Listen! – Improving the Cooperation between Game Designers and Audio Designers

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ABSTRACT
In the design research investigation *Listen!* the multi-disciplinary collaboration between game design and audio design students is researched. The research focuses on gathering more insight in the creative design process of game audio and presents general recommendations and pitfalls for the development of game audio.

Keywords
Game design, sound design, audio design, collaboration, creative design practices, design research, multidisciplinarity, education.

INTRODUCTION
Along with the graphical side of games, audio has developed rapidly over the past years. (Huiberts 2010). Academic research on game audio has been slow to develop (Collins 2008) but currently numerous resources on the role of audio in games are at the reader's disposal [1]. This paper focuses on the creative design practice of game audio design: the collective effort of audio designers and game designers to produce good sounding games.

Generally, game audio production tasks are often either performed by the in-house audio team [2] or outsourced to a third party audio designer or team. Audio teams are most frequently found at the large development companies where the total amount of audio assets can be substantial [3], while smaller game design studios tend to work with external sound designers or composers (henceforth: audio designers [4]).

It comes as no surprise that the separation of audio design from game design and development can result in challenging situations. The approach by designers to this cooperation mostly is intuitive - the lack of practical knowledge on the design process itself is only noticeable by its absence - and the two disciplines have a different priority: the result often being a 'dominance' of video [5]. More insight in the factors that influence this multi-disciplinary cooperation can be very valuable, as a lack of knowledge about the other disciplines in multi-disciplinary teams can make communication more complex (Kolsteeg and Mulder 2010). At the Utrecht School of the Arts, game design students and audio design students have collaborated for many years in game design

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projects and the differences in approach have regularly surprised their supervisors. During peer discussion meetings with professional designers, these differences were mentioned for causing misunderstandings and technical imperfections [6].

In 2009, the Utrecht School of the Arts commenced an investigation of the collaboration between game and audio design students. In the first year of this investigation, a baseline measurement was performed by interviewing final-year students about their experiences in game design projects at the School of the Arts, faculty Art, Media and Technology. Both game design students and audio design students were interviewed about the process, cooperation and final product or prototype. The student projects are quite similar to the ones in many of the small design studios that operate in the professional field in the Netherlands; external clients assign game design teams of about 5-9 game designers who in their turn approach an audio designer or audio design in order to complement their game with audio.

Following from this investigation and experiences with second year collaboration projects, the author will come up with recommendations for the conceptualization, production and implementation of game audio in collaborative design processes. It is important to notice that this is an initial baseline measurement accompanied with the findings in monitored projects. Although some peer discussion meetings [7] have been held about the current outcomes, further research in the form of a comparison between the baseline measurement and the design practice in the professional field will be important for validation.

SCOPE

In the Netherlands, the majority of game companies consist of less than five employees (Deloitte 2011). These small studios stand in contrast with the large game development studios that develop games with a high volume of assets and consequently have a larger development team. While the large game studios tend to work with an in-house 'audio team' capable of producing tens of thousands of assets for a game title (Huiberts 2010), the small studios usually outsource the audio design to an external party or – incidentally – produce the audio content themselves. This research mainly focuses on the small studios that cooperate with external parties for the audio design of their games: outsourced audio production.

APPROACH

The first phase of *Listen!* focused on the collaborations of fourth year design students at the Utrecht School of the Arts, Faculty of Arts, Media & Technology. Two initial baseline measurements were performed, outlaying the general process and the various relevant aspects of their design processes.

The collaboration in these student projects was considered to be appropriately equivalent to the collaboration seen in the field, since these game design teams function independently with a professional approach in a small, multidisciplinary team to develop a prototype for an external client. The size of these teams is similar to that of companies found in the field and students that are not part of the game design team are facilitating the audio design.

One of the most valuable aspects of investigating student teams is that these do not have business trade secrets and are not bound to non-disclosure agreements, thus allowing for the retrieval of transparent baseline data. Another method to ensure the gathering of

transparent data was the separation of the researchers in this project from the student supervision team. Fourteen collaborations in the fourth year were examined.

The fourth year audio designers and game designers were interviewed twice: once during the course of the project but before the start of the production (the interim interviews) and once after the project had been concluded. Only the game designers that had collaborated with the audio designers or were involved with the audio design in any other way were interviewed. Mostly, the interviewed game design students were the project leaders, but in some cases, game artists or game programmers that actively worked together with the audio designer were invited to participate in the interviews.

