The Secret To Perfect Mixes: VSX Headphone System by Steven Slate Audio

Abstract

Ever decreasing royalties for musicians and thus lower earnings for producers due to low income on the part of the artists. Nevertheless, good equipment for music production is becoming more and more expensive. The latter describes a two-sided conflict between artist and producer that can be investigated in the music industry. How can this be counteracted and how can producers create high quality tracks without spending half a fortune on related equipment? This is where the company Steven Slate Audio comes in, which has accurately identified and countered this problem with an innovative product that, in the recorded music industry, can be considered as revolutionary. The latter is characterized by the VSX (Virtual Sound Experience) headphone system which allows users to virtually enter and acoustically perceive numerous renowned studio environments, creating a new paradigm in the music production process. The company has been involved for years in providing innovative digital, but also hardware tools for music producers to make their field of activity and the underlying music production process as efficient and intuitive as possible. The following case study illustrates the underlying problem that raised the demand for such a product in the light of the recorded music industry and goes into detail about the company, their approach on this solution, as well as the product itself. Derived recommendations for practitioners dealing with innovation management consequently find their place at the end.

Introduction

Record labels today are losing their once central role of distribution in the music business due to the power of the internet (Harrison, 2014). Artists today can independently release their music and find a global audience, but they are experiencing a decline in compensation for their creative work due to the steadily decreasing royalties from all music streaming platforms (Krol, 2021). The financial challenge affects not only the artists, but further down the chain, their producers as well. Music producers, due to the artists' lower financial compensation, can only go out with accordingly lower salaries which they receive for their service. At the same time, many producers need to work with very expensive equipment, which they find increasingly difficult to acquire in order to produce songs to the current industry standard - a goal that many musicians set to achieve. This problem indicates a way for producers to create high quality music at lower cost. Concluding, the question arises on how to solve for such a conflict? Will there always have to be some kind of tradeoff between musician and producer and the respective quality of music? This problem had been on the

radar of one company for some time. *Steven Slate Audio*, a company of *Slate Digital LLC* launched a headphone system that stood out from anything similar on the market. Virtually entering as well as sonically and spatially experiencing a studio with the click of a mouse, in which famous tracks have been produced that are certainly known. Having the ability to listen, tune, and make changes to music on equipment the way world-renowned producers do in these environments as part of their daily routine. On top of that, having the opportunity to spatially recreate the sound of hardware devices, which normally cost a fortune, to help making decisions during music production. Experiencing all this on a single pair of headphones? As impossible as it seemed, the company has outdone itself with this product, making it possible for producers to create professional sounding music from anywhere. With the help of the VSX (Virtual Sound Experience) headphone system it has become possible to produce music at a fraction of the cost in such iconic and perfectly treated environments.

The following case study deals precisely with this product, its background and the associated innovative functionality. To begin with, it is worthwhile to look at the history and evolution of the music industry to show how many facets the music industry is composed of and where exactly the case of the VSX System can be placed. Later on, the company behind the innovation is introduced and it is explained why it classifies itself as an important player in the music industry, so that it can be understood for what exactly their solutions are developed. The chapter also highlights other solutions that are available from the company to illuminate the innovative force behind it even more. After the background knowledge gathered up to this point, the underlying problem that occurs from the evolution of the music industry, especially in the category of producing music is explained in more detail. This is particularly important, because only here it becomes clear what kind of problematic factors music producers have to deal with. This is followed by an explanation of how the company approached those problems and how exactly the team behind it arrived at the solution of the VSX system. To round it all off, the product is presented in depth with all the associated features and it is discussed, among other things, what managerial implications can be derived from the whole case after the process behind the creation of the headphone system has been illuminated.

Industry

In order to better understand the connection between the innovative product and the problem later on, it is important to highlight important elements from the music industry at first. To understand the dynamics of the music industry, we must first realize that it is not a single industry, but a series of interconnected industries, all closely linked, but at the same time based on different logics and structures (Ucaya, 2019). Generally speaking, composers create songs, lyrics and arrangements that are performed live on stage. Furthermore, those arrangements are recorded, produced, and distributed to consumers or licensed for other uses (e.g sheet music, background music). As a result, there are three major parts of the music industry: the *live* music industry, which produces and promotes live entertainment such as concerts and tours; the *recorded* music industry, which records and distributes music to consumers and the music *licensing* industry, which licenses compositions to businesses (Wiktström, 2021). In the course of this case study, we will focus mainly on the development of the *recorded* music industry. The latter has undergone a very large development in the course of the last 30 years. For a long time, the recorded music industry relied on traditional

record labels, as we know them today under the names of e.g Warner Music Group, Universal Music Group and Sony BMG. These labels could make up 80% of the music market back in the years (Mcdonald, 2019). Artists and consumers had no choice but to accept what the labels offered, and their choices were largely limited by what was available. Literally, the label decided everything about the artist's career, from marketing budgets to video sets and when and where they toured (Fountain, 2021). In this context, the industry has put down a significant figure in terms of sales. The global recorded music industry had been in a growth phase for almost a quarter of a century by 1999 (Wiktström, 2021). In 1974, about one billion records were sold worldwide, and by the end of the century, the number had more than tripled (Wiktström, 2021). By the early 2000s, the situation looked somewhat different, as the power dynamics began to shift. The usage of smartphones was increasing, as was the popularity of music streaming sites. Shawn Fanning, the founder of one of the first streaming sites *Napster*, launched the music file sharing service that allowed users to download and share music for free without compensating the recognized rights holders, including the labels and artists (Wiktström, 2021). In short, it enabled downloading a wide array of music illegally. Consumers now had access to records that were no longer defined by physical record stores, which was a significant change. With the increased availability of free music for everyone, consumers were now in the driver's seat and could decide for themselves what defined good and bad music. A few years later, in the direction of 2010, another important aspect came into play - social media. The latter made it possible to create a whole new world of music promotion for artists that was unimaginable in previous years, especially considering the central role and power of the labels (Baym, 2013). As new ways of interacting with fans have emerged, social platforms have rolled out more and more features to keep the audience or fans of artists entertained (Musicians Institute Hollywood, 2021). This included Myspace, for example, which was a fundamental platform for musicians (Irizarry, 2019). Concluding, the Internet was a major driver of this development, which at first glance seemed positive and has broken down the wall between artist and consumer. It was possible for independent artists to find a global audience and connect to fans in ways never experienced before. Besides the engagement aspect, there is another door that has opened with the Internet as an enabler, which reflects on the side of music consumption.

