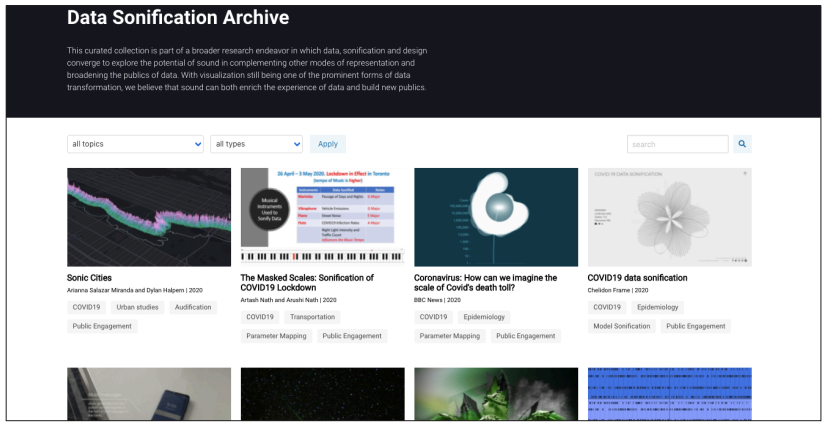
*

Appendix

Data Sonification Archive

The case studies used in this research can be found online at the website https://sonification.design which hosts the Data Sonification Archive. The archive is an open, ongoing and collaborative archive of data sonification projects. This archive, launched at the beginning of 2021 by Sara Lenzi, Paolo Ciuccarelli, Houjiang Liu and Yuan Hua, seeks to collect examples of application of sonification in order to foster discussion and explore the potential of sound in complementing other modes of representation and broadening the publics of data.



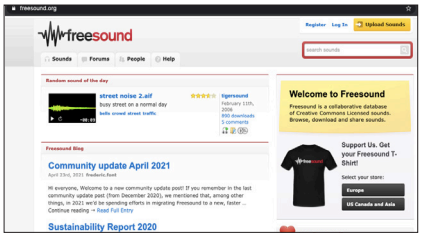
List of sound samples - Chapter 5

https://timberfestival.org.uk/soundsoftheforest-soundmap/

https://wildrumpus.org.uk/

License Type: CC-BY-SA 4.0

https://creativecommons.org/licenses/by-sa/4.0/



https://freesound.org/

License Type: CC-BY-SA 4.0

https://creativecommons.org/licenses/by-sa/4.0/

For the prototype of the second Design Action I used sounds belonging to my personal sound library as well as sounds sourced online and released under the Creative Common license CC-BY-SA. The samples were collected from the web project 'Sounds of the forest soundmap' by Timber Festival, created by Wild Rumous and from the sound sample reposiroty Freesound.org. A detailed list of the samples name and their authors follows.

List of the authors and samples

Digitopia: tour-2-over-birdmarket-cordoaria

Corsica s: rural australia morning birds

Soundbytez: australasian-birds

Audiochap: birdsong

Jonas Rocha: amazon florest

Dobroide: rbd nightfall

Felix Blume: forest at night crickets cicadas and insects in the sian ka an biosphere reserve

Rtb45: mount mogansha insect chorus

Interviews to sonification designers - Chapter 2

The full transcript of the interviews to experts which formed the basis for the discussion of Chapter 2 follows.

Expert 1: Brian Foo

Expert 2: Prefers to remain anonimous, will be quoted as GS.

Expert 3: Niklas Ronnberg

Expert 4: Pedro Rebelo

Expert 5: Stephen Roddy

Expert 6: Chelidon Frame (aka Alessio Premoli)

Interviewee 1 - Brian Foo

Bio:

Foo is an artist and computer scientist working in libraries and museums with a focus on the visualization and sonification of large collections of information and media for the public. He is currently a data artist at the American Museum of Natural History

and was the 2020 Innovator in Residence at the Library of Congress. His sonification work has been exhibited in the Museum of the City of New York and the Museum of Art and Design and featured on NPR, New York Times, and The Atlantic.

Full text:

Sara (00:00):

Okay. It's started. I'm I had some network issues earlier, so I ended up having to connect to the hotspot of my phone. So in that case, in case it happens, just allow me some seconds to do the switch. Sorry. Okay. Okay. Um, so, so basically I'm, I'm, I'm a sound designer, let's say, um, I've been working in the industry for many years, like 15 years. I had my own company working mainly with sound branding, but my formal education is in philosophy and classical music at the conservatoire. I studied piano, saxophone, electroacoustic music, and I've always been besides industry work, always try to be, to be like into, um, research and teaching at university lecturing part time. So three years ago, I was, I was relocating back from Singapore, where I was living at the time and I decided to take a break and go back to full time studying. Then I took a PhD. I am taking a PhD in, uh, I'm in a design department, mainly people do data visualization. I mean, a lab that does information design, but more specifically data visualization. And I'm the only person working on sound. So I'm doing not that data sonification work.

Sara (01:33):

I did some cases, but the focus for us today is more on the, on the, um, say theoretical part, even if it's always from a design perspective. So very practical, and I'm trying to identify a design framework for sonification, um, and in doing so, I'm trying to see what my, what my specific proposal would be with, you know, interviewing, uh, people who, which work have been following in these years to see if there are points of contacts or differences, you know, through which I can better, better position my proposal, too. And since I've been following your work for quite a while now, and I'm, I recently, recently I'm exploring

this concept of intentionality in sonification. So from, um, communication design perspective will be what, what, what is, what are you trying to communicate and how this influences the design process, the sound content, the final outcome, basically everything.

Sara (02:45):

So, so I was, I was writing in this article with my supervisor, who is from, from Northeastern in Boston, Northeastern University. And, um, and yeah, we were exploring different applications of sonification, but specifically on social issues. So from, from a usage for activism too. I use it for art and trying to create, to identify a continuum where, where intentionality can be used to place points on this continuum and identify a design space, basically. So we used your two works Two Trains and, um, and Distance from Home. And what struck us was some of the things you say, and to me, particularly because I'm, I'm the, the musician side, if you, if you wish he is more than communication design side was also the choice of material. I was now listening to your, some of, I, I guess there are newer works possibly because I couldn't find a date like the Gender Representation in Movies.

Sara (03:57):

Hollywood Movies? So always the choice of material for you is quite peculiar. And, uh, we were, we were discussing how this relates to the data set and, and, and then the final listener and just us, uh, you know, wondering about your choices from my side, mostly on the sound design, because that's a big part of my process, of course. And from his side, I would say mainly rather on the, on the intention to communicate that's all times if the choice of data and the choice of sound material, uh, sometimes you say in, I think in Two Trains, you were talking about agnosticism in the choice of materials. So these might, we were saying lead to not inconsistency about shortcircuits between, between what the data say, what the sounds are saying and who knows what the final listener will get! So, you know, we've been wondering about all this. So I was more interested in...I was interested in knowing how, yes, how you approach this, and mainly, about your background and your current job, what interests me is to later, you know, I've been asking the same things to everybody, the people I interview, so later I would try to see if, how these things are, do influence each other. Cause sometimes the coding part is stronger. Some other times the artistic part is stronger. And that's it. If you have any other questions.

Brian (05:33):

Yeah. No, that all sounds great. Yeah, that's, I'm totally, I think about all

those things a lot, so I'll try to be as concise as I can. Um, yeah, so I could start with my background. I can be pretty brief with that. Um, but it's all kind of relevant to where I ended up. So, uh, so my education was more in computer science and visual arts, and this was like a while ago. So I, I mostly had those two things separate. So I, I studied just computer science, just like a very formal, um, very like mathematical. It was very, it wasn't very, uh, I guess, real life, real life there wasn't a lot of real life programming in my education. It was more just like algorithms and kind of like, uh, computer science theory, an then I took Art classes,

Brian (06:46):

[inaudible]

Brian (06:46):

Those things. So that's a lot. Um, and, uh, again kind of had that artistic side separate. So I really didn't start to do data visualization until, um, when I started working at the New York public library. Um, and I think that's where those two worlds came together because the glue was around kind of making information accessible and thinking about how to, uh, create tools to make it easier for people to access materials and think of new ways to experience, um, uh, these, these materials as well. Um, and yeah, just general tools for knowledge creation and things like that. I think, I think just the, just the ethos and, and, uh, mission of the library kind of fit into both as me as a programmer and this idea of like open source, but also just like my interest in just like I'm working with public data sets and then trying to make it more accessible to people, um, in all the def all the definitions of that word.

