from my phone, iPad and my Mac. I have been doing fully electronic workflow since the second version of the iPad. I'm using the pen and the iPad for notes, and taking pictures. I am not using papers and in that sense I am quite green. I very rarely print anything nowadays. If you write with the Apple pen and have the settings to upload to the cloud it is available all the time from all your devices.

**How has internet changed the way you approach your work?**

It has changed everything. Nowadays I don't have to travel for a meeting, for example to Helsinki. This is something I had to do ten years ago when we started to build our first production asset management platform. For that project I traveled four times a week to

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Helsinki, but now when we have some kind of project I don't have to travel. I can attend the meetings online and I can see and edit all the documents simultaneously with my colleagues. And I don't have to do this from my office, I can do this from my home as well. It is a tremendous time saver.

**In your experience - over the past 10 years, how has internet based collaboration developed?**

10 years ago there was none of these tools. Of course we had our laptops at the time but all the files and documents were on the local hard drive, not in the cloud. Sharing of documents was not possible. If you wanted to send a document you had to attach it in an email, which meant that it was kind of a hard copy of the document. If I then changed the original one, the document that had been sent became outdated. Nowadays it is easy because the documents are up to date all the time. This is a big change.

When we are producing media, doing video or audio editing, it used to be movable hard drives or similar. Nowadays we use the online collaboration which is made between the Interplay systems. We have four Interplay systems in our company – one in Vaasa, one in Tampere, one in Helsinki and one in news production. The Interplay systems are connected so that you can send sessions, files, everything, between them. You can even edit content which resides in the Helsinki Interplay system from here in Tampere. It has been an explosive development.

We can now also use the Media Composer Cloud, which is an Avid client with which you can edit videos. You can now, with this web based cloud software, edit content everywhere in Finland over the internet using lower quality Browse media. You can stream easily with 4G connection and do your edits, then someone else can render it with the full quality video. Or export it so the Interplay system replaces the Browse media to full quality video. Inside the Avid clients this works well. Pro Tools also have a similar online collaboration and this doesn't necessarily need to connect to the Interplay system (but it is beneficial if the session is there, because it is a media network with a lot of speed and bandwidth).

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**Can you describe what online tools are used in your workflow?**

For the office type of work, or management type work, we use all the Google apps. Calendars, text edit, slides (a power point type of thing), emails and Hangouts which is the video conferencing system with chat functions. You can also share documents, and with Hangouts you can edit the same document simultaneously.

We are mainly now in the Google world and we don't use other video conferencing systems at all. We have been clearing out all the bandwidth in our offices for the Google tools. For file transfer we use Google Drive and we have a corporate license so we are paying for their services. Each employee has several gigabytes available and you can request more if needed.

Avid Cloud and the Interplay system is our collaboration platform for media productions.

**Are there any problems when working with others remotely?**

Yes, sometimes it's good to see people face to face. It is obviously important. The online collaboration is no substitute for your social life. If there are any issues it is easier to talk face to face.

**Are there certain things you can do with online collaboration, that is not possible locally?**

There are many things possible with online tools, for example we have meetings with people from different parts of the world. We also have webinars inside our house where some people are discussing equipment or software and we're watching this remotely. Previously we would have been traveling to London for a meeting, which could be nice but it saves a lot of time with the remote meetings.

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**Are there certain things you can only do locally, and not with online collaboration?**

Especially in the media side, if you have heavy files for example for color grading and manipulating the raw files from the camera. The files are so heavy in size and bandwidth and with the current technology you can't do this with the online tools. You need a dedicated disk array in the next room connected directly to the computer. It's not even possible with our high speed media network, you need a fiber connection between the computer and the disk array.

Now we are able to do the HD operations through online work, but if going up to 4K or VR (virtual reality) productions then it is also impossible with the online collaborations tools. And similar in the audio side, if you have a heavy session with a lot of tracks, stem mixes and Dolby Atmos rendering – you need the files near the computer. It is always possible to put files in a remote location, but there might be network issues creating a latency. If there is a lot of latency in operation, then the computer works too slowly.

**How do you experience communicating with people over internet, compared to being in the same room?**

It is more personal face to face. If you are working with people for many years so you know them well then there is usually no problem. But if there is new connections, it is always better to first meet face to face if possible.

**How do you see online workflow developing in the future?**

I think we are just in the beginning. In the movie making world there is now common practice with ADR sessions (Automatic Dialogue Replacement sessions) with studios in Hollywood and actors in the Philippines or New Zealand for example. The actors don't have to fly to Los Angeles, and the director can give instructions through video stream. If the connections are high speed so there's no latency it is quite convenient. It is similar to being in the studio behind the glass anyway.