The latter aspect is characterized by so-called access-based music services (Wiktström, 2021). At first, many people associate this with the company Spotify, whose application takes up memory on countless smartphones around the globe. In the first quarter of 2022, Spotify had more than 182 million premium subscribers worldwide (Statista, 2022). On this platform, users can listen to songs by their favorite artists in just a few clicks. People no longer have to own physical CDs or vinyls that were once distributed by the labels. Users can basically borrow a certain piece of audio for, abstractly speaking, 3 minutes. At first sight, this seems to simplify everything. It grants people the ability to be more flexible and to open up a world of music that was unimaginable back in time. In addition, all this is set up legally, not the way the exemplary file sharing platform Napster was concepted. However, all of this has a downside, which is mainly on the part of the artists. The financial compensation that artists receive on streaming platforms is lower than ever before (Krol, 2021). These low streaming royalties have fundamentally changed how musicians are paid for their creative work. This had a significant impact, especially since many composers do not have a budget to record their songs themselves, let alone produce them. The latter often means that an external producer has to be brought on board, who has to be paid for the respective services according

to the composer's requirements. Due to the ever decreasing income on behalf of the musicians, this part of the equation becomes critical, since the budget for an advanced producer is limited due to lower earnings and therefore the quality often has to be compromised. The latter, of course, also affects the success of the song and the overall impact of the artist. In this context it is important to ask: what exactly is a producer? What role does a producer have in this complex of the recorded music industry and why is it of such high importance?

In this context, it is first important to understand what is meant by the process of music production. Music production is the process of *creating*, *recording*, *processing* and *preserving* music for distribution and enjoyment (Berklee Online, 2020). *Created* basically means the arrangement, i.e. the concept of a song from beginning to end. Many musicians seek additional inspiration from a producer in order to make additions to the songwriter's prefabricated framework through extended creativity. *Captured* describes the process of audio recording, which often goes hand in hand with producers. The producer must know how to identify and capture the best performances from the individual members of the band. The term *processed* refers to the core activity of a producer which is mixing and also mastering. Mixing is the process of balancing, editing and blending all the musical elements together through a variety of techniques to make the respective piece of music sound good when all the elements (e.g vocals, guitar, drums, bass) are playing together (Berklee Online, 2022). Mastering describes the fine polishing of the mix that was created during the mixing process. The overall sound is further emphasized, consistency is created in terms of volume and dynamics, and preparations are made for distribution (iZotope, 2022). The step of saving the music in a suitable format (.wav or .mp3) for later distribution falls into the category of *preserved* by the producer. Overall, the producer must maintain the balance between the demands of the work and the creative elements that make up compelling music. Accordingly, it becomes apparent that a producer has an extremely important role in the collaboration with an artist and has the task and responsibility to bring the quality of the output to the best possible level. The latter is made possible nowadays by many hardware- but also digital tools offered by several companies in the industry. In the following, we will take a closer look at one company, which offers a wide portfolio of hardware and software products for this exact purpose.

Company

Slate Digital LLC was co-founded in 2008 by Steven Slate and Fabrice Gabriel. The mission of the two founders was to provide the greatest digital audio tools for professional producers, mixers and audio engineers (Slate Digital, 2022). The company operates only across two offices with approximately 50 employees. The headquarter is located in the Hollywood Hills, United States. In addition, the group operates under Slate’s and Gabriel's hand in Grenoble, France. Both locations focus on high caliber innovation and *“game changing music software”* (Slate Digital, 2022). As part of this mission, the group splits into several brands. One of these is *Slate Digital* which bears the same designation as the umbrella company. Here, the respective team deals with the virtual emulation of award-winning hardware tools which have been authentically imitated in digital form. These are mainly selected and designed by Steven Slate himself. Furthermore, musical samples and digitally recreated synthesizers for producers are provided by this company (Slate Digital, 2022). In addition,

courses or audio masterclasses are offered by top selling producers, which expand the know-how around the use of the previously mentioned software products. In addition, the company *Steven Slate Drums* was created. Here, Steven Slate and team focused on the virtual emulation of a drum kit, which can be expanded genre-specifically through various expansion packs and offers a professional drum sound for productions, with the obvious advantage of not having to hire, coordinate and record a personal drummer (Steven Slate Drums, 2022). The sounds here are out-of-the-box mix-ready and can be used in productions without basically adding additional effort. Normally mixing drums is very demanding, to which Steven Slate and team answers with this intuitive and convenient solution. The third company under the hand of Slate and Gabriel is *Slate Media Technology*. In this company, the team is defining the next generation of audio engineering on a single screen. With the so-called RAVEN, the team has focused on another intuitive solution, here in the area of the workstation itself. It can basically be imagined as a large touchscreen control surface that maps all the necessary features for music production. This solution is designed to allow producers to work faster, more efficiently and more creatively, as all knobs, sliders and buttons that are normally physically operated are mapped on a large screen (Slate Media Technology, 2022). The second to last company is *EIOSIS*, which provides software plugins for musicians, similar to *Slate Digital*. However, the tools for musicians are not designed by Steven Slate, but by his co-founder Fabrice Gabriel and focus mainly on the mixing of vocals, whereby the software is equipped with clever algorithms that effectively solve common problems within this area (Eiosis, 2022). Finally, the company *Steven Slate Audio* can be found in the corporate structure of Slate and Gabriel. This is the company where the VSX headphone system, the main focus of this case, is located. *Steven Slate Audio* is the most recent addition in the group's history. This innovative product will be examined in detail in the further course of this case study, but first we will describe the fundamental problems that caused the need for this solution in the first place.

Problem

As already mentioned, producers struggle with lower payments for their work due to lower earnings of musicians - but the requirements to produce a high-quality mix are set extremely high and go hand in hand with a lot of expenses (Joshi, 2022). An industry standard, high quality sounding track is not so easy to achieve, especially for “bedroom producers”. The latter is a term for producers who have to make do with only the most necessary and relatively low quality means. One of the largest and most expensive things in this context is the hardware equipment needed for referencing music; the studio monitors. To put it simply, studio monitors basically refers to a pair of playback speakers that help the producer make the right decisions in the mixing and mastering process (Neumann, 2022). The speaker design focus is to avoid artificially boosting bass, treble or other frequencies in an attempt to make the speaker sound “good” (Image-Line, 2022). In short, these types of speakers are designed to be as honest as possible (in technical terms, *flat*) to give producers a reliable basis for making decisions in the mixing and mastering process. These monitoring speakers can run into the several thousands euro range once a professional pair is chosen. The problem is that the monitoring speakers alone, even the most expensive ones, are not enough. That's where the second problem comes in - the producer's environment. Sound basically travels through the room and usually finds a point in corners where bass frequencies build up and distort or falsify the "heard" sound from the monitors in the room (Rothstein, 2020). Simply put, if the