Brian (07:49):

So I think that's where it kind of did the data driven DJ, uh, came about was, um, and this was also like a, um, a personal side project. Um, and it was around my interest in, um, yeah, just thinking about new ways to, uh, to experience, uh, data sets, which I have mostly seen in visual form, like through, through, you know, standard like graphs and charts, but also more creative data, visual data visualization. Um, and I, I was separately. I was also just interested in just learning, uh, music production. That's just been something I've been interested in. So I kind of married those two ideas of trying to learn how to make music, but using my existing skill sets, uh, which is computer science and, and kind of general general design. Um, and I didn't have really much of a formal background in music making.

Brian (08:44):

So, so I kind of leaned heavily on my, uh, computer science background, as well as my visual visual design aesthetics, uh, and just, just my overall interest or, or, um, interest in music as a consumer, which, which is why I, um, as you kind of mentioned, I try to reference like very specific, uh, aesthetic, um, like, like genres, as well as a specific, um, uh, composers and musicians. Um, and, and, and, and yeah, this, this wasn't a very, I would say like academic project or it wasn't like a, I guess I saw it more as like an experiment and like kind of like a creative project for myself. Um, although a lot of, um, I had to kind of think carefully about some of those was something around, uh, uh, I would say stay true to the, uh, to the, um, to the data set. Uh, and, and that kind of, that kind of, yeah, that kind of brought me around a lot of different topics and, and this is where, um, you know, I can speak to a lot of different things.

Brian (10:02):

Uh, so, so I'd be interested in specifically what you're interested in, but just on a very high level, um, I started thinking about like, what is the, what are the strengths of sound and what are the strengths of music in particular? So, so, you know, you typically don't see a lot of data sonification, uh, especially, um, when you compare it to, to, uh, how, and when we see a data visualization and includes graphs and charts, um, and, you know, I mean, it is, it is a relatively inefficient way to, to deliver a lot of information if you care about just delivering like, like very concrete numbers, um, on like a graph or something like that. Um, I think, I think there's, there are, um, you know, kind of more formal qualities of sound that are advantageous and you kind of see those, see that, and like things like heart rate monitors and Geiger counters, where it's kind of like a mixture of like a passive, passive consumption of data, as well as something where you're looking for like a change, uh, um, uh, and you, you kind of experience that in a very visceral, immediate way.

Brian (11:13):

Um, you can kind of experience that pretty quickly, but it's, it's also like a very, usually a really simple dataset, like, um, a single, a single, uh, uh, uh, a line line of data that you would, you know, um, match to like pitch or, or just like a beep or something like that. Um, but I was interested more in music in general, just because of music's capacity to, to change your mood or kind of give you like a visceral response to, um, or the, the listener just w would feel something, uh, regardless of, of, of, um, uh, you know, potentially what, what you're trying to get them

to feel. So I think, I think that's what, um, that's where my intentionality was primarily was thinking about, like, how should the listener be feeling, uh, about this data set. And I think that's also where the gray, gray areas around this being a creative project, as an, as an artist, uh, me wanting to deliver a very particular experience, a very particular feeling.

Brian (12:23):

And then me as like a data scientist me as a computer scientist, who who's, who shouldn't, who shouldn't, who would want to try to remove as much bias as possible, even though that's, you know, that's not a realistic goal in this case, or really data visualization in general. I think, I think that there's always bias or just just data, right? Like the, the, um, the fact that it did data set exists, exists. Uh, so, so, yeah, so I, I really kind of just like, um, immersed myself in that question. Uh, so, so for every data set, um, and, and the process kind of varied song by song, like, and it was largely driven by just my general interest in particular topics that I wanted to learn more about. Um, so in, in some cases it started with a dataset that was interesting to me, or it started with a, um, like, like a topic that I was interested in learning more.

Brian (13:23):

And then I was like, look seeing if they could find a data set that that is, um, representative of that, of that topic. And I probably focused on publicly available data, uh, from reliable sources, like, like governmental sources. Um, and, and yeah, and then from there, the process varied, uh, song by song. But, but generally speaking, I would try to find like, what is the, what is the experience or what kind of, what is the interesting thing embedded in what is usually a very large, broad data set? Um, and that required almost kind of like a, um, prerequisite data visualizations that may just understanding, like what's in this data set and it might be looking for things like anomalies and looking into, like, why is there an anomaly in that particular time, or is there a trend? Why is there a trend? Um, and then, uh, once I find that thing that I'm interested in communicating, so like in the case of, uh, the two trains, it's wanting to communicate this idea of income inequality in New York city.

Brian (14:29):

Um, how do I translate that into, into a song? So, so that, that poses a bunch of different challenges. So, so one is that the, uh, music is, um, or sound in general is usually experienced. It's a, it's a time based

medium. So, so I'd have to figure out in some way to put it into, um, into the dimension of time. And some, some datasets were more, it was more natural to do that because it already had like a time component. Uh, but in like the income inequality case, there wasn't naturally like a time based component, right. It was geographical component, uh, in which case I decided to kind of move through space. Uh, and, and that would be the, the time component and using the, using the, um, the New York city subway, uh, as a way to kind of move through that data data was, was how I ended up doing that.

Brian (15:23):

And for each song, uh, it was posed a different challenge because based on the dataset, um, and then obviously the, the more interesting problems was around how to map the data to sound. Um, and, you know, I, and, and from song to song like that varied, depending on a lot of different factors, I think one thing was also just, um, you know, ethical considerations, you know, with income and equality, you know, you, you, you have this interesting challenge of, you know, in, in data visualization, it's easier because you already have existing, um, existing visual language, uh, where you can put it on a chart or something, and it's, it's, you could just display it for, for sound or in particular music, um, depending on how you translate, it can have a very different effect or, or, um, or cause a particular, uh, feeling, uh, that might not be the best, um, or might not, would be, uh, would be intended.

Brian (16:32):

So in the case of income inequality, I could have mapped, uh, the, the income of a neighborhood to say the, um, to like a particular chord or a particular note, uh, which might've ended up being like maybe the, the, the poor areas might've sounded sadder or, and the, and the, and the, and the wealthier areas might have sounded happier that might not have been what I wanted. Um, or I could have mapped like say the, the quality of the sound to, to income, which again, that's one way of doing it, but it's not, it's not what I wanted to kind of convey to the listener. I really wanted to really focus on contrast of, of the highs and lows to really make that, um, kind of the, the primary, um, uh, experience the listener should have while listening to the song is the, the, the contrasts, uh, the dynamics of the song, um, uh, should give you a visceral, um, visceral, uh, uh, experience that corresponds to the vast contrasts and, um, inequalities of income in the city.

Brian (17:44):

Um, and again, that, that kind of how I map that vary depending the, um, the song and the dataset. And then also, as you mentioned that the other, um, aspects of this is choosing the right genre of music that I'm ref referencing as well as the right sounds to sample from them. And I decided early on to focus on sample-based music creation, and this is largely a personal, um, creative decision, uh, of just a, just my interest in sample-based music. And also just having it as an opportunity to, as just like another reference, uh, to use as a, um, as a, uh, a creative constraint. Um, but also my choice in sounds, uh, should have, uh, some kind of reasoning around it. Um, and, you know, for the, uh, for the, the, um, the refugee song, you know, using, uh, American country music as a reference, uh, just because it has that nostalgic, uh, quality to it, both in the lyrical content, as well as the, um, the instrumental content of like steel, steel guitar sounding like a crying human voice and all that, all that stuff.

Brian (18:56):

And then country music usually has a lot of language around nostalgia for home, uh, when they moved to the city or something like that. Um, so, so I think, um, having that as another creative decision that had some reasoning behind it, um, was, was something that a was just, uh, I think it was just interest interestingly, interesting to me from an aesthetic point of view, but it also helped me in my creative process because otherwise it would just be an arbitrary decision, you know, just choosing a sound. So just having some intentionality to that, uh, what was interesting to me, and then in some cases, um, choosing like a very particular compositional strategy, um, and, and this is kind of referencing, um, like specific composers or compositions as a way to construct the song. So some examples of this would be like, uh, there's a song using brainwave data.

Brian (19:57):

I wanted to use the, uh, the musical structure of a Rhapsody, you know, kind of this three phased, um, three phases composition, uh, which correspond directly to kind of the three phases of as seizure, which is, uh, before, during, and after the seizure. Um, with two trains, I referenced, uh, Steve Reich uh, Steve Reich, um, and his, um, uh, his idea of, um, uh, what is it called, um, uh, kind of phase shifting. Um, and I thought that was an interesting metaphor to the New York city subway of these constantly looping, uh, tracks, um, that slowly go in and out of sync. Um, and again, this is just creative constraint that, that was helpful for me to just not make an arbitrary decision and just kind of

think about what the, um, the underlying issue is. And then, um, trying to kind of use that as a, as a way to fit together, all these different pieces into one song. So the data set the, uh, the music genre, the sampled sounds and the composition, and having that all kind of come together. Um, and I think because I have used that, uh, otherwise I would have prophesied what I should sound like ended up

Sara (21:40):

Wait, I was switch network because I lost this last part, couple of sentences only. So I pause the recording and reconnect to the other, just give me a second. Yeah.