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I think it is going to develop a lot. Avid are hard at work with the cloud collaborations, and new production platforms that are entirely cloud based are being developed. Then there is no hardware, everything happens in the cloud. You stream up media and stream down media and can do graphics rendering or similar in the cloud - all remote work.

I was in a seminar a year ago with the head of technical development at Discovery Networks. They have moved all their media quality check and playout stream into the cloud so there is no strict location of where the files are. Content can be uploaded and downloaded anywhere in the world.

Another thing with the cloud is that you can have computational powers not available with conventional computers. When rendering VR graphics, which is very intense operations, it is easier to calculate this in the cloud system with super computers – it is so much faster. We are looking into moving some graphics intensive rendering work into the cloud.

If I try to predict something I would say that in 10 years we are using clients, for example video and audio editor, which is just an interface. We would not have any local files. Everything will be in the cloud, like virtual instruments and sound libraries and effects. The new network technology with higher speed networks, for example 5G mobile networks, makes this possible as the transfer speeds increase.

**Any other thoughts on the subject?**

We are a big company with a lot of money invested in our systems and hardware, so we can not move as fast as a smaller company who can easily move into new technology. We have so many users, so we are behind two or three years.

Looking at music production and online collaborations when using Dropbox or similar there is always a version of your latest session that you are sending. With Avid Cloud collaborations you are collaborating inside the sessions, so if you do changes the session is updated for all users. It is quite clever.

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It is a shame that similar functions are not available in all other DAWs. As a session musician you need possibilities nowadays to record yourself, and online collaborations are growing fast because of the convenience. I think it is rare that you'll get flown out to a studio to do session work nowadays.



Transcribed by Marucs Mittilä

**Briefly – who are you, and what do you do for a living?**

I'm Patric Sarin and I've been a professional songwriter for about eighteen years. I do vocal productions but mostly topline. And now I'm also the creative director for a publishing company called HMC, which is owned by Warner Music.

**How big part of your work is done collaborating with people using internet?**

Actually a lot, but I wouldn't say we have live sessions that much. We have had some live sessions over internet, for example through Skype. But there's this one second lag, which is hard to work with when you get excited. You shout something and the other one will hear it one second too late and react to something else than what you meant. So we use it more for discussing lyrics or melodies and how to change them after they are written.

Obviously we are sending emails with versions back and fourth. We send multitracks, and I have a Dropbox account with a lot of songs and acapellas. I can send an acapella to another producer to work with. It's so practical, even if you are in the same city you can send it over internet so you don't have to travel.

Nowadays you can also record melodies on the phone, and hand it to someone to work with. You can demo things on your phone, and request changes like that or have someone start working on a song just by sending them a phone demo.

The aftermath on a track is always done over internet. Emails, text messages, voice messages and so on. That is really the way to do it nowadays. It's not a single song that is completely done after a session day, so usually we write something and then the lyricist work on the lyrics somewhere else and send it to me. I might go to the studio and sing a new demo and send the acapella to the producer and he starts working on that. When we have a new version we think it over and we do it again. So this is basically how we work now.

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**How has internet changed the way you approach your work?**

It hasn't changed the core process of writing, because obviously 85 % of the core thing I think is being done in the same room with other people. But the aftermath, the polishing of the track – you don't need to book the second session. It has all gone somewhere else. It is faster like this. Writing with people who have a lot of other projects going on then it can take two or three weeks to book the next session. Like this it gets done some evening when they have time, and I do stuff when I have time. I come from the office and I go to the studio to record. So there's a process going on all the time. It's faster like this and bit more stressful as well.

With the aftermath I mean the whole polishing process. Tweaking melodies, lyrics, how the song is built, the different parts, mixing and mastering.

**In your experience - over the past 10 years, how has internet based collaboration developed?**

The first thing was obviously the emails, and this was more than ten years ago. When I was young we had to send CDs, so it took a few days to get feedback back in those days. So with emails it happened so much faster. Now you can react really fast as well, which makes it more stressful.

The more stuff, the more applications you have, the more stressful it will be because you can work all the time now. But on the other hand you don't have to travel all the time. So it's cheaper, and in a way less stressful like that with the traveling and less of a global footprint.

I'd say, in the beginning when Skype started we tried that out with real sessions. But you can't connect to the person in the same way you can in a session in the same room. Discussing the song is obviously better with a video chat than over email, because you can rephrase what you are saying if you don't understand. So the real-time communication is faster like that. It has changed a lot in ten years.

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When this goes a bit further you will sit with VR glasses in the “same room”, even though they live somewhere else. I think this is going to work, this way you will book sessions online and this is going to be crazy. This is coming, obviously, but it’s not here yet. If it is already here then I haven’t used it.