The interviews were semi-structured. The duration of the interim interviews was about 1 hour; the final interviews had a longer duration of approximately 2 hours. The interviews were designed to question the interviewee about the approach, the current state of the project, the positive and negative developments, learnings from the collaboration and a final evaluation of the project.

The interviews were voluntary, anonymous and not in any way connected to the appraisal of the students. The game designers were interviewed separately from the audio designers. The interviewer is a designer in the field of games himself, and particular care was taken to ask neutral questions. The interviews were annotated by the interviewer and recorded to enable consultation during analysis of the data. The interviewees were surprisingly enthusiastic about the fact that their creative design process was investigated and that the outcomes were to be used for learning purposes.

In addition to the baseline measurement, 20 second year collaborations were examined by weekly project supervision. This was done to gather insight in the course of the projects and to gain a larger number of control data.

GENERAL PROCESS

In the interviews, the general approach of the students was examined. In the following sub-sections various phases of the design process and corresponding observations are explained.

Pre-production

Conceptualisation phase

At the start of the development process of the monitored projects, all game design teams scheduled a conceptualisation phase in which the basic game design was laid out. In all the cases, sound was not discussed into detail or even completely kept out of the conceptualisation, as it was clear from the beginning that audio design was to be outsourced to other students.

Briefing

After the conceptualization phase had ended, the game designers generally arranged a briefing with the audio designers they had approached. During this briefing, the first concepts were explained, preliminary artwork was shared and some first ideas were generated. The ‘setting’ or atmosphere of the game was found the most relevant issue to be shared with the audio designer. Most audio designers were furthermore interested in the number of sound effects and the planned duration of the music.

Definition phase

After the briefing had taken place, most audio designers commenced by producing some sketches in order to agree upon the style of sound effects and music for the game. An asset list was often created in this phase, defining the sound effects that needed to be created for the game. This list was mostly created by the game designer, but in other cases by the audio designer, or compiled in a cooperative effort. A fragment of an asset list can be seen in Figure 1.

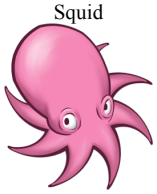
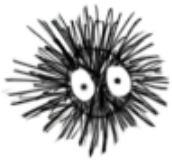
In-game object	Visual	Description	Animation idle	Animation/sound action
Propeller	Squid 	Sucks a current of water towards it and pushes it away on the other side	Helicopter–like rotating movement of the tentacles	*Animation* Player jellyfish explodes upon touch *Sound* Floppy and squishy chopper-like sound and the water current sound
Pushing water	Anemone 	Pushes a current of water without harming the player	Pulsing lower body and tentacles drifting along with the current independently	*Animation* Emits water current *Sound* The water current sound
Destroying enemy	Sea urchin 	Destroys the player upon touch	Floats about very simply	*Animation* Shakes heavily when touched by a jelly to make the jelly explode *Sound* Evil, high pitched snicker
Floating enemy	Fishhook 	Is able to be dragged into the player's current, where it will explode upon touch	Floats about very simply	*Animation* Makes a tugging motion when touched by a jelly to make the jelly die *Sound* Sharp, metal-like zing (in the style of the sound when you unsheathe a sword)

Figure 1: A fragment of an asset list that was regarded as useful by the audio designer as it contained enough information about the game.

Production

Asset production

Later in the process, the audio designers started creating sounds for the game. Challenging for most audio designers was the fact that in between the definition phase and the asset production phase, game design parameters had often changed. These alterations had been initiated by the demands of the client, technical limitations, early user tests or new inspiration of the game designers. Audio designers mostly produced the

content in a (home) studio, thus separated from the game development team. Eventually, the audio assets were shared via online hosting services.

Implementation

In most cases, the delivered audio assets were downloaded by the game development team and gradually integrated into the game system by the game programmer. The teams worked until the final deadline and audio was integrated along with other game-assets or in sessions. In many cases, audio integration was one of the final tasks of the programmer and sometimes the available time for audio integration was fairly limited.

Post-production and finalisation

In the monitored projects there was no final post-production in which the audio is tweaked and balanced phase as seen in for instance film sound production (Bridgett 2007). Some project teams shared the end results with each other, but in some cases the audio designers have not evaluated and tweaked the end result before the release of the game prototype.

OBSERVATIONS

Based on the interviews, some observations can be made. These are structured according to four topics: cooperation, process, technology and concept.