Brian (21:54):

So what was the last thing that you heard me say,?

Sara (21:57):

you were summing up the, the three main elements, so the data sets the content and the composition.

Brian (22:06):

Yeah. Yeah. So, yeah, so basically that, um, because I didn't have a musical background, um, I use that as, as a way to make, make, make those creative decisions that I, that I would have made just if I was a music musician, I would have kind of probably envisioned something in my head and then, and then, um, did it that way. But, um, it was a way for me to, uh, you know, just make intentional creative decisions just based on, um, what the underlying topic is about or the underlying dataset is about.

Sara (22:38):

Yeah, yeah, yeah. So the, the, uh, composition on the, say the structure of the composition it is super interesting is the first time something like that emerges in my conversations. Is it a pre I mean, for example, in the case of the Rhapsody you wanted to experiment with the Rhapsody form, sort of, so these three elements are balanced differently, maybe depending on the project, or,

Brian (23:11):

Yeah. Yeah. Typically I would try to try I would try to find those three, try to identify those, those three components. Um, uh, in the beginning, like I think there's, with all these songs, there's like a research phase. The first thing is really just understanding the data set. Um, and then just learning about the topic itself. Um, and then thinking about, you

know, given, given that, like, what is, what is the target experience, uh, or the target thing that I'm trying to communicate and what is, what is the appropriate, uh, sounds and potentially, uh, you know, structure, um, or kind of formal formal elements of a particular song. Um, and just trying to use that as like, uh, the, the, the raw material that, that I figure out how to put together. And then, and then, uh, once I get to that phase, like, it's, it's very iterative.

Brian (24:11):

So, um, it's like kind of putting all those pieces together, listening to it. And then, you know, it's probably like hundreds of iterations of just trying to figure out how to get it to the right. Um, uh, like a mixture of like tweaking, tweaking those parameters to kind of make it the right experience that I want it to be, um, or completely changing, you know, like, okay, this, this just, this is just, this just isn't working, you know, either the structure, the sounds are not working, so I'll have to like, kind of roll back and, and, and rethink yet.

Sara (24:46):

Yeah. Okay. Nice. Would you, will you share it with, uh, with people during these phases, like play it to friends or family and say, do you get something because in fact, the fact that it's, so if I got it correctly, the, the, what you are interested in anyways in using sound is this, this added, um, power or complimentary potentially. But I mean, in, in sound for film theory, you know, there's a lot of talking about the added value of sound in terms of yes. visceral instinctive experience, that reaches faster probably, and more, more powerful someone says than the image. So rather than the analytical understanding of, of data, right. Or so I guess, would you, would you try to play to people and say, what do you feel just so it's more important for you it's important for you to get the correct feeling out of people?

Brian (25:55):

Yeah. So I, I, there's a couple of things to say to that. So I think for the, um, for this project, um, I did get feedback from some musician friends, just, just for the musical aspects of it. And just, just general feedback of, of if it, if it matches what I'm intending. Um, typically from my creative projects, I don't, I don't worry too much about feedback. Um, although with my professional work, um, that's very, very integral to the process. Um, so, and, and that's mostly just because of just, you know, um, various constraints, uh, for, for my personal work. But, um, yeah, typically I am, I am kind of the primary, uh, user user, um, that I get, uh,

try to get feedback from during this process of just seeing if it, if it kind of fits what, on what I'm, um, intending it to be. But, uh, I, in some cases I do get feedback from, from some friends, usually, or colleagues.

Sara (00:00):

Yeah, well, because I mean, I'm working currently on realtime sonification, but for monitoring of, for cyber security. So something, I don't know how I got there as it is quite far from how I started, but of course that's very specific, right? So in, in this case, I need people that use potentially my sonification to understand what's going on and to perform some tasks. So it's easier for me to check, to have a feedback in a way, because, you know, I give them some tasks. If they don't perform, then they didn't get the right message from the sound. So it's very different. That's why I also find it interesting to see the difference, because maybe if I, if I think of other creative projects, let's say of mine, you really don't even, yeah you don't necessarily imaging a specific audience or worry about a specific audience. Right. Or do you, do you imagine an audience, because then you said that there are some things that you want to communicate from the data, right? You, you select some, some things in a way when you, when you throw it out to the world, you, I guess, expect people to get the same message or

Brian (01:27):

I would hope so. And yeah, I do. Um, I do listen to that feedback. Um, and I think, uh, depending on the song or the underlying issue, I think there is a particular type of feedback I'm looking for. Um, so, so for any data set where it's like using data about particular people or particular communities, um, I would like to hear from them, I think about it and if it fits what my intent, what my intentions were. So I think the best feedback that I hear for the things like the two train is like the people who actually take the two train in New York city. And does it resonate with them and does it kind of fit their experience, uh, while, while they're taking the train. Um, and, and, uh, you know, for the, for the, the song about, um, uh, like brainwave data, like somebody with epilepsy, like, is it, is it, is it something that is a powerful and personal to them, uh, that, that helps them communicate their experience to other people?

Brian (02:29):

Um, so that's like the type of feedback that I, that I care more about. Um, obviously I would like it to resonate with a broad audience, um, as well as just be just generally aesthetically pleasing. And then that was like another, just personal constraint I put on myself. And that's also

something that I also feel like lacking in, in sonification in general is just like, kind of like thinking about, um, you know, just aesthetics and just having it, uh, pleasant to listen to. Um, and just as a quick side note, before I forget, so I currently work at the American museum of natural history in New York city. Um, I'm also doing a residency at the library of Congress, also doing a sound project there. Um, so from my work at the museum, um, so I, I do some sonification work there. Uh, the goal, the goals are very different or it's much more focused of, um, we have to assess whether somebody learns a particular thing.

Brian (03:29):

Um, so we have very particular learning objectives. So that's something that we need to, um, quantify or, or, um, you know, just, just make sure that people are getting those things in addition to, to some are more, some of those more qualitative things like, um, was it fun? Did, uh, did it leave an impression, um, things like that, uh, which, which, you know, I think sound, sound, we definitely get that some really good feedback, uh, in that regard. Um, and, and typically, typically a sound is used to reinforce a visual representation of, of data, um, rather than being at, um, just, just sound and, and that's just, I know it's typically just around various constraints, uh, but just trying to, I use, I usually use that, um, like a combination of sound, uh, visuals and touch, uh, in, in the museum contexts, um, just as just to try to, um, create like a very physical experience that's, uh, in mind with a lot of the other things, um, in the museum that you can interact with, uh, that's physical.

Brian (04:43):

I think the challenge with like a digital exhibit is that it's, um, you know, it's on a screen and a lot of cases and it's not very, um, it kind of removes them from kind of the physical nature of the museum. So I want to try to kind of like, think about data as almost like a physical specimen in this case where you can feel it, you could look at it, you could hear it, you know, so, so that's, that's the general goal I have in the museum context. And then having that all serve a particular learning goals, as well as general fun, uh, and, and, you know, things you associate with like a natural history museum.

Sara (05:21):

Yeah, yeah, absolutely. Actually you, even in your, in your creative project, I mean, on the data DJ website, you always use visuals. Right. That's interesting.

Brian (05:34):

Yeah. Yeah. And that's, yeah, that's something that, um, I decided early on, like originally I think the original intention was just, just to have it as a music project. Um, I think the problem was the, the music, like the songs themselves couldn't stand alone in the sense that it needed some context to really understand what is the underlying thing that it's trying to communicate. So unless you had like some kind of annotation, uh, that, that came with the sounds, um, it would be hard to communicate like the very specifics, but I do think the visuals support the, the sound, which is the s the sound is the primary experience. So I think once you see the visuals, um, and, and kind of go through the experience with the visuals, you can remove the visuals and still instill, um, uh, get the experience, uh, with, with the sound.

Brian (06:33):

Um, and I did, I did want the music to be able to stand alone, aesthetically, as I mentioned before. So I, I wanted it to be music that one would potentially listen to. Um, and then, um, you know, if they were interested is like, how did this, how did the song get made? And then, and then they can learn about like, like how, how, like, what is the underlying kind of topics around it? And then it would potentially change how they listen to it again and hopefully make it a little more meaningful when they listened to it again. Um, so, so, and I think that that also gets to like another strength of music in that. Um, if it's, if it's a well constructed song, um, it gets stuck in your head, you know, it's, it's catchy, uh, which, which is, uh, something that, um, is also kind of like a goal as like a designer of, of visualizations is how do you leave an impression, um, how do you get the underlying message, uh, stuck in the person's head, uh, and a bit memorable? Um, I think that's something that, um, I strive for a while thinking about just kind of the, you know, the general aesthetics and catchiness of a particular song, um, which, which is another nice construct, um, um, results of using music.