**Can you describe what online tools are used in your workflow?**

Email, messenger from Facebook, WhatsApp, iChat, Dropbox, SoundCloud. Producers use Splice which is samples from the internet in every production nowadays. This is amazing as well because you don’t have to record anything anymore if you don’t want to. You have a lot of instruments out there. These are the tools I can think of now.

When you discuss unofficial stuff with your writing friends a lot of communication goes through WhatsApp, and if you need to clarify something where you don’t want to write or record it as a message you can call them instead. I use WhatsApp a lot. I book sessions like that, putting people in the same conversation group, deciding the date to go to the studio, I send the leads and who is looking. When the song is done I can comment on the song in the group as well, and we can discuss it there.

We also use Google Documents where we write lyrics, so we have the lyrics on the phone. When I write melodies I can see changes the lyricist is doing in real-time. So we can discuss the lyrics and get the new suggestions directly. If the lyricist just tells you a suggestion you will forget it, but with Google Documents you can see it written and process it and then say what you think about it.

I am using Logic, while the producers usually use Ableton. I am on Logic because I do a lot of vocal sessions. I have shared a Logic session once, which was a complete disaster. I know a lot of producers has tried this Ableton sharing feature, and it works but it’s still evolving so it’s not something that people do very often. Also, producers can have big egos about what they do so it can be troublesome sharing sessions where people can tweak it. I do my parts in Logic and send multitracks, and it’s safer when I also do my own parts. Obviously if I collaborate with someone they could record it and I could edit it afterwards, but I have not got into that so much.

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I have a set workflow and use the same settings, and as a publisher I don't have so much time to learn new things. I go with what I know already.

**Are there any problems when working with others remotely?**

As I said, the latency over Skype and video calls does not work. When you are eager on something you "eye talk" a lot. The latency is making it hard to do that, really having a session for writing.

Also with WhatsApp, if you need to clarify something you need to write a lot so it's easier to call people then. But otherwise, with Dropbox you can just download and tweak stuff for everyone to hear it at the same time which is great.

**Are there certain things you can do with online collaboration, that is not possible locally?**

It's a bit easier to tell something straight through online means, for example over WhatsApp. You don't have to look someone in the eye and tell them something is not good. So that is probably easier, but otherwise I still think the easiest thing is to sit with people in the same room and get a song done.

Of course it does allow you to meet people in a different way. I was chatting with this producer, Cirkut. I met him first in Los Angeles and I also met him in Finland when he came to our office. After that we have been chatting, and this is a lighter way to communicate. He probably does not have time to meet, being on billboard top five. I feel like I have created a lot of contacts through Facebook Messenger. Just because it's such a light way to just say hi, and if they don't answer you it sends a clear message that you shouldn't pursue it. But if they say hi back it's a great way to start a conversation. They could be sitting with world class artists every day, but if you have met someone at a party and you know they are doing music it's easy to go through Facebook just to say hi. It would be a lot harder to travel to another country just to have a coffee, and after chatting maybe you could actually go for a coffee next time you are in the same place.

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**Are there certain things you can only do locally, and not with online collaboration?**

I think the whole co-writing process of getting the over vibe in the room, when you get really eager creating, getting the hooks together – for now I think this can't happen online. It's not the same thing online, creating a group and having fun together. This is so much harder online. So still I think you need to meet people.

But when you will have VR communication and faster internet speed, with zero latency or possibility to account for latency – it's going to be a lot closer to the real thing. I think this is the only thing missing now.

**How do you experience communicating with people over internet, compared to being in the same room?**

I like people and I like sitting with people in the same room. I like seeing the reactions. A big part of writing is reading people. They might not be able to tell you straight up that they don't like something but you can see it in their face. So I think it's a very honest way of doing things, sitting in the same room, getting to know the people.

The plus side of using WhatsApp is that you can be quite short, and honest if you need to cut a song. This can be tricky in person, but online you can be more honest and save some spare time for yourself by not going to another session if you don't think it is actually that good.

**How do you see online workflow developing in the future?**

We already have PlayStation with VR, and also VR video recordings. So just imagine it – downloading a nice environment where you sit and write, but you're actually sitting in the studio with the microphone so the sound will be great while in your headphones and glasses you can be anywhere you want. When this works flawlessly this is going to be very similar to being in the same space with someone. Then you wouldn't need to fly to America just to meet someone. You could have a virtual session together, and it would work great.

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I still think you would meet people if you are in the same city, because the hanging out part like going for lunch for example wouldn't be the same online. But the writing part can be, which is actually really scary when you think about it.

**Any other thoughts on the subject?**

Music is such a personal creative process, and a lot of emotions. I think this is why it is so hard to work with online tools in the writing process. Especially with new tools, you need time to understand how to use it efficiently to not run into any technical problems that will destroy the vibe.