Cooperation

One of the most outstanding observations is that the form of cooperation – outsourced audio production – usually appears to have an impact on the feeling of flow (Csikszentmihalyi 1997) of both the game development team and the audio designer(s). Game designers mention in the interviews that the audio designers 'are frequently not in the same flow' as the game design team and that a 'team feeling' is missing. This apparently negatively influences the motivation of both parties.

In many cases, the audio designers work on multiple projects at the same time. In these 'crunch' periods, the audio designers are sometimes completely occupied with the finalisation of other projects, while the game design team asks for the delivery of assets. The same occurs when the game designers are trying to finalise their project and fail to respond to the audio designer. During these moments of asynchronous flow the lack of communication regularly leads to misunderstandings.

As the audio designer usually does not produce the audio assets in the same room as where the game is being developed, the use of a prototyping platform is mentioned as a method to allow the audio designer to tweak and produce sound effects in the context of gameplay. An advantage of this method is that the audio designer can tweak the sound effects during creation at his own pace. This strategy is also mentioned for making sound effect production more effective and rewarding, as the result can be directly evaluated.

In general, not all participants of the interviews had a clear view on the responsibilities with regards to outsourced audio. This applied to for instance the creation of the asset list or the mixing or balancing of sound and music in the game engine.

A final observation is that the projects were frequently not concluded and evaluated and that the communication frequently stagnates near the end of the project as a result of diminished motivation. Proper evaluation is for instance mentioned by Kolsteeg and

Mulder (2010) as a good way of rounding up a project while preventing neglected loose ends to disturb future collaboration.

Process

Throughout the process, communication was found to be crucial. In the context of game development, effective communication was regarded by the audio designers as even more important than in contexts such as film, as the game development process often follows the *iterative* principle (Cf. Nielsen 1993). In an iterative process, several steps or cycles are repeated in order to get to the final result. This can cause many defined aspects to become redefined later in the process: game characters could for instance be altered in the last week, while it is unlikely that the main character in a film production process is altered after the recordings. The fact that the audio designers work in their studio on a different location asks for a very secure communication of alterations and updates. As mentioned in the description of the production phase, alterations can occur at any moment during the production phase. To exemplify this issue with a case from the research:

*Second year game design students had defined the setting of a game prototype as a city at night. The game audio designer started producing music and sound effects based on this information, but after some time, one of the game artists decided to change the setting to an underwater world. The main characters were to be **fish** instead of **gangsters**. This change had great consequences for the audio designer, making all material that had already been produced inappropriate.*

In contrast to communicating status changes by phone or in real life, communication by email was frequently mentioned for causing miscommunication, especially when discussing the dramatic impact of sound effects or music.

Rather challenging for outsourced audio production seems to be the planning throughout the process. As there are many process variables, it is at times rather difficult to predict beforehand when to plan specific activities with regard to the audio design. The planning of the testing and prototyping of audio assets highly depends on the progress of the game prototype. The audio designers had the tendency of producing content relatively early in the process and considered their products as being final versions sooner than the game designers.

Technology

A fundamental issue of game audio development is the used technology in combination with the technical abilities of the team members. Besides the production of high quality assets, the way of implementing these in a game system determines how these assets react to the interactive process triggered by a player (Stevens and Raybould 2011). In many teams, the expertise to get the most out of the implementation phase was lacking by both the game programmer and the audio designer. This mostly becomes apparent near the end of the process, when the development team has to prioritise as a result of time limitations. In many cases, initially intended audio features are omitted – e.g. interactive or adaptive music (Cf. Huiberts et al 2009) – which has its impact on the innovation found in these projects as well as the motivation of the audio designer. Audio designers that had a basic understanding of game audio implementation, programming or scripting in the used game tools or engines were found to be capable of realising these audio-features themselves.

Concept

Since the conceptualisation in these projects is often done without the intercession of audio designers, conceptual decisions about audio are mostly not made. At the moment of briefing, many elements have already been defined, and a more fundamental role of audio is then hard to realise. Concerning the conceptual knowledge, in the interviews it became clear that the game designers could benefit from more conceptual understanding of audio, while basic knowledge about game design and the repertoire is of significance for audio designers. Influencing and inspiring one another during the conceptualisation phase might be an interesting method to get to new game concepts. The assets lists that are created mainly describe the sound files that are to be produced, not the conceptual link with the game. Developing a game audio document that reflects the role of audio in a game is a new strategy that can be explored in the future.

The topics addressed above have been summarized in the classification in Figure 2.