Sara (07:57):

Yeah, of course. I absolutely do agree that the, the field of sonification, I mean, meaning the, the, the research community, which is quite, um, small, but possibly quite productive too, but, you know, they've been, they've been writing and discussing for about 20 years now, but the results are always, um, the impact let's say it's always very limited to me because they, they got like stuck in this idea of the mapping, the centrality of the mapping or the mapping problem, as they say, as you were saying as well, that they, that is completely arbitrary, because I

find many times there's a total lack of context,

Sara (08:44):

Context of the, of the, the wider experience that you do have that are through the sound. And so, um, in your, in your work, I say that the, the mapping, of course it has to be there, but it's not probably the focus of your work. For example, you never, I was about to ask you, but you already replied. You never thought, for example, in the income inequality to simply simply to use pitch pitch, that goes up, I mean, that does only fire up classical way would tell you, this is also a neutral is neutral is efficient, is probably more effective to, for the listener to understand data, the behavior of data over time. Uh, whereas using samples brings a lot of things to the listener, um, because every sample is, especially if they are instrumental, they are already very complex in their own right, right? Whereas I don't know, a sinewave that, just synthesizes a pitch going up and down. Did you ever think of this, I'm asking for the sake of the research

Brian (10:00):

Yeah, yeah. Yeah. I think, I mean, I think one thing, one question I had very early on this project and it has been like, kind of a driving question is like, why can't I just use a chart for this? Right. Like, like, um, like, um, unless, unless you had a constraint that like, you must deliver this data in sound, um, like I always think of like, why am I using music, um, uh, for, for this particular, uh, data experience. Um, and yeah, typically if you're, if you're trying to deliver very specific, um, uh, um, uh, values, uh, very specific numbers of data, like, yeah, probably a chart is probably your best bet, you know, like, like people already know how to read a chart and things like that. Um, but, uh, yeah, to me, it would just be it just to me, if I just kind of mapped it directly to like a pitch or something like, like using like a synthesizer, um, it seems like a, just a very inefficient chart, you know, that, that doesn't work as well, because we don't know, we don't know intuitively what a pitch maps to, we just know, we just know relatively speaking, this is higher, this is higher, this is lower.

Brian (11:11):

Um, we don't have an idea of like an axes or anything like that. So, um, so yeah, so I think, I think that's, uh, that was really kind of the driving thing that kind of moved me away from this, like very, um, yeah kind of, kind of thinking about map the mapping is like a very, uh, uh, uh, yeah, I kind moved away from like trying to communicate very hard

values, I guess. Um, and, and moving more towards just kind of this overall feeling and overall experience, um, that that's, that's something unique to music. Um, but yeah, given that, you know, do, um, in, in the museum context, I do have to think about, uh, more rigorously, uh, how I'm mapping a particular value to a particular sound because it is, it is communicating or reinforcing a particular number or example.

Brian (12:08):

So I'd be more likely to use something like pitch, um, uh, to, to map like a high, high value, um, to sound. Uh, but it's usually, it's usually with like a visualization. Um, and I would also use a sample sample based, um, uh, sounds like a xylophone or something like that, just cause it's just more interesting in timbre or whatever. Uh, so, so yeah, and and there's also just like questions of like scalability. I mean, like, I think for a tool, like a financial tool or something like that, they probably don't, you know, maybe they don't care as much about that. Uh, but, um, yeah, for me, in a, in a museum context, or just like for the general public, you know, like having this kind of this very pleasant, fun experience, um,

Sara (13:02):

Absolutely. Actually I do believe that the aesthetic component is, is fundamental in any context to, because well, otherwise we would just dress or the same. We would not even care what we wear. So it is, it adds that engagement part that makes any action, any, any task you have to perform easier to perform. Um, yeah, I'm working now on sonification of, uh, water networks, water infrastructures for, uh, monitoring cyber attacks.

Brian (13:40):

Hmm.

Sara (13:41):

Well, intrusions, let's say digital to digital intrusions to, to physical digital systems. And, uh, I'm using a soundscapes natural soundscapes of forests, partly because they, my partners asked for it because they are in an office, they have to monitor eight hours a day. So music will be non sustainable in this case. Right. So they asked for something that can, can go very, very quiet while we still, we still can peripherally monitor because we are used to like everyday sounds.

Brian (14:19):

Yeah, yeah, yeah, no, that sounds really nice.

Sara (14:22):

We're very good at perceiving changes in everyday sound because we are...And, uh, but other that, besides that I think the richness of the experience is just so, um, much better if you used the yeah, well like in your case and if you use just abstract, whatever, they basic syntheses acoustic qualities of sound that get totally lost, then when you have to deal with a lot of these sounds, you're working only with pitch or, or dynamics or one specific sound quality. Then I think they information just don't reach. It's very, very difficult to process the, the, the cognitive effort as you say. And as any of my colleagues, when I started at the lab, they would just say, Oh, you know, this is just a bad visualization. I mean, because I was trying to say, you see this visualization is visualization is like that. But with sound, you can get that.

Sara (15:24):

They used to tell me, no, it's just that the visualization is bad. You change that. You don't add sound you'll redesign the visualization. But then going more on them, a few of them, a couple of minutes on them. Um, the sample based on music, I mean, sorry, the music sample, uh, sample based approach is very interesting. And I didn't meet any other case in my research so far, eh, because to me, yes, it adds this, it adds this richness at the same time, this complexity. So you never worry that the message will be, um, not, I can not find the right word because it's not inconsistent. Yeah. As I was saying before, like a short-circuit if you just hear, if you just heard the music, then you could misunderstand the, some of the, of the things that happened in the data, like in the, in the two trains.

Sara (16:35):

Of course, I, I agree totally with you that forcing an association between bad data with sad music is just a bad use of basic metaphors, right? Because we shouldn't them , there are always biases in the way we choose that either we collect data, as you were saying, but these will, would force, um, too much a judgment. And at the same time, what happens if potentially you end up with a, with the opposite message? I mean, just do you wonder about that or not interested...? I found very interesting what you said, sorry about them visualization, because you said you just listened to it and whatever the impression that you get, if, if this triggers some additional interest, then you can go to explanation or you can go. So as if the visualization part was like a learning tool in a way additional training training. Yeah. Yeah, exactly. Yeah.

Brian (17:50):

cause it does change how you are...It might change what you're listening to. It, it changes how you interpret certain sounds. Yeah. I don't know. I'm not like a, um, I'm not trained in that, uh, like psychology, I guess, of things. But, um, yeah, I think to answer your question, I think it's always a risk to have that disconnect. And I think that's, I really enjoy that challenge. And I think that was part of this project is, is, is trying to really do that research and experiment experimentation for myself of, of like, how can I use all of my knowledge and just general, like, you know, aesthetics as an artist to, um, to, to try to match the, the, the, those two things as closely as possible with, with the understanding that there is that risk of having a disconnect with any art, right? Like, um, you know, it, people will get the wrong message.

Brian (18:50):

Uh, either of, it's not very well constructed or just the fact that people are just very different, you know? So, um, I think the one thing that I try to do, uh, and, and you, you probably see it on the website is I try to really explain my process, both my creative process, as well as, uh, having the underlying code publicly available. Um, and that's kind of like a catch all or not, maybe not a catch all, but I try to just be very transparent with my decisions just so you can, people can critique it and come to their own conclusion, you know, about, uh, maybe they would have done it differently, or they don't agree with how I mapped this one thing to another. Um, I, I think, I think that really, I think that that transparency, transparency that transparency and documentation hopefully will, um, help, uh, at least address some of those, those issues that might come up around somebody getting the wrong experience.

Brian (19:49):

Um, and, and I think, I think, uh, that's just become part of my general practice is, um, is just having all my stuff publicly available, both the process as well as the code. Um, just so, yeah, I mean, I that's just like something I've been, just been interested in just in just data science and data visualization in general. Just, just being very open about how, uh, where I get my data from, how I use the, um, just to kind of make it, um, a little more robust, I think, uh, just, just in terms of, yeah, people make mistakes or people may not, um, make the right decisions at any given time. So just trying to make it open and then also giving the people the option to fix it by making it open source, they can make their

own thing. Yeah, absolutely. Yeah.

Sara (20:41):

I also think is a very healthy practice to reflect on the way you do things. And then also when you go back in time, you reread. And sometimes because sometimes I'm surprised at works by that. I have done myself Did I do that? It's not easy. You change. Yeah.