I think it's really interesting with what you see with VR in games right now. For new writers as well – it's really expensive to travel, and you don't really get money directly from a session. You can be writing for two or three years before you see any money from the songs. With VR, you could for example be five friends owning the gear together and you just book the room for a day. You go online and you can have a session and start writing. I think this is the future, and it's going to happen more and more.

A lot of our producers use a lot of Dropbox, so you can be singing melodies to the producer from somewhere else when they go home. This is a bit stressful. It's similar to when the mobile phone came. Because earlier, between phones you could not do anything so you did not have any stress. Now when you have a mobile phone you can do anything, so you end up working 24/7. With this new technology the session will never end, so it's up to you. And you don't have to fly anywhere. You don't get the spare time of sitting 10 hours on a plane to Los Angeles. So this will mean work will be even more stressful. But it's all good for the song because you don't have to wait and you don't have to pay for the flights. I think this will mean more songs to be written, and more international collaboration.

Transcribed by Marcus Mittilä

**Briefly – who are you, and what do you do for a living?**

I go by Lenny J. I'm in the band Pros & iCons. I play guitar and I'm also a producer, mix engineer and songwriter. I write lyrics, melodies and do the instrumentals. I started getting into online collaborations for songs for me, songs to pitch to publishing companies etc. For publishing you'll receive a brief that say "we need this type of song". There's different type of careers – my band is a career, being a mix engineer is a career, and online collaboration is a whole other realm as well. I do this full time, working for myself.

My band just did Warped Tour, and has endorsement from different companies. All this is independent, and the internet allows that. Online collaboration also leads to working full time for yourself.

**How big part of your work is done collaborating with people using internet?**

It's massive for pitching and for clients. I make most of my income mixing and writing for others. But when it comes to pitches for labels and publishing companies – you should know what you are great at when writing, and really craft that skill. You will not be great at everything – some people do EDM, others do Hip Hop or Country. I had a pitch to do for a publishing company in Sweden, and it was for EDM. I am not heavily into sound design for synths, like Martin Garrix etc. So I asked for help in a Facebook group I am in. I had a reference of the sound I needed, and my writing for the song. Someone was referred to me to help out with the sound design, and now we are writing partners. He's from Barcelona, Spain and I'm in New York City. We work together almost every other day, and this all came from just asking for help online.

**How has internet changed the way you approach your work?**

It changes everything, because you could be sending labels and A&R stuff from wherever you live. It's nice to be in New York City, Nashville etc – but today you can just send an

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email. With the collabs you'll never know who you will be working with. You will randomly get hit up to collab for major projects. People just ask online for this type of stuff and you could really change your whole life in one second on the internet. It's really insane nowadays.

**In your experience - over the past 10 years, how has internet based collaboration developed?**

I will put it this way – I didn't even do any of this 10 years ago, but I know it was non-existent. I started online collabs about a year and a half ago and it just took off. I started mixing and producing about two and a half years ago. I really focused on it every day, for 15 or 16 hours a day. Learning how to mix, master, edit, tune vocals, play instruments. Because there is so much skill out there, it's very tough. It's such a competitive industry. I kind of hid in the shadows for a few years to train myself. Then I came out, starting to collaborate with people. But as soon as you figure out the whole online collab you are golden. There is a lifetime of infinite opportunity out there.

Back in the Myspace days of 2008 – 2009 you had to add people and ask them to check you out. I hear stories from major writers and producers who would go online to ask artists on Myspace to write for them. That's how people got started and it's not that different now except maybe some artists are harder to reach. So Myspace was the first days of online collab, maybe a bit before that with instant messenger. So it has evolved with all the technology.

**Can you describe what online tools are used in your workflow?**

I use Facebook, there are different groups – for example this one group called Make Pop Music. It's an amazing group, there's 16 000 people in there and all of them are writers and producers. It's easy to find collab partners there. Also the Joey Sturgis Forums and URM Academy. I also have opportunities with my band making its way through the industry and publishing companies I've come in contact with along the way. I have a few publishing companies from here and there, and I'm busy all day every day. I know I always have things to do and the online collaborations keep it that way.



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When collaborating we communicate with whatever means is most convenient for them. We try to keep it all in one place. Facebook messenger or WhatsApp is great for communicating with people in other countries. Email is most efficient in my opinion because you can keep a chain and keep it organized. Sending files is done with either Google Drive or Dropbox, and WeTransfer works as well. Usually we're sending zip files with the stems, because we usually don't work in the same DAW.

Sometimes you will be called upon for a specific thing, lately people have been wanting my drums. Then they send me the synths and I'll make the drums around them and send them off to be mixed. In other cases, it will be a lot of back and fourth. It's a process, and sometimes annoying – but that's how you have to do it.