environment is not right, you can't rely on what you hear, even on a high end monitoring system. An improperly constructed room that is also set up without room treatment will lead to misleading decisions when it comes to mixing. Room treatment basically describes the process of covering the recording studio with panels that improve and control the acoustic behavior (Rothstein, 2020). A clean and accurate room treatment with acoustic panels and so-called *bass traps* that solve the problem of the bass build-up in corners will also not spare the producers wallet. If we now assume that these two problems already described are not yet solved, the problem of inefficient workflows during the mixing process arises in addition. Producers often have to listen to their work in different places, such as the car, the laptop speakers, the smartphone speakers and many more. This is especially important because the final mix must sound as good as possible on each playback device, since it is not known in advance under what conditions the consumer will end up listening to the song. If important elements are lost in the car, the producer gets back to the studio and corresponding changes have to be made. If the resulting changes then affect the playback experience on smartphones or on in-ear headphones, the producer is trapped in a vicious circle of countless adjustments which are due to the acoustic unreliability of the environment (Rothstein, 2020). These inefficiencies in the workflows often result in the "final" mix having very unnatural and overproduced characteristics due to the countless adjustments with musical elements no longer coming into their own. In addition, these inefficiencies cost the producer a lot of time, which can also cause customer dissatisfaction due to not finishing projects on time or also lead to intermittent project cancellations. Producers who have experienced the latter problems will also know the problem of guessworks in this context. Low quality monitoring equipment, poorly treated environments and inefficient workflows often result in mixing by numbers instead of by ear, while following certain industry-established mixing rules to be on the safe side. This problem can be attributed to ear fatigue, which occurs while producing or consuming music over a long period of time, especially in unreliable environments (Waves, 2022). As a producer, the task is not to work through each track according to a formula, but to build an acoustic understanding of the artist's vision and implement it through systematic and creative input, which requires optimal working and listening conditions in order to make efficient decisions. As it can be seen, a lot of things come together that prevent a producer from working effectively and efficiently. The question now is, what did Steven Slate and team do to counteract the problems described?

Approach

To fully understand the problem solving capability of the final product, it is important to look at what challenges had to be approached. It has already been explained what the issues are in terms of the monitoring speakers, but there are also challenges with headphones to address. This is especially important regarding the VSX system, because the essential component is a pair of headphones. Steven and team wanted the producer to feel like sitting in a completely different environment while wearing over-ear headphones. Regular headphones only offer discrete left and right isolated speakers that sit directly on the listeners ears, which makes the auditory image appear to be inside the head (Steven Slate Audio, 2020). The latter is not what Slate and team actually pursued, because this underlying way of functionality does not grant spatial acoustic perception. In comparison, speakers in real rooms operate much differently. This speaker-like sound perception on headphones was the ultimate goal to achieve, as it was intended to accompany the producer into a different environment where he perceives the

acoustic elements spatially and not inside the head. Why is that important? Speakers in real rooms place the sound in front of the listener, making it more natural to identify mix elements (Steven Slate Audio, 2020). Furthermore, the sound of audio coming out of the speaker drivers combined with the slight resonances of real rooms makes it easier to hear compression and equalization - both very important elements and techniques to identify and distinguish when it comes to music production (Steven Slate Audio, 2020). To put it in simple terms, compression is used in the process of mixing to get the dynamics of the various components under control, while equalization is used to adjust the frequency spectrum in certain areas of an instrument, or of the entire song (Sage Audio, 2020). To pick out these aspects would make the producer's job much easier, so approaching this component was an important part of this journey. However, there is a catch which should be kept in mind. The problem with real speakers and real rooms on the other hand is, that if the speaker response in those rooms is not *flat* (i.e. honest to the producer) then what the listener hears coming out from the speakers is not accurate and reliable. The last challenges considered, what criteria have come together so far? In short, creating a headphone system that breaks out of the conventional way of working while emulating rooms with speakers that spatially represent a flat sound - very challenging, considering that so far no headphone system has been created that embodies those requirements. Fortunately, there is a modelling technique that Steven Slate and team have pursued in their innovation approach to make this possible. This technique is called *Binaural Perception Modelling* (BPM). With the help of this procedure, it can give the listener accurate recreations of speakers and their spatial sound characteristics in numerous environments (audioXpress, 2020). But how exactly does the modelling technique work? Binaural Perception Modelling bypasses the ear and physical hearing mechanisms past the point where physical sound is converted to electrical signals, to the brain's matrix of neurons (Braasch, 2005). Put simply, this is where the listeners "inner soundstage" exists (Stone, 2020). The goal was to have the VSX system interact directly with the brain's inner soundstage of the producer, which makes it able for the producer to hear sound spatially. With the help of BPM, it is also possible to recreate the sound of perfectly flat, high end studio speakers. As innovative as this sounds, this would open up a completely new paradigm of digital audio technology. This approach, coupled with an intuitive software solution in which the user can select different listening environments (which have been emulated using BPM) would solve quite a few producer problems. But now the question arises, how did this idea with the combined hardware and software solution come about? How can a team of no more than 50 people create such an innovative tool from scratch? It is worth taking a look behind the scenes into the organizational structure and the work mentality at Steven Slate and team. With the help of an interview conducted by Nathan Doyle, content creator in a music production related online blog, the situation can be understood a bit better.

The first question Steven Slate was asked was whether the process of designing the VSX system was similar to products from the past (Vintage King, 2020). According to Slate, the design process for the VSX system was significantly more difficult compared to other hardware or digital products. The largest challenge faced, according to Steven, was to fine-tune everything down to the last detail and to make it sound "right" as in the professional studios or general environments chosen (Vintage King, 2020). This challenge came to light in the area of Binaural Perception Modelling. Stated by Steven Slate, as part of the project, 7000 binaural captures were performed, along with several thousand HRTF (head related transfer function) processing formulas to make the digitally recreated environments as

accurate as possible (Vintage King, 2020). The latter measurement technique basically means that a uniform solution for sound perception should be found, which allows everyone to perceive acoustic signals equally, no matter the shape of head or ears. The reality is that our individual head measurements differ from one person to another. Therefore, everyone experiences sound in the real world slightly differently (Audiolabs, 2022). Finding a universal solution to this, which at first seems somewhat unrealistic, is made possible by these HRTF measurements. As it can be seen, there was a very high and precise measurement effort involved in the innovation process. Looking at this approach from a different perspective, it becomes clear that Steven Slate wanted to implement the supposedly unrealistic and has continued to pursue the ambitious goal in mind, despite several thousand measurements, until the final result stood.