Brian (21:03):

Yeah, yeah. I always say like, I am the, I am like the first and primary user of my documentation, just because, you know, for things like this, you know, I haven't worked on this project in five years, but I could go back and look at my process and remind myself of, okay. Yeah, this is, this is why I did, this is why I made these decisions. Um, so, so yeah, so I think it's, it's, it's kind of a no brainer to me.

Sara (21:29):

Absolutely. Good, good. Well, interesting, because I've got lots of things to process now, because I had another interview before that was similar to the previous one. Um, your way of working is, is quite different? Yes, there's been, especially from, of course my, for me, the interesting part is the, what the, the, the most interesting is that even as a musician, this idea of the samples collection, and then also the composition structure, I think it's very interesting how these three elements feedback, one into the other way to start with the idea of a composition and then sorry, or a structure, and then sort of deconstructing it to accommodate all the elements. Thanks. I don't want to waste more of your time, but I would ask you if I can contact you again, um, in case, because as I said, I have a lot to process and maybe go back and look at some of your works again. And, uh, and in case I drop you an email with some, if I need some clarification.

Brian (22:46):

Yeah. That sounds good.

Sara (22:48):

So, yeah, I don't, of course I meant, I don't want to waste more of your time. Not mine, it's a pleasure listening to you

Brian (22:59):

As a waste, but I think it's also, I like to, it is good. I mean, kind of what you were mentioning before. It's good to kind of reflect on the, um, some of the, uh, creative process and, and decisions cause yeah.

Being able to articulate that is also important. I think. So remind yourself of why, why you made certain decisions.

Sara (23:21):

Yes, absolutely. And, um, how long does it take for one project? Sorry, just those that are on the website. I mean, typically

Brian (23:30):

So for the data-driven DJ project, um, those 10 songs were done over well, so yeah, it kind of varied cause I kind of had various varying degrees of, uh, time to work on this. So I would say on average, uh, in the beginning I could, there was like one, one song per month. Um, and then it started to, uh, take a little longer time, but you know, this was like kind of a part time project. Yeah, yeah, no, of course. Yeah. And um, yeah, it was varying degrees of, um, like research required as well as just the creative process was like all over the place. So you definitely slowed down in towards the end just because it was just, I think it was more of just like a creative challenge of, of, um, trying to like another constraint I put on myself as I tried for each song, like have a completely new, um, type of data set as well as like a new technique that I learned, uh, from a music making point of view. So, um,

Sara (24:43):

Yeah, one month is a short time to me it sounds, I mean, because there's a lot of work behind really, really work of. Yeah. Creative work. It takes its time.

Brian (24:56):

Yes. I'd say between one and probably the longest is maybe like three months or something like that. Yeah.

Sara (25:01):

Yeah. I'd expect that. In fact, usually my experience too, nice is great. And uh, well the, the project at the museum be documented online somehow or

Brian (25:16):

Yeah. So all of that stuff is also documented online. I could share specifically, um, I think a lot of this stuff should be linked from my website. Um, so what I worked on at the museum there, there's a couple of things. So I guess the sound one is, uh, I did an exhibit around climate change. Um, and there were some interactive things that had a sound component. Um,

Sara (25:43):

Yeah. Your website, Brian fo.

Brian (25:46):

Yeah. Brianfoo.com. Although, yeah, I don't, I don't actually link directly to it maybe, but yeah, if you had any specific things that you were looking for, I can, um, I could just send you a link to it.

Sara (26:01):

Yeah. I'm curious now to listen to it because we've been talking about it, but yes, I didn't. I didn't visit your website, your personal website before, so I will now. Okay. Thanks a lot. And hope things in New York are better as for the world situation

Brian (26:25):

That's definitely doing better, but you know, there's definitely parts of America that are going the opposite direction, so.

Sara (26:33):

Yeah. Yeah. Still quite unpredictable, so to speak. Uh yep. Thank you very much and great to be talking to you. And when the article is out, I will send it to you. You know where we talk about We talk about your work and thanks again.

Interviewee 2 - GS

Bio:

Full text:

Gabi (00:00):

I would read your, read your analysis of it.

Sara (00:06):

Yeah. It's just because then I will transcribe it and that will make it easier for me to analyze, because I will try to extract some key words with the other interviews. Yeah. Do some qualitative analysis of sorts it's more to trigger? Um, well it was more to identify emerging topics because my, my thesis is, is, um, is trying basically to identify a sound designerly approach to data sonification, um, mostly, uh, not, I wouldn't say in, in contrast, but I, I have to say that I'm a bit critical in a way to the current approach, uh, to, to the use of sound, to represent data. So I'm trying to say that as a designer, I can, I can bring, um, a practice that takes the listener more into consideration and works more on the material. So on the sounds themselves, rather than an algorithmic process and focuses more on the phenomenon behind the data sets rather than on the numbers. Um, so the big question is what defines a designerly approach to, to something actually to any, to any practice, right. Um, so I've been working lately on this concept of intentionality that will be, um, taking deliberate decisions to solve specific needs of, of, of, of a potential audience. And so the, the article I mentioned was, was trying to, to analyze so cases of certification for social issues and see how the intentionality of the designer guided the production, basically. Wow.

GS (02:08):

Oh, this is so interesting. I have, yeah, I have a few thoughts already coming up, so I'm really glad you gave me that introduction.

Sara (02:14):

Oh, awesome. Awesome. So I would just let you go, just mentiong that Egypt Building Collapses is one of the poles, one of the extremity of the continue. Um, let's say more, more driven by this, this idea of communicating the phenomenon to the listener, that choice of material. Um, we based, we, we based the interpretation on some, some explanations by the old source. I think I found something on this, uh, in, in, um, in this article that Angeles passed me a long time ago because it's written in Spanish, I think, originally.

GS (03:00):

In, um, it's in, Diseña

Sara (03:03):

See. Yeah, yeah,

GS (03:06):

Yeah. That was it. Yeah. I think I wrote that with, uh, a colleague of mine called Leo

Sara (03:12):

Yeah, yeah, yeah, exactly. And there's some explanations, some descriptions of the work process behind, um, and the other pole there will be, um, what, what that basically uses uses data on income inequality, New York city to build a song. So the author says he's trying to be agnostic towards the data set. So it uses, it uses the data as an excuse to experiment with musical structures to obtain a pleasant song. But you know, the topic behind saying this is not making a judgment on deliberately in a way, not using sad sounds to represent poor districts to make, not to make a judgment, but you know, there could be so many options there. So yeah. So, so I'm, I'm, I'm using all of these and I'm talking to people to, to map a map of the practice and then see, see what comes out. Yeah. So yeah, I'm done.

GS(04:20):

That was great. Um, I mean, I have, I have some thoughts that I could launch into, but I don't want to completely, um, disrupt your interviews. Um, the way you've scheduled the question.

Sara (04:32):

Oh, no, no, no. Pretty useful. Actually the questions about background and current job in, in the end, uh, are becoming less and less important demographics.

GS(04:46):

All right. Well then I'll just give you a quick, I'll just say mine quickly and then I'll get onto the meaty stuff. Um, so my, yeah, my name is, um, xxx's, but I go by different names at work. So my name before was xx, um, I haven't said it in ages, xx Um, and, but it's, um, I should say it's, um, I, I changed my names privately, so I try not to, um, I like to, yeah, anyway, so that's why my name was different back then. Um, I work in human rights. Um, so mainly on human rights investigations, um, looking at, um, people that abuse their positions of power. Um, and I

mainly work on, uh, using technology to introduce new methodologies for, um, uncovering, um, yeah, abuses. So my focus has kind of emerged between technology, the way that we could use technology for good, um, to discover, or to find new ways to talk about or to document, um, human rights violations, um, which is what I do currently.

GS (05:59):

So I'm the head of open source research at human rights watch, which is a, um, yeah, but human rights organization. Um, that's very used to doing traditional human rights research, which is mainly interview based. So, um, my role is to, let me just turn my email off. My role is to bring, um, a new, new, um, kind of new methodology to the researchers and there's around 120 researchers. Um, and this could be w talking about plane tracking, um, video analysis, using social media data, um, kind of using freedom of information requests, like a whole bunch of different things. So that's what I do. And the, with the sonification I became. So I worked for about two or three years just in data visualization, um, which is why I know Density design, because I really love Rawthe, um, I love that it was open source that it was offering D3 to people in this way.