**Are there any problems when working with others remotely?**

Sometimes it's problematic to write together over Skype – you can't sing together because of the delay. That human interaction, there's nothing better than that for collaborating and occasionally it's scary to work with people online. Sending someone your music you will never know what happens when you hit send – what if you never hear from them again?

**Are there certain things you can do with online collaboration, that is not possible locally?**

Technically I guess no – you could always meet someone. But the online does allow for a lot of collaboration that could be tricky otherwise. You can't physically be in other countries constantly, but the internet allows you to be around the world all the time.

**Are there certain things you can only do locally, and not with online collaboration?**

Being in person could be better for some instances, and for convenience purposes you could probably find people close to where you live. There is definitely a difference.

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It's always good to meet people, and there's nothing more genuine with music than when you are in the same room and there's this energy when you collab. It's harder to get the vibe online because you are miles away. You can definitely still make great music

together. You can reach out to someone online when you already know their music, but it's always good to see someone in person.

**How do you experience communicating with people over internet, compared to being in the same room?**

Communication could definitely be an issue; you have to be super specific with where in the song you you're discussing. In person you could just go "stop it right there" and you know exactly where you are and what you are talking about.

Also explaining sounds, when people have to type out what's in their head – in person they could explain it better. Now they have to send examples, in person it's easier to get to the point. But yes, you CAN get the point across in email. It is just easier in person.

**How do you see online workflow developing in the future?**

I wish there was a way, and I think you could do this in Cubase – working together on the same session. Two sets of hands on the same session, I wish this was a tool. That would be great - if I'm for example tracking vocals, and you would hear it on your speakers as I'm tracking and be able to tweak it in real time. I don't know if this is a thing, and if it isn't I wish it was.

I have never spoken to anyone who have actually used functions like this, so I figure it's more complicated than it seems. If this isn't a thing in all DAWs by now, there is probably a reason why.

**Any other thoughts on the subject?**

I think you should really make use of online collab, but it requires a lot of self discipline. The internet is everything now. Just make a schedule and use the internet as much as possible. There are people in Facebook groups doing big things on professional level, working with major artists. All they are is just a comment of friend request away. One day you'll wonder how you could collab with a certain person, and the next day your song will be submitted to Bieber or JC. Just don't waste anyone's time – that is important.

Develop a system and you'll take your career from trying to do it - to a full time career. It can literally happen overnight, but you'll need years of practice to get great at your craft. Use the internet in every way, and make it great.

For Facebook, although it may seem like it's dying right now, there are groups out there for songwriting, musicians, mix engineers etc. All those are connected and you can find thousands of people who want to collab, working for major labels. People say it's impossible to make it big, but it is not at all. All these people that are huge were just regular people doing the same stuff we do. They put a lot of work in, and that is all it takes.

With mixing you have to get fast – it is so much fundamental. Yes it is creative, but you need to EQ it right and you need to compress it right. If you get quick tuning vocals, editing timing etc. it saves you times. The quicker you get the more work you can take on. Eventually you can take on an assistant and pay them maybe 15 %, and you can take on double the amount of work. If you can outsource the editing, you can take on a lot more songs to mix in one day. In general time is everything.

Transcribed by Marcus Mittilä

**Briefly – who are you, and what do you do for a living?**

I'm Stefan Pommerin, music producer and audio engineer. We run Illusia Productions that is based around voice over and other sounds in media, commercials, TV etc. Mainly voice overs. The studio things is on the side, producing bands, recording, mixing, mastering. Anything music, anything audio.

**How big part of your work is done collaborating with people using internet?**

Probably 95 %. Currently working on four albums, and none of the bands has been here in this room yet. Modern technology allows for anyone to record anywhere. It saves time and money. They don't have to travel, I don't have to book appointments, and things still get done. For the media production side, it's basically the same thing. The clients contact us online, usually corporate companies such as Google and Spotify. They contact us online with their needs, through email, and we then contact our subcontractors and arrange the project. It's all online. No one moves anymore, it's just email.

**How has internet changed the way you approach your work?**

It has made things way more comfortable. You can communicate at any time, basically from anywhere. This business wouldn't work without internet, that's for sure.

**In your experience - over the past 10 years, how has internet based collaboration developed?**

Quite a bit actually. For example, Cubase has VST Connect that allows one person to record audio in spot A and another person to receive the audio, lossless, in spot B without latency. Lossless – I don't even understand how that is possible, but we are living in a time where that is.

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There are similar apps like this, some are DAW based and some or other third party plugins. Voice artists that dub nowadays don't have to record themselves. They just go to their mic and someone will record them, from somewhere else in the world. That was not possible 20 years ago, that's for sure.