The second question he was asked was basically how he decided on the defined environments or why (Vintage King, 2020). According to Steven Slate, the selection of environments was based on his own subjective assessments of the most optimized studio environments in terms of music referencing. In relation to this, it should be mentioned that Steven Slate has built up many relationships with different studio owners over the course of his musical career and has spent many years in th respective studios producing popular music pieces (Vintage King, 2020). Accordingly, his choices can certainly be trusted, especially when world-renowned albums have been released in these selected environments. Here it is worth taking a deeper look behind the courtains of two selected studio environments to better illustrate the ambitious approach and the associated work mentality from both parties. The two environments are the *Archon Studio* and the *NRG Studio*, both located in California. The Archon Studio, under the hand of Aris Archontis, has been renovated several times in the course of 10 years of existence to make it as flat, that is, as honest as possible (Steven Slate Audio, Archon Studio, 2020). The studio presented perfect conditions for emulation, as it had the best conditions for referencing. However, with the help of Slate and team's usage of BPM, it was possible to tune the studio even further, as additional factors came up that could be improved and were not known to Aris Archontis until that time (Steven Slate Audio, Archon Studio, 2020). According to the studio owner, their work ethic was like-minded, so they did not settle for a "good enough" result. There were lots of re-iterations during the measurements until the perfect result was acknowledged by both parties. So what is evident in this approach? Steven Slate not only added a perfectly treated environment to his VSX portfolio, but also helped Aris Archontis further optimize his studio as part of the process. So, mutual motivation to create the "perfect" has led to a doubly positive effect. Aris Archontis stated in a publicly available video about the process: *"We had a downtime of 2 months but the end-result was incredible and definitely worth it"* (Steven Slate Audio, Archon Studio, 2020). At the NRG Studio, under the hand of Jay Baumgardner, similar results took place. Steven and Jay have worked together a lot throughout their careers, producing collaborative works in the studio. As Jay Baumgardner describes: *"The NRG Studio was known for popular works, so Steven wanted to virtually enable customers to precisely mix in this environment - from anywhere"* (Steven Slate Audio, NRG Studio, 2020). With the help of on-site BPM calibrations, it was even possible to assess that the near-field monitors in the studio (i.e. monitoring systems placed more or less directly in front of the producer) were acoustically worn-out and thus had to be replaced. Concluding, similar to the results in the Archon Studio, Steven and Jay managed to optimize the real environment and take the optimized result into the VSX system. An interesting fact here is that Baumgardner claims in

a publicly available video, that despite 20 years of his own studio use, he keeps going back to the VSX system to better identify certain mix elements, since they offer a sharper representation of certain problem areas which he can't always identify under the real circumstances (Steven Slate Audio, NRG Studio, 2020).

Now that it's been shown how and why Steven Slate chose certain recording studios and how the processes inside of those exemplary environments took place, a final and not unimportant question arises. How does the overall development of a product at Steven Slate Audio go from start to finish? According to Steven Slate, at first there is a basic concept in place that aims to eliminate a major problem within the industry, focusing on the big picture (Vintage King, 2020). These concepts are regularly presented within a small team. Basically, concepts are always emerging within a team, it is rare that a single person works out an idea, as stated by Slate (Vintage King, 2020). The latter thus underlines the team and innovation-driven culture in a company of about 50 employees. After a common idea has developed, it is a matter of refining the idea, presenting it in more detail and weighing up whether necessary resources are available or not (Vintage King, 2020). After this thoroughly examined pre-selection, the first prototype is set up. In the context of the hardware prototype, Slate and team set out to find a new partner to extend their capabilities. The ambitious requirements that have been listed so far have certainly not provided a realistic perceived implementation possibility for every company. However, one company was willing to take on the challenge together with Steven Slate and his team. The silicon-valley based audio and music technology company *Scaeva Technologies* in California, which deals with *"mind bending spatial audio"* (Scaeva Technologies, 2022), was able to prove itself as a potential partner. Together with this company it was possible to implement this already described flat response into the prototype headphones after all the measurements took place (audioXpress, 2020). As the companies explain, Scaeva and Slate furthermore jointly invented the patent-pending Acoustic Ported Subsonics (APS), described as *"an innovation in authentic sub-low frequencies reproduction in headphones"* (Steven Slate Audio, 2020). The system thus also had the ability to authentically reproduce the lower ranges in the frequency spectrum (i.e. the deep bass). This was something that had never been achieved before in headphone systems (Steven Slate Audio, 2020). Concluding, Slate and team have managed to extend their know-how and bring another hardware innovation to the forefront, together in cooperation with the Californian company. After the first prototype with Scaeva, the second iteration cycle began. The prototype was optimized and another was made until the *golden prototype*, described by Steven Slate, was achieved (Vintage King, 2020). Once the team has arrived at this status, it went into the beta testing phase, where a selected pool of people, mostly professional faces in the music industry were provided with the product. In the last step, the golden prototype was further refined within the beta testing phase. Once this step was done, the official launch of the VSX headphone system took place, as stated by Slate (Vintage King, 2020). This cooperation thus made it possible to develop a hardware component that was equipped with innovative capabilities. This was an important milestone, as this headphone system was the basis for the acoustic representations of the environments in the wake of BPM measurements, which were led by Steven Slate and his team, as well as the design for the VSX software (*Steven Slate Audio*, 2022). The jointly created headphone system was Scaeva Technologies' first public product launch and the first available models quickly sold out on Steven Slate Audio's website (PR Newswire, 2020). In this context, Steve Curd (Scaeva Technology CEO) stated: *"We knew we had a winning product on our hands, but the demand far outstripped*

our wildest expectations" (audioXpress, 2020). In conclusion, it can be seen that the entire innovation approach and the process steps were driven by a very ambitious, open, and value-focused attitude of Steven Slate, his team, and his partners.