GS (07:00):

Like I used to do lots and lots of trainings on data vis and, and kind of communicating messages and finding data and, um, yeah, visualizing it. And I always used to love introducing Raw to people. Um, and so I was working a lot with data vis in general, and then I, I S I was interested in other ways of visualizing data. So I became quite interested in what I called. Physicalizations the idea of creating yeah. Um, which now I think, yeah, which lots of people were calling it, um, and like, so a more like tactile approach. And I was interested in how other senses could be used. Um, and with the Egypt project, um, we had this data from, um, yeah, here, the person we were working with, um, and he he'd collected all this data and, but so much was going on in Egypt at that time.

GS (07:56):

It was 2015, but talking about the year before two years before, and my coincidentally, my husband is a sound designer. So, um, okay. We think a lot about sound and like, there's just a lot, it's just very, um, yeah, he's, he's been a sound designer for nine years now. So we just, the sound, a lot of talks about sound in our house anyway. Um, and I was just thinking, like, if I wanted something that showed the extent of the

building collapses, that wasn't in a way of saying, well, this is just one problem in many, so that's why I wanted to, and I offered xxx maybe three ideas of how we could visualize it. Um, and then he went for the sonification one. Um, and yeah, and then we went through that process and then actually the biggest, um, the biggest, biggest difficulty was the sounds.

GS (08:53):

Um, so what we choose we chose, and I actually don't like the sounds that we have, that we that we finalized. Um, and the sounds that I, we originally had in the first draft were, and I can't remember if I wrote about this in the article or not, but probably I did. Um, the first sounds we had were very, like a bit more neutral, um, um, it's in the article. Good And then we w they're a bit neutral. And then even my actually is the, uh, is the first time me and my boss had a, actually a, quite a big disc, a heated discussion, um, about the sounds like it was the first time we really disagreed. Um, and, um, he said that they sounded, yeah. So I'm going to, I'm just going to be very honest with you. Um, but I hope that, um, the, yeah, but he, he said that, um, they sounded very Christian, um, the sound it's like bells of churches and, um, and, but for me, and so he had those connotations, but the person who had, um, produced the music, um, is a Muslim, um, used to not used to Christian sounds.

GS (10:09):

So for me, we had all these like, big discussions about what Christian sounds were and, um, what that even means in a country where there's lots of Christians in Egypt. Um, yeah. And then we went back, um, with the sound designer and then, um, talks about these a bit more literal sounds. So like the actual sounds of building collapses. Um, and I didn't, and I felt torn because I agreed that the, the more neutral sounds didn't work. Um, you got kind of the, they were quite meditative in a way, um, and you forgot what you were listening to. Um, but I also really don't, I don't really like the literal, um, translation either, um, because it felt quite difficult to listen to. And just also quite obvious, I guess it's the most, I think it just felt the most obvious choice we could have done. Um, but we also didn't have other options.

GS(11:09):

And so, and it also, again, working with xxx, that was really important to know what he wanted. So we gave him both options and talks about the different sounds and he went for the second sound as well. Um,

so that's how it, it became this. Um, and I did, in that time, I did have these feelings of, um, that I didn't want it to be too neutral. Um, and I remember there was this, um, project that someone did where they visualize Wikipedia edits. Yeah, yeah, yeah. And, um, I found, and it was, it was super calming and actually lovely to hear. Um, but Wikipedia as a, is a really, um, actually a really difficult place for lots of people. And I think it has like an average of 80 the editors at 87% male, um, to like 93% male. And it's. So when you think about the concept of like one group of people generating the world's knowledge in this way, and then it's been well-documented that it's not an easy place for anyone who's not in that demographic. Um, to, to, to partake in this, I found that the, the noises were too neutral. Um, and I think I interviewed, I think for the article I did interview, I interviewed a few people that made those kinds of visualized sonification. Um, they, there was a guy in New York who was doing, I wonder if it's the same guy you're talking about? Um, yes, yes, he is. He is in the article data driven DJ. Yeah. Brian Foo.

GS (12:59):

Yeah. And I interviewed the Wiki, I think I interviewed them. Um, I mean, this was, again, we're going back five years, so I'm trying, and then I actually made a version of it, um, like for myself, like, so I, I, I got the cause they made it all open source, so I just recreated that website, but I changed the sounds and to reflect, and I programmed it that every nine out of 10 sounds were a male sound and one out to 10 was a female sound. And so it didn't line up with the, it doesn't line up with who's actually doing the edits, but it's just meant to be like, um, yeah, I just wanted to make it. Um, and then of course, then I had an, uh, a difficult process of thinking, well, what sound do I use for women?

GS (13:56):

What sound do I use for men? Um, which is like, sorry, I'm I didn't know. Let me just tend to turn off my email one second. Um, and yeah, and that's really like visualizing gender is super difficult and, um, solidifying it is also really difficult. Um, so in the end I went for, um, uh, songs where someone said, men like women or man, and I just took the snippets of those songs, like really well known songs. I think I did, man. I feel like a woman, like when they say a woman and then I did the man someone saying, man, so it was still kind of like a song and that felt like the easiest like option in order to make that. Um, and I think I called it anyway. It was just for like a personal project. I just wanted to see what it was like. Um, and, and I was, I think, cause the, with the Wiki, I think when things are too calming and then the data behind it, you kind of

think a bit more about it. Um, it, you feel like it shouldn't just be that, um, neutral in like hear the sounds of the Wiki edits, but then what does that mean? Um,

Sara (15:14):

Yeah. Yeah. I actually passed along this project to a few friends colleagues. I mean in, um, different contexts, maybe I, I showed it and then someone in the audience told me, Oh, that's very cool to listen to when you're working. Can you pass me the link? So I had this sort of several times just people telling me, you know, I let it play stream when I work because it kind of randomized and it's so calming and it's called to, to listen to is a good option in headphones when you work. But this doesn't have any relationship with, with either with the data we got, the data meant to represent. It's just background music. Yeah. Which is an interesting outcome of the project. I don't know how much intended or unintended Would be interesting to know. This is in the, in the sonification research community that is grouped around this ICAD So community for auditory display, the official definition, excludes speech from sonification Ah, that I always find, you know, why? I mean specifically say no speech sound. Wow. Okay. I guess the point is that it carries speech carries a lot of meaning for, for humans. Yeah. But sometimes it's precisely what you want.

GS(16:56):

Exactly. I kind of, for me, it was like, I'll let them say it for me. Um, rather than me trying to find it was too complicated to find two noises that represented something so complicated anyway.

Sara (17:09):

Yeah. Yeah. It is. I guess. Did I interrupt you? I mean, were you okay?

GS (17:14):

No, no. I was finished like this was, so this was my main, the main issue is exactly what you were talking about is how, what sounds do you use? Um, and, and what's, what is the meaning and what do you want people to feel? And that was really, really difficult.

Sara (17:32):

Yeah. Yeah. Yeah. I think this is quite an overlooked issue also by, by, by authors. I mean, by, by sonificators if you want to. And I kind of explain it with the fact that mainly at least in this community, um, researchers come from computer science. So they, they do tend in general to overlook the, the, the materiality of sound in favour of the algorithm.

And then, and then for example, chimes is a very good option. I guess the other option was kind of challenged, right? Exactly. Church bell-ish, because it's easy to implement technically. Uh, it's a very good quality sound, even if it's synthesized simply for example, in a browser, it works well. So it tends to work well in any context is, is even in software. So usually times synthesis is quite good compared to other options. Um, so I, I, I also tend to give this explanation, even if you want to use a very simple Python script, MIDI probably is your best choice because other choices would be, find ways of being poor sounds that are, that don't give a good listening experience, right. So it tends out to be very common.

GS (19:04):

And they wouldn't do if they mesh because with us, I think we had nine or 10 sounds and you also need to think how they mesh together and the first one meshed together so well. And I think that's why the, the Wiki, the Wikipedia one was so good because all their sounds all fitted together.

Sara (19:22):

Yeah, yeah, yeah, yeah. It's kind of, um, ambient music also that we are very used to hear. So we find it so thing, whatever the combination of rules. Yeah. It's almost never out of tune, right. That will be very difficult to make it out of tune.

GS (19:41):

Um, but I think that's what, that's, what I found difficult about this is that I, data is not neutral and the way that data is collected is not, um, neutral and the way that, um, it's put like, um, portrayed or, um, visualized or sonified, shouldn't be, I don't think our, and I think maybe that's why some subjects are easier to Sonify. So like I S I saw a lot around space and like orchestras or chime sounds around different things, data coming from space. And I think that then that it also abstracts you even further cause it's about space and it's not, it's already quite beautiful anyway, as a, as a concept of when you look up into the stars. Um, but I think when you, when you're working on something that impacts people and it may be collected, like how was that data collected or who's doing the collection, who's analyzing it and who it, who does it impact then I think it's really hard to keep that sound neutral, even though it might be the easiest option.