**Can you describe what online tools are used in your workflow?**

For the media side there is 95 % corporate companies, so always someone above them. Emails with CC's so everyone else is on the same page. So for the media side, mostly email communication.

For the music production side it can be anything. Facebook groups, chats, WhatsApp, voice messages, Skype video chat, TeamViewer (to access someone's desktop computer). Bands are more open minded, and almost everyone's on Facebook – why not use the tools?

For file transfer we use WeTransfer, because Dropbox is kind of buggy on mobile devices. So Dropbox is our backup, and mostly WeTransfer for file transfers to clients.

Band production is a bit more of anything goes. I have several Google folders where bands can drop files, and I get a notification when someone uploads a file. There's less compatibility issues with Google drive compared to Dropbox. Bands usually sends notes in a text file, then wave files and midi.

We send a mix prep guide to bands so they know how to deliver the files, but the delivery itself can be anything as long as the files end up on my desk.

**Are there any problems when working with others remotely?**

Yes, there are. We have to split it – in the media production side it's basically a no. We have a system that is close to fail proof. We have 120 voice artists, and make sure that the narration style is appropriate for the project. This happens before the recording, so there shouldn't be any problem.

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For the band production side, it's different, because we are talking about music. Music is very subjective and emotional. If you listen to a song it might mean something else to you than it does to me. If you do have the luxury it is important to work together in the same room. There is this magic that you are simply missing when you are not in the same room. As great and comfortable online collaboration is nowadays – this is the only thing that is still missing. Video chat can help, that's as close as it gets without the person physically being next to you. But if you don't video chat constantly while working on a session, then something does go missing.

Some people are not comfortable with video chat. I think my job is to capture literally every emotion the musician has to offer. If some of that get lost because we are not in the same room, I feel like I have done a bad job. So I offer the video chat for everyone. Some take it and some don't, but I make sure they understand that something might get lost if we're not working together at the same time.

So this is basically the only limitation, and it's only about making music and the fact that music is very subjective. Like little nuances when tracking guitar for example, they may not hear it as much as an audio engineer or producer who listens to note clarity for example. This might get lost if you're not there with them while tracking. Overall it is great and there are not much problems. But because everything is online I feel like we're missing out on a little bit of emotions.

**Are there certain things you can do with online collaboration, that is not possible locally?**

Oh yeah, right now I'm working with bands that are so far away. Like Australia and Italy. These kind of things would never have been possible a few years ago. You get to work with people you might never see in real life. It opens up a whole new door of possibilities, you get to work with companies and bands from the other side of the world. It wouldn't be possible without internet, that's for sure.

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**Are there certain things you can only do locally, and not with online collaboration?**

Barbecue and drinking beers, for example. There is a bit of magic that goes missing when people are not in the same room. People in the same room making music gives this creativity spark, it is so much more fluent when it's present locally. But then there are people I can work with from the other side of the world, so I still take the online collaboration and have a few percent of emotion missing that we still can get to with revisions. This magic that happens when people are together making music is only possible locally, but it doesn't mean you can't do it online. Just a tiny bit missing.

**How do you experience communicating with people over internet, compared to being in the same room?**

I'm a people person. I just feel like I'm bringing a positive uplifting energy to the people around me, and this usually leads to better performances on the instruments – having comfortable artists. Communication wise I do prefer local or video chat.

Nowadays everyone's always chatting, so we are used to using emojis and everyone can kind of sense the tone in a chat nowadays. Communication wise there are so many tools, and if there's an issue with chatting then you can use voice messages. I will say that there's no big downside to online communication, because people are so used to it now.

**How do you see online workflow developing in the future?**

More and more tools allow for online collaboration between a producer and an artist. But I feel like we are still in the baby stages. There are approaches and there are solutions, but I feel like no one ever feel like "I never have to go out and meet a client again". It just comes back to this with people being in a room together making music.

I know that people successfully use the tools to collaborate online, but I feel like there is still something missing. There is too much hassle still. We are getting there, but we aren't there yet. Every collaboration tool should have a video stream, it makes it more personal to see someone's body language.

**Any other thoughts on the subject?**

The main thing is that people get to work together, who would never have met before. Be it a corporate client or a band from Australia – suddenly working with a random German dude living in Finland. This would not have happened 30 years ago. This is so huge that I am willing to put up with the little spark that may get lost. If the communication is right it might not even get lost, and you can work with revisions too. There's not really a downside.

We are living in a time where the producer market is more saturated than ever before, and all these producers and musicians can collaborate with just the click of a button.



**Briefly – who are you, and what do you do for a living?**

Fredrik Nordström, music producer.

**How big part of your work is done collaborating with people using internet?**

I would say 80%.

**How has internet changed the way you approach your work?**

Way easier to work with people round the world, sending tapes or hard drives is not necessary any more and stuff go so much faster.