Solution

In the following, the end product, i.e. the innovative solution from Steven Slate Audio with the associated features will be examined in more detail. Furthermore, the extent to which the issues already described in the chapter *Problem* were solved, will be explained. The innovative headphone system is communicated on Steven Slate Audio's website with the following premise: *"The VSX headphone system allows you to create your music in precise models of pro mixing studios, mastering rooms, car stereos, nightclubs, audiophile mix rooms, boom boxes, and more from anywhere in the world"* (*Steven Slate Audio*, 2022). A strong statement, in which the effort behind it seems quite unimaginable. Obviously, there is more to it than a few studio environments. Included car speakers, a large discotheque, as well as various industry standard headphones can be additionally emulated on the VSX headphone system. All these features and environments were developed based on the usage of BPM. This makes the intention behind the project from Slate and Team even clearer. The monitoring environments are clearly separated into those that are used during the mixing process (Archon Studio, NRG Studio etc.) and those that are used to answer the question "How does my *final mix* sound here and there?" (Nightclub, Boombox, Car Stereo, Headphone models). In the following Figure 1, an excerpt shows in more detail which environments are involved in the software part of the innovative solution:

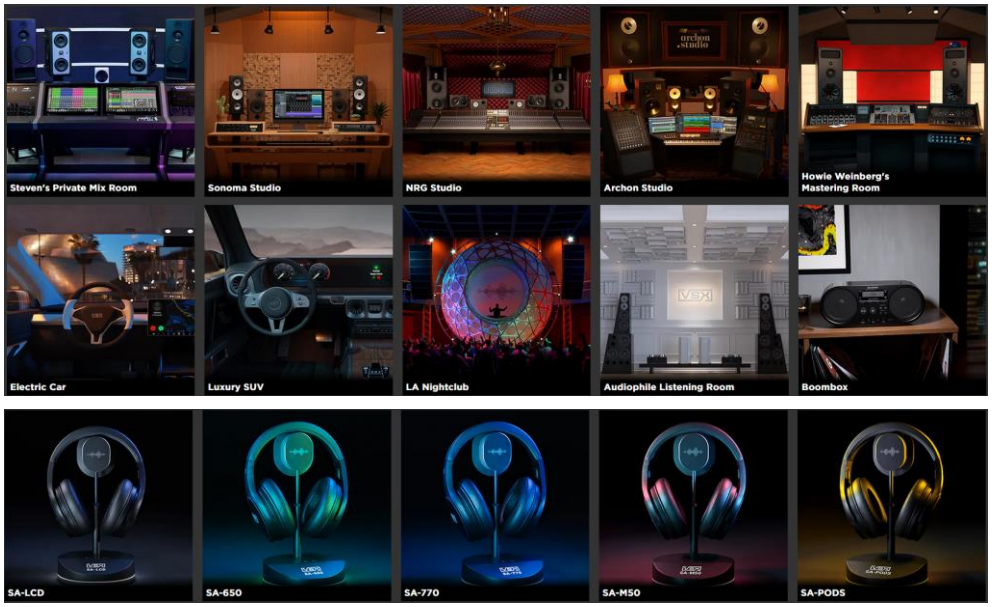

Figure 1: VSX System Environments

There are many different reasons why the environments shown in Figure 1 are of high importance for producers in their workflows. Here, in addition to the NRG Studio and Archon

Studio examples already mentioned in the *Approach* section, a few more examples will be illuminated to better clarify the scope of functionality within the software.

For example, why is a *Luxury SUV* sound system useful? The producer can immediately hear if the mix needs work on this sound system which has been captured in a luxury Mercedes-Benz (Steven Slate Audio, 2022). The producer will get lots of high frequencies, greater stereo spread, and powerful low frequencies making it a go-to for nearly every genre. While this system does not have the most flattering sound, especially when coming from the studio speaker environments, this car system will unapologetically let the producer know if the mix needs work (Steven Slate Audio, 2022). Going further, why does it make sense to have an *LA Nightclub* emulated? If someone produces electronic dance music, hip-hop, or overall bass music, it's important to hear how the track will translate in club environments which in any case place high demands on powerful, bass-heavy sounds. Steven Slate and team modeled this famous Hollywood Nightclub in the middle of the dance floor, so the producer will hear the resulting mixes with impressive width and depth. Furthermore, the team added both *flat* and *bass boosted* modes. This should help to perceive the mix both honestly and more entertainingly in this environment. This is especially important since DJs often equalize (manually adjust) the frequency spectrum in addition to the frequency spectrum of the system to further shape the sound of their tracks (Steven Slate Audio, 2022). With these two options, the producer should be on the safe side and make the mix sound good in both scenarios. Moving forward, what is the purpose of *SA-PODS* and what can be imagined under that naming at all? This feature emulates Apple EarPods and AirPods. These two headphones are the most popular listening references in the world, so it's important to check mixes genre-independently on them (Steven Slate Audio, 2022). They have a classic mid-forward sound (emphasis on the mid frequency spectrum) with powerful low end. It’s getting clear that in this case of referencing, very specific frequency ranges play a role. Using this simulation can bring out strengths or weaknesses in the appropriate areas of the individual mix. Another interesting example is *Steven's Private Mix Room*, which Steven Slate didn't want to leave out during the BPM measurements as it represents his own property. The producer can step inside the company CEO’s private studio, completely constructed with everything that is needed to mix a polished record (Steven Slate Audio, 2022). This environment includes perfectly tuned medium- and larger sized studio monitors. Both sets of speakers are extremely revealing and will make it easy to hear the most intricate equalization and compression tweaks. Finally, the nearfield monitor (the monitoring system placed directly in front of the producer) is a model of a classic mono *Auratone* speaker that will allow to hear balances with ease, and help make decisions for more conventional consumer speakers like laptops and smartphones (Steven Slate Audio, 2022). By just illuminating these four examples from many, it becomes immediately clear how much ambition and know-how the team has put behind the emulations to address common problems in the field of producers and music referencing. Each monitoring environment serves its own important purpose and gradually, with different frequency emphasis, helps to achieve a better final result.

What is additionally offered to the user is the extended adjustment possibilities of individual parameters in the virtual environment itself (Steven Slate Audio, 2022). Thus, the user can make various equalizer adjustments (i.e. adjust different frequencies in the playback), but also make settings via depth-of-field or studio monitor selection. This allows the producer to adjust parameters individually over the settings that are already perfectly fine-tuned anyway, and to hear how the tweaks affect the mix. To make it more understandable, the frequency

spectrum inside the VSX software can be adjusted with five different modes. These include L (lows), LM (low-mids), M(mids), LH (low-highs) and H (highs). This covers the five main frequency ranges, which the user can adjust as desired using intuitive controls. Considering the depth-of-field setting, in short, it means that the producer can choose how far he stands away from the monitor speakers using the effect of the sound in the room. This setting is especially important because often in real studio environments, producers listen from different angles in order perceive different effects of sound. This feature is particularly essential because on the consumer side, music is not always listened to directly sitting in front of the speakers, but while moving freely in the room for example. Furthermore, the choice of studio monitors (near-field, mid-field, far-field) allows the user to get different impulses from several systems and thus make adjustments in the same spatial conditions that will eventually sound good on all three speaker modes. In addition to the important functions mentioned so far, there are also other isolated parameters for adjusting the sound experience. These include rather basic settings, such as adjusting the overall output volume, switching to a different environment with a mouseclick, or selecting Ear Profile, which offers the user three different modes based on their own assessment to further customize the perception of the sound. The following Figure 2 illustrates this relationship and the software's user interface in more detail in the *Steven's Private Mix Room* environment. The corresponding areas that have been mentioned are marked in red.