Cooperation Integration in team General communication Prototyping platform Responsibilities Team spirit / etiquette		**Process** Planning of audio Communication of changes Iterations audio Final priority audio
	Success and motivation	
Technology Tools and platforms (engines, middleware) Implementation Game tool expertise audio designer		**Concept** Audio during conceptualisation Conceptual expertise Knowledge repertoire Game audio document

Figure 2: Classification of topics for examining the creative design process of game audio design.

RECOMMENDATIONS

As stated in the introduction, at this stage it is too early to consider the findings in the baseline measurement as complete. Still we would like to share with designers the aspects that are generally considered as positive and negative aspects following from our broader experience with student projects as these can have value for other educators and design students.

Positive

There are several conditions that were mentioned as positively influencing the course of the project. These will be discussed briefly.

Early involvement of the audio designer can contribute to innovative audio design, as she or he has the ability to influence the conceptual decisions about both the audio and the game. Furthermore, audio designers that are involved already from the beginning of the project have more time to connect with the rest of the team. A fair amount of involvement of the audio designer throughout the process is found as a positive factor. This includes attending (project) meetings on a regular base, even though audio is not always discussed. This helps to stay in the flow and getting the feeling of being connected with the other party. Furthermore and importantly, alterations in the game design that are not considered as being relevant for the audio designer by the game design team can still have impact on the work of the audio designer.

Game designers with some knowledge about audio usually find good ways of collaborating with audio designers. They can express themselves in a more useful way concerning musical or auditory parameters, which helps communication.

Audio designers with programming skills usually have an advantage, as they can implement and tweak their design concepts themselves. The ability to be able to script the audio design during gameplay was regarded as positive by the audio designers.

Audio designers who take a pro-active attitude and 'defend' the role of sound and music usually are capable of overcoming the problems concerning the dominance of video mentioned at the beginning of this article. This is more often seen as a task of professional game audio designers [8]. To give an explanatory case: *Charles Deenen, senior audio director at Electronic Arts, once convinced his director that more resources were needed for audio by having him play the same game two times at a row: once without and once with music. He measured the director's heartbeat with a heart rate monitor and represented it on a chart. The director was immediately convinced of the importance of audio when he saw differences between the two graphs and assigned more resources for audio [9]*.

Having a clear understanding of the abilities of the audio designer is important. Although the term audio designer is used in this article, one could define many functions in an audio team (e.g. composer, sound designer, technical sound designer etc. Cf. Stevens and Raybould 2011 and Huiberts 2010). Not all audio designers both compose music and produce sound effects. Knowledge about the design process of the other discipline and a clear view on the responsibilities can be valuable for finding overlap in schedules and determining the right timing of performing specific tasks.

In student projects in 2010-2011, it was found that 'in-house' audio designers – functioning as a (nearly) fulltime project team member – preferred to connect with the

game artists. They experienced that many conceptual design decisions that are relevant for the audio design were effectively communicated to the artists and that also the method of communicating changes was found to be valuable for the audio designers. This finding will be investigated more deeply in further research.

Pitfalls

Several conditions were found that can be regarded as generally having a negative influence on the course of the project. These will be presented below.

The use of email for the discussion of auditory properties can deliver considerable problems, not only because the way of communicating is asynchronous, but also because some properties of sound or music are difficult to describe in words. Most students that had used email for this purpose indicated that this was not something that they would do again in future projects. Face-to-face contact was regarded as the best method to discuss sound or music, with phone contact as a backup. The creating of mock-up sound files is also discussed as a better way of overcoming the problems of formulating auditory properties, in other words letting someone listen to what is difficult to be told (Stevens and Raybould 2011).

A pitfall that was found frequently was the lack of communication during the production phase. Small last minute changes by the game designers frequently had greater impact for the audio designer than the game audio designers had imagined. This accentuates that it is important to keep each other informed and have a clear understanding of which information is useful for the other party.

Some audio designers had already worked for film but not for games. The game designers stated that these audio designers generally had the tendency of exaggerating sounds, as is often done in film sound design (Kutay 2006). The game designers stated that these sounds were too intrusive when played repetitively in an interactive context. This is likely to happen when sounds are created without the ability to test during gameplay.

The sound designers that at first did not feel responsible for the implementation of the audio assets into the game engine were generally not satisfied with the end result and indicated that they would like to be able to be involved in future projects.

DISCUSSION

This first stage of research has gained a detailed description of the general development process, several observations and some recommendations for further improvement of this collaboration. Four points of focus have been discerned after analysis of the interview data: *form of cooperation*, *process*, *technology* and *concept*, which altogether form a model presenting relevant topics for the collaborative development of game audio.