**In your experience - over the past 10 years, how has internet based collaboration developed?**

People just use it more.

**Can you describe what online tools are used in your workflow?**

Dropbox, WeTransfer, email or FBmessenger.

**Are there any problems when working with others remotely?**

Can be time problem as people in Aussie sleeps when I'm awake.

**Are there certain things you can do with online collaboration, that is not possible locally?**

Not really.

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**Are there certain things you can only do locally, and not with online collaboration?**

To meet a person in real is almost always better, as feelings are hard to send over internet.

**How do you experience communicating with people over internet, compared to being in the same room?**

More misunderstandings with online communication.

**How do you see online workflow developing in the future?**

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**Any other thoughts on the subject?**

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**Briefly – who are you, and what do you do for a living?**

I'm Heikki Vihersalo, 23 year old marketing and sales manager from Finland. Part-time doing music producing, mixing and mastering. Full time at sales and marketing.

**How big part of your work is done collaborating with people using internet?**

Almost everything nowadays. I mainly do pop/rock/hiphop music and a lot of stuff comes from bands or artists working by themselves. Only the finalizing is in my responsibility (some editing, mixing and mastering). If someone comes to my studio, they are most of the time only there to record vocals. Besides that, communication etc. is all done through the internet. I have also tried to outsource some production tasks to others and so far that seems to work well.

**How has internet changed the way you approach your work?**

Hard to say how it has changed anything, because I have always lived in that era.

**In your experience - over the past 10 years, how has internet based collaboration developed?**

I can only say from few years of experience but the trend is the same in all industries. Everything is going to cloud and distance between countries and cities are getting smaller and smaller. New tools are being developed constantly and workflows are getting more efficient because of automations and macros. I believe there is going to be even more internet based collaboration in the future.

**Can you describe what online tools are used in your workflow?**

I use a lot of Google services (G Suite). Now with my mastering service my whole backend is based on Google App Script and Google Sheets. Also my CRM is all Sheets and Google Drive.

**Are there any problems when working with others remotely?**

Communication is sometimes a problem when there's a certain change that needs to be done. Also the nit-picking final changes to a project could be done so much faster if the person would be sitting next to me.

**Are there certain things you can do with online collaboration, that is not possible locally?**

Mastering and mixing work would be super inefficient if done with a client in the room. It is impossible to concentrate in that situation.

**Are there certain things you can only do locally, and not with online collaboration?**

I still believe that when it comes to songwriting and practicing songs, there is no better alternative than getting bunch of people in the same room.

**How do you experience communicating with people over internet, compared to being in the same room?**

Much more difficult. Everybody describes music differently so it is much faster to do for example any changes to a song when someone is sitting next to you. Over a phone or email there is a big chance of error. Most of the time it is fine, but sometimes it is super difficult to get it just right.

**How do you see online workflow developing in the future?**

More studios will start to think like a business (use of CRM and other business stuff), increase of competition in the production area, faster internet connections, better and cheaper recording gear. Because of all that, soon you will really be able to for example run a session online with almost zero-latency. New services will be developed to give you more efficient workflows.

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However still on some parts I think there are still a demand for local sessions and nice studios or cottages. Just for people to gather around and create awesome, emotionally loaded music.

**Any other thoughts on the subject?**

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**Briefly – who are you, and what do you do for a living?**

My name is Alexey Soloviev. I'm a composer, songwriter, mixing engineer and sound producer. I compose trailer music, music for promo videos, TV advertisements, documentary movies and short movies for a living. I write my own songs in collaboration with different musicians, and also do some mixing.

**How big part of your work is done collaborating with people using internet?**

The internet is the biggest part of my music work because I have a great chance to do my music and express myself as a musician and have some great possibilities and opportunities thanks to collaborations with musicians or music libraries via the internet. Because if I want to make some metal music and need experienced metal musicians to play with, or to do the recordings of my metal song, I can easily find the right people on Facebook from different countries and if they like the music I do we can start working together via the internet on making my metal song come alive.

This means that they are recording the instruments for my song at the places they live and then can send me the audio files of instruments via e-mail for the final mixing and mastering. And it's super convenient, internet connects people and make people who live on the other side of the globe feel very close to each other. Plus, if you want to compose music for TV trailers you can compose a trailer cue and send your music via e-mail to some trailer music library and if they like your music they take it on their trailer music album and if your music is really good you'll have a chance of getting a placement in some real trailer campaign.

I find my collaborators through Facebook.

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**How has internet changed the way you approach your work?**

I had a problem with finding good musicians to play with here in Russia, but thanks to the internet I can find the right people even from famous bands and of course if I have some money to pay them for a collaboration they can take part on my songs and music. So it is very simple to find the right people for your music via the internet if you cannot find anyone good enough close to you.