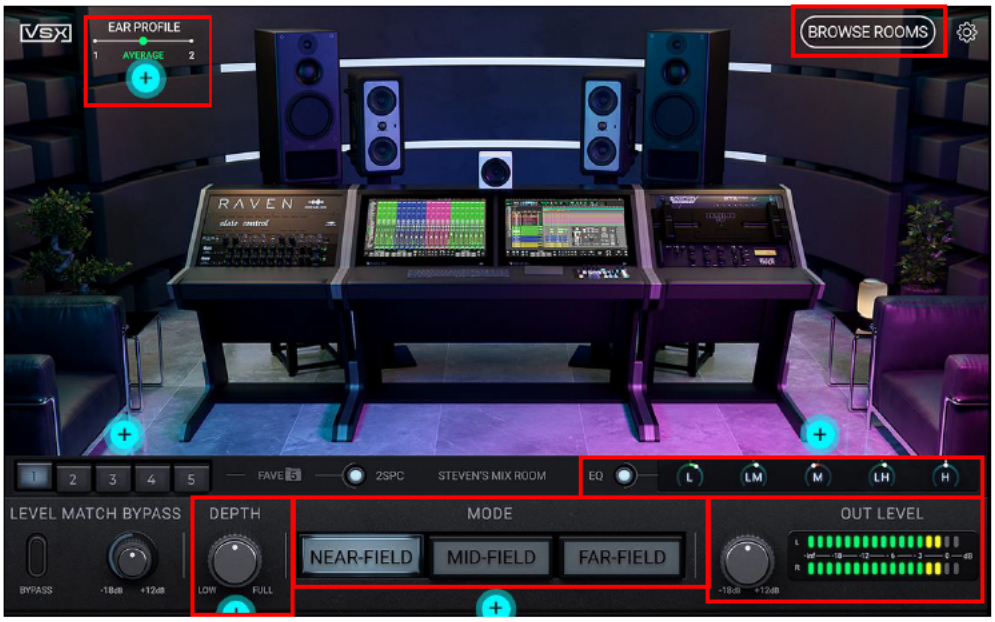

Figure 2: User Interface of the VSX Software

By now it is clear what the functional scope of this hardware and software combination is. Consequently, the question arises as to how effective this solution is for producers? In this context, it is beneficial to take a look at the aspects described above in the *Problem* section. The first point was the multifaceted problem of costs. Just looking at the studio in Figure 2 in terms of monitoring systems and room treatment, it's clear that this is a costly affair. The VSX system has a one-time purchase cost of about 500 Euros (Steven Slate Audio, 2022),

which is about half of a near-field monitor in Steven's Private Mixing Room. For that price, not only does the producer get a dozen more environments, which in reality comes with half a fortune, but the innovative headphones come with it as well. This "alternative" is thus definitely to be preferred when it comes to the cost factor. Considering the financial tension between musician and producer, this one-time investment solves a significant problem, which has a positive impact on the overall quality. Furthermore, more than obviously, the problem with optimizing the environment is no longer an issue. Thus, with this solution, there is no need to purchase acoustic optimization items. This part has already been adopted by world-renowned producers in their studios and brought into the customer's workstation with the help of Steven Slate and team. Finally, taking a look at the problem with workflows and guessworks, it also becomes clear that with the help of this innovative product there is no longer need to interrupt workflows or to mix by numbers. The user does not have to worry about rendering his mix and running to the car, to the laptop, or to the nearest headphones that are sometimes not even suitable for this purpose of referencing music. The producer can conveniently and effectively simulate the mix immediately in a Mercedes-Benz sound system, on a boombox, or on virtual Apple AirPods among many others. This allows changes to be implemented immediately without interrupting the focus. For example, if the producer is in the habit of producing rock music, but also takes on alternative genres like hip hop or trance within the framework of a new customer project, environments like the *LA Nightclub* or the *Boombox* can be used to make better decisions – not by numbers but by precise acoustical representations of desired systems. This saves the danger of mixing according to certain "formulas" that are designed for a specific genre (e.g bass music) but eventually don't always work on every sound system in practice. The producer, with the capability of VSX, sits virtually right at the source where preferably the track should be played in real life circumstances.

The final, but not unimportant part of this Case Study provides an insightful discussion of the extent to which this innovation was successful, what theoretical aspects could be identified behind the innovation process and what can be derived from Steven Slate's work mentality to address future challenges within this industry.

Discussion & Lessons learned

After the detailed description of this innovative solution and the associated process behind it were shown, there are definitely important lessons to be derived that could be important for practitioners in the future. Taking a look the chapter *Approach* from a theoretical standpoint, Steven Slate and his team have chosen a kind of *innovation co-creation* or *innovation ecosystem* approach. Innovation co-creation describes a collaborative development of new value together with experts and/or stakeholders (Fronteer, 2022). This approach is a form of collaborative innovation where ideas are shared and improved together. In addition, as already described, there is the aspect of ecosystems. The latter refers to a loosely interconnected network of companies and other related entities that "*coevolve capabilities around a shared set of technologies, knowledge, or skills, and work cooperatively and competitively to develop new products and services*" (Granstrand & Holgersson, 2020). Such an innovation approach is quite powerful as it grants many advantages and opportunities. One of them lies in exploitng two-sided motivation. To make that more precise, in order to stay innovative, companies need to rely on incentives to motivate internal and external