Sara (20:58):

Yeah. Also for one thing, there is no sound in space. So for example, this could be something that you bring in. I mean, we have too many times we are talking about sound. And then in fact, what we are using is music, which is actually Western Western music the structure, or that type of tunes, the structural organization of, of the structural rules or the composition, uh, Western music. So this about Christian sounds is interesting. Exactly. The fact that I think, um, the Egypt project, um, works also because there's this visual component, so it's kind of cinematographic in a way. Um, it could have been equal that when done with different, with less, I'm also not a fan of, of literal sounds, but more, more as a matter of principle, because I think there are so many options. I mean, I started so many years. Yeah.

Sara (22:12):

There must be something slightly more sophisticated. Right, exactly. But in fact, in this case, I think it works very well because also they, you have the, the background image, which is static, but it is an image that, that corresponds to the source of sounds. I mean, it's a full building. So I think as a listener, you, you just make this connection you're given like moments to, to the moment through so sound, I don't know. I think that the experience on the website will be very different with different sounds. I think this is helps keeping the focus

GS (22:57):

To hear, I mean, I had, we had, I couldn't like my brain because I'm not trained in any of this. And then, and also, cause of course, then you work on deadlines, you're working on a budget. Um, you're at small NGO. And so you just want to, uh, and you have to finish it. Um, and we had our, one of our other biggest problems was matching up the sound cause we had moving, we animated the graphic. So it was perfectly in line with the music, but the, well, the sounds, and then the sounds you mention, like you can, when you move back on the timeline or forward, it was meant to keep, keep pace with the moving graphics. And that actually, um, I think it was in the end, there was weeks where we couldn't cause we worked with, uh, uh, um, like an external company to produce the, the, um, to do the programming. And I think in the end they misplaced a zero and that was why it was out of time for, so we couldn't work it out. They couldn't work it out. And then I think that's what, but yeah, it was really hot to get it in, to sync up. Um, but it's, it was so important too, because when people are watching something and the sound is off, like I think is, our ears can detect that. So,

Sara (24:18):

Yeah. Yeah. And have you ever thought of it, of, of us sound experience without the website? I mean, do you think it would have been different when you were listening to the sound, the options of sound material? Was it with the, with the visuals or, or not? Hmm.

GS (24:38):

I never thought of them. I never thought of the sound alone, but I always thought of the visual alone, the visual for me could be a loan. Yeah. For me, I wanted to, maybe I made the error of wanting to present all of xxx research and

Sara (24:58):

Baby's awake. Yeah. At this, my mom cope. Yeah.

GS (25:08):

So I went to present all his research or his data points and, but keep people on the website cause it takes some time. Um, and I think I wasn't confident enough to just have the sound. I think I thought it needed, they had to go together, but the visual could be alone. And I think I just couldn't be confident with, with just the sound. Um, and I mean, I asked him he had it on my phone, like as a, you know, when you're importing MP3s or whatever. And I, um, it kept on coming out from my shuffle and, uh, I CA so I would walk around and it would just come up and I would hear it and I couldn't, I couldn't listen to it and any, I couldn't even listen to a few seconds of it. Um, cause I knew what it meant.

GS (25:57):

And uh, yeah, I find, I, I do now lots of research on, um, cause a lot of my work is, uh, I spend a lot of my time looking at graphic and distressing videos. Um, and that's just the, the particularly the nature of my, my work. Um, and the, and so I then spent a lot of time thinking about, um, kind of resilience and trauma reduction strategies. And the number one is to turn the sound off. Like it's the number one you get told. And the number one that's helpful is to listen to videos without sound. And if you have to listen to the sound to just do it once, um, and I mean, it's the same when you're watching like a horror film. Yeah. And I think that, that's why I found, yeah. I found that sound difficult as well. Um, cause you couldn't really switch off from it.

Sara (26:53):

Yeah. Yeah. Definitely. In fact, you only, the only, um, theoretical literature on sound design was mostly referring to cinema actually, um, less on gaming, even if there's something that cinema, as in sound, as an added value to, to not, not just the soundtrack that you add at the end but something that really, uh, radically changes the experience. And in fact, we also have this definition of, um, sound design and music for film that can be neutral, empathetic, or empathetic. So if you play around with these three criteria, you would try to read design sound following. I argue the neutrality really exists, but the point for example, um, I don't uh, the shower that keeps going in in the Psycho scene that kind of a neutral sound, but then, then isn't, it is not. I mean, once you saw that, the thing together listened to the sound bites that is neutral, but.

Sara (00:00):

But together with it, with the visuals then, and still, it should turn it off. The visuals will not be so impactful, probably. So, yeah, I totally agree. There is things work, uh, uh, is, is by, um, English, uh, electro-acoustic musician. So the world they come from, they say, so classical, classical electronic music. There's something like that exists. Um, it's called, um, is, is, is from the seventies is called a Political Prisoners Dream and it's all, um, this is the subtitle we might like, and I will point you at that. You might find it interested at some point Red Bird. Yeah. And it's, it's, it's quite, uh, it's very tough because what he was experimenting with techniques, for example, uh, morphing in sound. So passing from animal sounds to human voices or human sounds, and there's this it's very long and there's this passage of, of kind of torturing this this prisoner and he's just hearing is terrible. So yeah. Yeah. It's um, yeah,

GS (01:23):

I think I interviewed him. I did interview him. Um, but I'm trying to think how, if it relates to sonification too much, the, I think his name is something Herbert or Herbert, the one, the person who did the album and based on the pig, like a pig being killed. Um, I he's, he's like, uh, uh, I sent it to you, but, um, Matthew, Herbert. Yeah. And he did this like pig album where he, I think he records a pig being killed maybe, or like anyway, but he, um, um, he was, he was quite interesting to talk to about one sick one pig, and I forget which part of his, um, work I found useful for sonification. Um, but also I was interested in sound because of how we can use, um, sound for human rights investigations. Yeah. Um, and he, he was interesting because he went to the, these big farms and, um, that, uh, really, really hard to gain access to with cameras.

But with microphones, people are less aware of what you could record. Um, and so, yeah, but it's something, so sound is something I'm so interested in from the perspective of, um, investigations. Um, but I moved away from the, the yeah kind of communication side of things, but it's something that I would, I would like Human Rights Watch to, uh, if, if there's a project that fits, I think it could be, um, it could be really interesting.

Sara (02:59):

Yeah. I think it still needs maybe, probably because we are not used, it still needs really the right project. I'm, I'm, I'm thinking I'm not one of the use of metaphors, but there's no really easy answer in the choice of sound. I'm one of the persons I interviewed, uh, talk to, uh, talked me through this project, which I find very interesting is about the sonification of Irish migration data, historical data. So at a beginning of the 20th century, and this certification is all based on, um, sailing sound, sailing boats, sea, wind, birds. And, and he told me that the it's the result of quite a long investigation into, um, metaphors used in language English language to describe migrations and hard times. And, uh, somehow he found that a lot of them refers to use sailing metaphors waters, you really, really, you literally went through press of the time to describe also migrants like a flood of migrants. Um, so they, they also, so they use of sound is the choice of this, which are literal sounds, but it's not related to the phenomenon itself, even if, of course being an Ireland, an Island, if you, if you emigrate, you have to go by sea typically. So

GS (04:36):

I love that. It's such a, yeah, I never thought about it as metaphor. And I really liked that because it's also like sailing, sea sounds, uh, a really nice sound to listen to, but I like the idea of, um, thinking like I want, because it just makes you think about what people must have been feeling as they're hearing these sounds and, um, taking something that could be quite comforting to a different, um, and feeling a different emotion with it.

Sara (05:04):

Yeah, exactly. In fact, in fact, in all my conversations and also in this, this characteristic of sound that it could trigger emotions at maybe a more visceral level than image emerges, because there's not much scientific literature on this point. Um, as a, as a practitioner, I worked a lot in sound branding before taking this PhD break. So I'm a mature

PhD student. But, you know, I was relocating back to Europe from Asia and I just decided to take this break, but I had, um, my own company of sound grounding. And then I worked for other companies, but anyway, in, in the field. So what I used to say is that sound is, um, like emotion and information together. Even if you don't want to, the sound of a Hoover tells you something about the functioning of the Hoover. If you take away completely from the product that just, you know, the user experience will want to work, the last use that you get, like in a relationship with a Hoover through the sound, it's something, you know, it's an object. You know, our, our understanding of sound is very sophisticated. I think that this changes, littles changes, for example, that tell you that the hoover is clogged. You could use these in sonification or at least they will. I would like to think so. Oh yeah.