**In your experience - over the past 10 years, how has internet based collaboration developed?**

I guess 10 years ago I even could not dream about making my music with professional foreign musicians because writing them letters by mail would be very stupid and very long. And now you can find everything and anyone you need on the internet. Now you can buy some great plugins and music libraries to do a very good sound of your music, now you can have some great subscriptions of some DAWs like Pro Tools if you don't have enough money to buy Pro Tools at once you can subscribe monthly and work in Pro Tools on mixing and mastering and recording for your studio or home studio work. You can even watch tons of free tutorials about music production and everything else you'd like to know about on YouTube. There is a lot of knowledge to be had from YouTube, and you can self study and learn new things.

**Can you describe what online tools are used in your workflow?**

I mostly use YouTube to get all the info I want. And use email for business contacts, Facebook for communication with friends and musicians for collaborations. And Dropbox as iCloud service to keep my important data on.

Most of the time I try to write my messages, to musicians I collaborate with, on Facebook messenger. We discuss all of our ideas in writing. Then I prepare a rough mix (demo) for musicians to play with if I want them to do real recordings of instruments for the final mix and send them a demo via Dropbox.

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Once they do recordings of instruments, no matter if real or virtual ones including real voice they send me back separate audio files via Dropbox or WeTransfer services or Google drive.

If I do music for a trailer music company, I hand them a mix of my cue with a private SoundCloud link. If they want me to send them my cue in stems, I then do the stems of all instruments I have in my session and send them the stems via Dropbox. I don't really use Skype or video chats because if it is a trailer music company they have their briefs in writing with reference tracks they want you to use to get inspired by and compose something similar to the reference track. But they always have their ideas in writing, connecting with you via email.

For official work with composers and trailer companies, communication is done through email and files transferred with Dropbox or WeTransfer links.

### **Are there any problems when working with others remotely?**

First of all, you must know English language to communicate with people. That's the biggest issue for some people.

### **Are there certain things you can do with online collaboration, that is not possible locally?**

As I wrote before, you can finally find the right people to work with. For example, if I write my songs in English mostly then I need some singers to sing on my songs not only with good voices but knowing English well and thanks to the internet and collaborations I can find such people. If I need some really professional musicians from different bands to play on the instruments for my song, I can find such people via the internet. You can even hire famous singers, if you have enough money, via the internet for collaboration to sing on your song because you cannot do anything like that locally.



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**Are there certain things you can only do locally, and not with online collaboration?**

Don't know about such things. Everything I do, I do via the internet.

**How do you experience communicating with people over internet, compared to being in the same room?**

Depends on the people you are talking to in the same room. But again if it is all about music, so in my real life I have no one to talk to about music because now I'm learning to make money with music and most of local people take music as a hobby but music is my life and I can find people only on the internet to ask for some tips, feedback and advice about my music and learn from them how to make money with my music for a living.

**How do you see online workflow developing in the future?**

Maybe there will be more online mixing, mastering and musician services. Maybe some platforms where people can hire professional musicians from famous bands to play and sing on their songs and mixing can be done by professional mixing engineers on the same platforms. I guess in the future it will be much easier to make music and finding clients for a living than now.

Because maybe there will be some universal currency for the internet and we will be using it to pay for a musician jobs like euros and dollars now but now you have to convert your money to another currency and so on. But I'm sure that there will be some more great stuff for musicians around the globe to find each other and collaborate via the internet in the future.

**Any other thoughts on the subject?**

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## Appendix 9. Thesis project EP, Mackan å Mörkret, 2018

The EP is scheduled for digital release on Spotify, Apple Music, Google Play Music and other streaming services in late December 2018.

More information on Mackan å Mörkret can be found on the website:  
[www.mackanåmörkret.nu](http://www.mackanåmörkret.nu)

Appendix 10. The song “Killer” by Dorit 2018

The song can be found as a digital release on Spotify, Apple Music, Google Play Music and other streaming services.

<https://open.spotify.com/track/6fHtfuWTQ8V44Dq2aKpKcc?si=MUXLKf1ES-vizOY27CfgiYg>

More information on Dorit can be found on the website:

[www.doritworld.com](http://www.doritworld.com)

Appendix 11. The song “Shadows of the Dark” by My Last Whisper 2017

The song, from the debut album “Embers of Eden”, can be found as a digital release on Spotify, Apple Music, Google Play Music and other streaming services.

<https://open.spotify.com/track/2ME6GHUZqQtAILINmNwBvi?si=bwgUC4UWScq9VpDG9ZDEWw>

More information on My Last Whisper can be found on the Facebook page:  
[www.facebook.com/mylastwhisper/](http://www.facebook.com/mylastwhisper/)