collaborators that are potentially part of a project. The latter aspect became clear in the exemplary case of the Archon and NRG Studio. Steven Slate and team were motivated to include two renowned studios in the portfolio and provide customers with excellent referencing conditions, while the studio owners motivation lied in participating in this project in order to further improve their studio through BPM measurement technology and to map the optimized environment inside the VSX system in terms of exposure. Organisations need to identify and respond to their partners' true motivation and must try to balance the objectives of the entities involved with their own and ideally make it work best for both sides. The latter is reinforced when the stakeholders involved share a similar work mentality, as was the case with Archis Archontis in his studio, who together with Steven wanted to exceed the "good enough" and in the end both sides benefited. Another similar point during the innovation process was that Steven Slate and team chose partners with complementary skills to expand the space for value creation. The potential here lays in the exploitation of Steven Slate's long-standing relationships with, among others, various studio owners who were as at home in the audio field as Steven Slate himself. Of course, these partners are long-standing contacts, but another approach should not be lost in this context: embracing new partners, from the theoretical perspective of *innovation co-creation*. Steven Slate and his team wanted to look beyond familiar resources and implement an ambitious concept with a new partner, in this case Scaeva Technologies from California. A common challenge in innovation co-creation is to take on and find new partners. New partners always include costs in terms of search, validation, and also compliance, as well as the forming and establishing of new social relationships (Rayna & Striukova, 2015). An important learning here is that preserving some of that open-minded attitude towards new partners can help companies stay on top of innovation. With the cooperation of the Californian company, Steven Slate and his team have succeeded in developing a prototype or, ultimately, a finished product, the requirements description of which could initially have caused concern among many companies with regard to feasibility. On this point, too, it is of course important to remember that it is not only the technical capacities of a new partner company that are decisive, but as also mentioned previously, the working mentality and the overall common ground towards approaching a defined concept (Frow et al., 2015). Another, but not unimportant point is to increase competitive advantage by understanding the big picture instead of only tackling a supposedly problematic component, which has been successfully realized by Steven Slate and team. To make this clearer, it is worth taking a closer look at the competition. In the past, there was only one company with regard to a similar product. The latter characterized by the company *Focusrite* and their VRM (Virtual Referencing Monitoring) product combination. This product from the competitor can be compared most effectively with the VSX headphone system as they had a similar fundamental idea of solving the music producer’s problems. Focusrite offered a VRM Box, which was a small audio interface for the usage under the producers own headphones. The additional component was a software that could simulate different speaker models in different rooms. These rooms included a recording studio, a living room and a bedroom (Kusche, 2011). The intent was to give users the ability to reference their music on different listening monitors in three environments. The company thought they were solving the large issue of people wanting to have a reliable referencing option for their music, but in the end they only managed to illuminate the problem from a different angle. The focus on emulating different listening monitors in an arbitrarily defined bedroom, living room and a recording studio briefly created a wow effect, but it didn't take

much time to realize that the user could never achieve a good result with their own, usually not high-quality headphones. As it has been stated at the beginning of the *Approach* chapter, headphones only work with a strict right and left channel, which completely eliminates spatial perception. In addition, unlike the standardized, honest and flat headphones in the VSX system, a user's own headphones usually do not meet the latter requirements and thus do not offer any reliability. In addition, the simulation of living rooms and bedrooms was also not really impactful, since the user could do it himself at home, without a software that basically replicated what the user could already do himself. Virtually going into a world-renowned studio, experiencing an honest simulation acoustically, influencing the environment in an intuitive user interface, and making efficient and reliable decisions at the same time - Focusrite couldn't achieve that for their customers which, along with other compatibility problems eventually resulted in the product being discontinued, as stated by the company on twitter in 2016 (Twitter, 2016). This big and whole was grasped by Steven and his team in cooperation with their ecosystem of partners in a co-creation approach, thus outshining the competition. Last but not least there is a general lesson that should not be forgotten regarding this case. As a group, especially under the leadership of an ambitious individual like Steven Slate, managers should set goals that are aspiring and which create the same drive and motivation inside the heads of the like-minded team as it is created and communicated by the leader himself. Ambition begins with understanding the aspirations a leader has for the company and the team. These aspirations are often expressed in the form of goals that define desired outcomes, in this case, solving the multifaceted problems of music producers in the industry. Knowing how far to reach for any given aspiration is key to harnessing healthy ambition. Setting goals that require just the right level of difficulty and discomfort helps ensure the company pushes itself and the team to reach beyond current abilities. This has been demonstrated by the final problem solving capacity of the VSX System, as well as the difficult and demanding process behind it. “Good enough” was never the desired solution for Slate and partners. Beyond that, there was still a lot that might have seemed intangible at first, but was achieved through the drive of amibitious goals.

In summary, Steven Slate Audio has solved the fundamental problems of producers and created a new, previously intangible way of working in music production. The whole innovation process created know-how in new areas and helped the company to meet its customers at their core problems. It furthermore eliminated the initially stated financial conflict between producer and artist without sacrificing quality or compromising efficient workflows. To date, Steven Slate and team continue to improve the VSX system with new features and gradually add new virtual environments for advanced music referencing (Steven Slate Audio, 2022). Because of that, this field remains very exciting for the future of music production. Additionally, it is interesting to wonder what kind of new possibilities will be embedded into the VSX system over the years or if an even more optimized solution is going to be introduced to the market that currently seems as inconceivable as it felt at the time of Focusrite's VRM era.

Appendix

Research Method:

In the context of this case study, the method used to obtain the data was primarily relying on online research as well as content and text analysis on respective online websites. Online content and text analysis refers to a collection of research techniques used to describe and make sense of online material through systematic categorization and interpretation (Clootrack, 2020). The sources of content mainly included Steven Slate's company websites, but also industry related websites, forums, blogs and publicly available videos that helped to better clarify the context of several data. In addition, an interview conducted by a third party in relation to the innovation process of the VSX System was included. This was due to the fact that the intended personal contact with Steven Slate did not come about within the framework of this case study. The latter described method was chosen because today there are only a very few starting points in the literature in the context of this company and the corresponding VSX system. This initial situation required to make and interprete connections across online research and various website content.

References

Audiolabs. (2022, July 2). *AudioLabs - HRTF measurements for binaural sound research*.

audioXpress. (2020). *Scaeva Technologies and Slate Audio Team Up on VSX Headphone and Modeling System.* https://audioxpress.com/news/scaeva-technologies-and-slate-audio-team-up-on-vsx-headphone-and-modeling-system

Baym, N. K. (2013). Fans or friends? seeing social media audiences as musicians do. *Matrizes*, *7*(1), 13. https://www.academia.edu/4530318/Fans_or_friends_Seeing_social_media_audiences_as_musicians_do

Berklee Online. (2020). *Music Production: What Does a Music Producer Do? – Berklee Online Take Note*. https://online.berklee.edu/takenote/music-production-what-does-a-music-producer-do/

Berklee Online. (2022). *Mixing Music: What is Sound Mixing? – Berklee Online Take Note*. https://online.berklee.edu/takenote/mixing-music-what-is-sound-audio-mixing/

Braasch, J. (2005). Modelling of Binaural Hearing. In J. Blauert (Ed.), *Communication Acoustics* (pp. 75–108). Scholars Portal. https://doi.org/10.1007/3-540-27437-5_4