One could argue why the production process and collaboration of game audio should be examined in isolation from other asset production workflows total development cycle of games. Although ideally one should indeed focus on the complete process, the creative design process of game audio seems to be having very specific properties that at some times seem to be conflicting with the design process of game design. In the interviews, audio was mentioned being a different domain with very specific properties which therefore demands different design expertise. Also, among the participants it was found that for game audio production implicit steps in the process are involved that are usually not exposed. The fact that game audio production often occurs separated from the game

design team – whether an effort to reduce noise nuisance or a result from outsourcing the tasks – can again result in an asynchronous workflow. Game audio lecturers Stevens and Raybould (2011) have an advice to game audio designers and refer to the specific expertise in the following statement:

"Don't assume that everyone's an idiot; they just don't have the same knowledge about what great sound and music can do. Rehearse your arguments and put them across in a reasonable and reasoned manner."

In the past two years several experiments with the form of cooperation have been done. It is currently too early to draw conclusions out of these experiments; however, it seems that the (partial) integration of the audio designer in game design teams generally has a positive influence on the success and motivation of the design students, although more insight in the process is needed to support the optimal timing of certain activities. Early involvement of audio designers generally is regarded as positive during the design process. Successful game audio designers were mentioned 'team players', having the merit of adapting their activities in such a way to enhance the flow of the game development team, and still being able to work effectively. One crucial means is systematic communication, showing interest and keeping the other party involved during regular meetings, which of course is a mutual responsibility. This corresponds with the two key properties of successful audio designers mentioned by professional game designers: the ability to learn fast in an ever-changing context and being a communicative designer with people skills with the ability to articulate concepts in a discussion, rather than an argument (Stevens and Raybould 2011).

It is important to acknowledge that there many variable parameters in a cooperation, possibly too many for finding a direct causal relation between the form of cooperation and the success of that cooperation and it is presumably just as important to bear in mind that there is not *one* single and universal game audio design process, for every project has an individual progress and many unique, influential factors. Yet, the generalisation in this paper of these projects helps us to find similarities and patterns in order to gain insight in the game audio design process.

The findings have been used at the Utrecht School of the Arts as a base for renewing the structure of the curriculum to overcome the pitfalls that were frequently encountered. These pitfalls accentuated that knowledge about the design processes can be important for design students in order to help them find a useful way of adapting and optimising their design processes.

In the next phase this baseline measurement will be compared with the situation in the professional field to gain more knowledge about the elements that generally have a positive or negative influence of the process of game audio design with the goal of contributing to the available knowledge that is available for professionals and design students.

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ENDNOTES

1 A good overview of academic literature on the role of audio in games is the Game Audio WikiIndx by Mark Grimshaw - http://www.wikindx.com/gameaudio/wikindx3/

2 This statement is based on Rabin (2005 785-789) and on observations at the Game Developers Conference '06 and '07. It is important to notice that there is not a fixed or standardized composition of an audio team, as its size depends on the complexity of the tasks that have to be done. Many of the job descriptions are often loosely described (Brandon 2005 38-39) and the properties of a job title can differ among different companies.

3 For example, the production of the game Halo 2, released in 2007, involved the creation of 4000 sound effects and 80.000 lines of speech, according to Brian Schmidt in the Audio Boot Camp tutorial of the Game Developers Conference '06, *Next Generation Console Audio Solutions* (March 21, 2006).

4 For the ease of the reader, in this article *game designer* is used to define game design students and *audio designer* to point to audio design students. One should be fully aware that there are many tasks in both game design (e.g. game programmer, game artist, game designer) and game audio design (e.g. sound designer, composer, audio programmer).

5 The dominance of video was for instance mentioned in the GDC Audio Boot Camp tutorial *Next Generation Console Audio Solutions* by Jason Page and Brian Schmidt (March 21, 2006). Wilde (2004 1) writes that video is generally dominant and that the audio generally gets about 10% of the resources. Rabin (2005 789) mentions that although audio is equally important to visuals and design, it is often treated as post-production and that the audio designers often have to convince others of the importance of audio.

6 For instance at *Mapping The Field*, March 2010, Huis aan de Werf, Utrecht and *Unravel 2010* and *Unravel 2011* at the Utrecht School of the Arts.

7 See 6.

8 Also mentioned by for instance Stevens and Raybould (2011 382).

9 Lecture 'Emotion & Sound & Games' by Charles Deenen at the Utrecht School of the Arts on September 28, 2006.

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