Clootrack. (2020). *What Is Online Content Analysis? - Clootrack.* https://www.clootrack.com/knowledge_base/what-is-online-content-analysis

Eiosis. (2022, July 2). *Eiosis - Advanced Audio Plugins - Designed by Fabrice Gabriel - Eiosis.* https://www.eiosis.com/

Fountain, T. M. (2021, September 13). The Evolution Of The Music Industry — And What It Means For Marketing Yourself As A Musician. *Forbes.* https://www.forbes.com/sites/forbesbusinesscouncil/2021/09/13/the-evolution-of-the-music-industry---and-what-it-means-for-marketing-yourself-as-a-musician/?sh=c54a46297a7d

Fronteer. (2022, July 3). *What is co-creation? | Fronteer*. https://www.fronteer.com/what-is-co-creation

Frow, P., Nenonen, S., Payne, A., & Storbacka, K. (2015). Managing Co-creation Design: A Strategic Approach to Innovation. *British Journal of Management*, *26*(3), 463–483. https://doi.org/10.1111/1467-8551.12087

Granstrand, O., & Holgersson, M. (2020). Innovation ecosystems: A conceptual review and a new definition. *Technovation*, *90-91*, 102098. https://doi.org/10.1016/j.technovation.2019.102098

Harrison, L. (2014, July 24). How has the Internet and Social Media Changed the Music Industry? *Socialnomics.* https://socialnomics.net/2014/07/23/how-has-the-internet-and-social-media-changed-the-music-industry/

Image-Line. (2022, July 2). *What are 'monitor speakers' and why do I need them?* https://support.image-line.com/action/knowledgebase?ans=231

Irizarry, K. (2019). *16 Bands Who Got Their Start on MySpace*. https://loudwire.com/bands-who-got-start-on-myspace/

iZotope. (2022, July 1). *What Is the Difference Between Mixing and Mastering?* https://www.izotope.com/en/learn/what-is-the-difference-between-mixing-and-mastering.html

Joshi, K. M. (2022, January 6). Why Is Audio Gear So Expensive? (Especially Synths). *Integraudio*. https://integraudio.com/why-audio-gear-so-expensive/

Krol, C. (2021, October 20). Streaming services propose “lowest royalty rates in history” for songwriters. *NME*. https://www.nme.com/news/music/streaming-services-propose-lowest-royalty-rates-in-history-for-songwriters-3075098

Kusche, G. (2011). *Test: Focusrite VRM Box - AMAZONA.de*. https://www.amazona.de/test-focusrite-vrm-box/

Mcdonald, H. (2019, July 29). How the Big Four Record Labels Became the Big Three. *The Balance Careers*. https://www.thebalancecareers.com/big-three-record-labels-2460743

Musicians Institute Hollywood. (2021). *Social Media's Critical Role in the Music Industry | Musician's Institute*. https://www mi.edu/in-the-know/social-medias-critical-role-music-industry/

Neumann. (2022, July 2). *What’s the Difference Between Home Stereo Speakers and Studio Monitors?* https://www neumann.com/homestudio/en/difference-between-home-stereo-speakers-and-studio-monitors

PR Newswire (2020, December 10). Scaeva Technologies Powers Paradigm-Shifting Pro Audio Tool, 2020. https://www.prnewswire.com/news-releases/scaeva-technologies-powers-paradigm-shifting-pro-audio-tool-301190345.html

Rayna, T., & Striukova, L. (2015). Open innovation 2.0: is co-creation the ultimate challenge? *International Journal of Technology Management*, *69*(1), Article 71030, 38. https://doi.org/10.1504/IJTM.2015.071030

Rothstein, A. (2020, February 18). Why do Recording Studios Need Acoustic Treatments? *Institute of Production and Recording*. https://www.ipr.edu/blogs/audio-production/why-do-recording-studios-need-acoustic-treatments/

Sage Audio. (2020). *What is EQ and Compression: The Basics of Home Recording (Part I)*. https://www.sageaudio.com/blog/pre-mastering/what-is-eq-and-compression-the-basics-of-home-recording-part-i.php

Scaeva Technologies. (2022, July 2). *Scaeva Technologies – mind-bending spatial audio technology*. https://scaevatech.com/

Slate Digital. (2022, July 2). *About | Slate Digital*. https://slatedigital.com/about/

Slate Media Technology. (2022, July 2). *Slate Media Technology - RAVEN Touchscreen Control Surfaces by Steven Slate - Slate Media Technology*. https://www.slatemt.com/

Statista. (2022, July 1). *Spotify users - subscribers in 2022 | Statista*. https://www.statista.com/statistics/244995/number-of-paying-spotify-subscribers/

Steven Slate Audio. (2022, July 2). https://stevenslateaudio.com/vsx

Steven Slate Audio (2020). VSX User Manual. https://download.stevenslatedrums.com/vsx/VSX%20User%20Manual.pdf

Steven Slate Audio, Archon Studio. (2020). *Inside VSX | Archon Studio Owner Aris Archontis | Steven Slate Audio - YouTube*. https://www.youtube.com/watch?v=Dhi6gagqtfo

Steven Slate Audio, NRG Studio. (2020). *Inside VSX | NRG Studio Owner Jay Baumgardner | Steven Slate Audio - YouTube*. https://www.youtube.com/watch?v=72FNdrWFRT4

Steven Slate Drums. (2022, July 2). *Welcome - Steven Slate Drums*. https://stevenslatedrums.com/

Stone, A. (2020). *Steven Slate Audio VSX Headphones - User review - Gearspace.com.* https://gearspace.com/board/reviews/1331112-steven-slate-audio-vsx-headphones.html

Twitter. (2016). *Focusrite auf Twitter: „@Stone_Wallace That's right, VRM box is now discontinued. We don't have any plans to continue development for it.“ / Twitter* [Tweet]. Twitter. https://twitter.com/wearefocusrite/status/697444193430450176

Ucaya. (2019). *The Mechanics of the Music Industry | Soundcharts Blog*. https://soundcharts.com/blog/mechanics-of-the-music-industry

Vintage King. (2020). *New Environments For Mixing With Steven Slate Audio's VSX Modeling Headphones - Vintage King*. https://vintageking.com/blog/2020/10/steven-slate-audio-vsx-modeling-headphones/

Waves. (2022, July 2). *How to Avoid Ear Fatigue while Mixing | Waves*. https://download.stevenslatedrums.com/vsx/VSX%20User%20Manual.pdf

Wiktström, P. (2021, June 16). *The Music Industry in an Age of Digital Distribution | OpenMind*. https://www.bbvaopenmind.com/en/articles/the-music-industry-in-an-age-of-digital-distribution/