GS (06:42):

I wish I'd spoken to you before we did this project five years ago. I think it would have been. Yeah, but this is a no it's. Um, yeah, I, I have found a few articles talking about how sound impacts, uh, in terms of, um, kind of vicarious trauma, um, which is, yeah, but I can, if I find them again, I can send them to you if it's, if it's interesting. Um, I don't know if yeah,

Sara (07:06):

Yeah, absolutely. Because there's no much not so much literature or anything. It's interesting. Um, so I'm, I'm, I'm working currently on, um, sonification of internet networks for, for cybersecurity internet, but I did water plans also also digital physical systems. And I'm using the soundscape of a forest because people would have to monitor in real time. So you have to listen to the soundscape for a long time. So natural sounds are probably more, uh, yeah, a relisient or more efficient or organization just less impactful on your psychology. And, and also because I'm trying to work on the metaphor of network, insight is a forest. So using animal sounds and, and leaves and wind and rain and thunders to represent all the elements. But my idea is that through time, if not immediately, and in fact, I have a question for you on this, um, through time, hopefully the, the operator will be able to develop the same sophisticated understanding of the soundscape that we have in real life, because in a real natural settings, we are very good at detecting the minimum change leaves and animals passing by, or this information and usually also has an emotional reaction attached, usually, always.

Sara (08:45):

So, so in your was it your goal? What was your goal with a soundtrack for people to find, to feel...wait, I will not give you any answer in terms of insights into the data, or,

GS (09:04):

Um, I think the goal was to make people stop and take and consider the seriousness and the frequency of the collapses, um, and to kind of interrupt people's day. Um, and because also I hadn't seen that many sonification, um, that many, yeah, that, that many examples of it, I thought it would also be, um, a, something that people would, um, would impact people more, um, by seeing something they weren't familiar with. And I think, and the, um, NYU did research afterwards that talks about whether, data visualizations that's memorable, less memorable is better like that people know, or don't know a familiar unfamiliar. Um, and I forget the results, but I, um, I think they said that it was better to do something that people knew, like a familiar type. Um, but anyway, but I wanted to, um, I wanted to get break, break up people's day and to spend time on the website, there was a lot of data there and to really think about, um, what the different sounds meant and how frequent they were. Um, and I, I mean, yeah, xxx was happy with it, with the, um, with what we did with all his work. Um, but I don't know if it had, I don't think it had the impact that we were, I was hoping for. Um, I don't think that lots of people looked at it, lots of people shared it. Um, so I don't know if we had the impact where we could break through all the other stuff that was happening in Egypt. Um, but yeah, but that, that was the goal

Sara (11:13):

Because, um, yeah, I'm asking because there's a lot of assumptions in the sonification community, but nobody really talks about it explicitly, you know, the, the, the goals, there's a lot of what I would call basic research. I mean, does sound work too, if I use pitch increasing, do people understand that the data going up, for example, and there are those kinds of projects like that where our real practical goal is not even identified Um, sometimes the assumption is that because soniofication a research is a scientific tool for analysis, which I don't personally think it works. One of the interviews interviewees told me it as an inefficient graph, which was, yeah, no, that's okay. I actually kind of agree. So, so I'm also trying to work on that. I mean, identifying a goal is probably a step to, to be taken for it to be impactful. So the expectation was not that people really gauge the numerical values of the data set. Right. Also they are displayed on the website. So there will be much easier to

just read them, I guess.

GS (12:46):

No, it was very much to, it was that kind of, uh, like exposure, like quick people could get it quite quickly. Um, and if they wanted to dig in further, they could look through the data. Um, so it was, yeah, it was more to bring attention to the issue. Um, and we kind of predicted that people would think it, yeah, it w it wasn't a big issue. Um, and with everything else going on, so we wanted to, to really highlight, um, why we, why it was, um, and the frequency it was happening. So, yeah, and I think for us, it was very important to, to know what impact and our goal and like what our goal was quite soon, like, like that was a part of our planning stages, um, and how we decided to, and the main reason we decided to go with a sonification. Um, so we used mainly for like advocacy reasons rather than, um, rather than research, um, or people to read into it more. Yeah,

Sara (13:50):

but you're going to have, you don't have data on the, um, on reception?

GS(13:59):

We had, I remember, I mean, we had analytics on it, um, and I mean, people viewed it, people stayed. I was happy. I think that the amount people stayed was quite relatively, quite long. Um, but it, it wasn't, um, yeah, it wasn't hugely shared also with people in Egypt. Um, and, but I think most of the views came from Egypt, which was good, which was one of our goals, which is why we did it in Arabic and English. Um, and it opens in Arabic. Um, I think, um, but yeah, it didn't, it wasn't, um, it wasn't like a viral storm, but it was, I think it was, it definitely was used in, uh, I remember, uh, even a few years later it was used in a Guardian article that they wrote about building collapses, um, and where they linked the website is kind of more data. So, um, yeah, but it, but yeah, I, I had a debrief with you afterwards, but it was, um, it wasn't that detailed, um, in terms of what we, maybe what we should have done differently.

Sara (15:12):

Yeah, yeah. But so your concern was also that the sounds were very harsh for website experience, right? Yeah,

GS (15:25):

I was, yeah. I was worried that people would, um, yet turn it off, um, that it was too literal. Um, and yeah, just a bit distressing as well. Um,

and yeah, I wish that we'd found a happy medium cause the original sounds were too, you know, too med sensitive and I wish that we found something in the middle.

Sara (15:48):

Hmm. There is some of the, uh, in these cases we are analyzing the article. There is one from, um, then investigative journalists where this website is called Report. They also have, um, uh, we do is that American association or what is not report, why have so many things on my plate? Um, Reveal, Reveal yeah. Um, obviously, and they have something about the Orlando shooting. Um, and they used chimes. In fact, sounds to Sonify, uh, is, is a very simple sonification because it's the birth dates of all the victims. So he's on a timeline from the, from the oldest to the youngest. And each of them has like one of these bell sounds, but they justify it by saying it's chimes they say, okay, it's it's bells in the Christian culture. It could be, maybe it could be a gamelan orchestra in, you know, in, let's say it's a kind of, um, cross to the sort of universal sound for meditation.

Sara (17:25):

And, and the idea is that is that sometimes they, sometimes the harmonies would match more than other times. And they say, which also happens with people in life. I mean, there were all these people there in the same place and they happen to share the same fate. Some of them would have matched more than, and the idea of using, uh, these, these continuous harmony that sometimes matches more. Sometimes it's less, it's like a bit of a, of a trenody or the, um, hommage, funereal but the same time. Yeah. In a way. So I would think, you know, how many ways you can explain the usage the same sound it's, as I told you, it's quite common because technically this is an efficient solution.

GS (18:24):

It sounds like it could fit quite well with that data. Yeah. Oh, that's good. Yeah. Th that sounds like a good use of chimes. Yeah,

Sara (18:35):

Yeah, yeah, yeah. I agree. I do agree actually, so it's quite a good certification and the data they use is so simple, but, um, yeah. I mean, it's just, the timeline is perfect for sound. And also,

GS (18:51):

So can I ask you a question? You see more people, cause I thought

sonification is for, especially for advocacy, similar to the Reveal one would really take off. And I haven't really seen that many, am I right in thinking that there's not that many people, um, yeah. Producing sonification aside from, for research purposes. Yeah.

Sara (19:19):

Yeah. You, you, uh, you are right. I, um, I see a lot of interest out there, so I talk about it or, you know, I go somewhere to present or they call me that I see a lot of growing interest, but then go to the practicalities and you really try to, to make, uh, sonification and we'll bring it to the public is always, the reaction is always a bit tricky or yeah, it doesn't really take off, but this is the same with sound, I mean, I'd be working in this sound branding for example, for 20 years. And there is this Society on Audio Branding every year we, we met and it was this year is you have sound never really know we're talking about a very small niche. Um, I think that partly it's, um, uh, w we are not used...

Sara (20:21):

So we are very, very visually, um, yeah. Define the power of the visuals. And then of course the, um, internet, the web, software, there are also visuals that even, even sound people are constrained by visual dimensions, right? So it's very difficult to get out of it unless you combine it with other type of experiences. I mean, holistic experiences, as you were saying at the beginning sound as part of a visual, a tactile, an embodied experience. And the other reason I think is there's really not so many people out there. I mean, it's a kind of, um, hybrid stuff. Like, I, I know that Density, for example, they too struggled to find the good figures to fit because you need to be a good visual designer, but also programmer... This is already is a change that's already happened. The sound is a little bit delayed.

Sara (21:31):

So as I mentioned, a lot of people doing sonification, they are not designers. So they're using this, this synthesized sounds that are just extremely boring. Yeah. On the other hand, there's a lot of usage of music, but a reflection all to make it a good experience. And also, you know, conveying insights about that. I still very, very at the beginning I see, I see, I think where it will have a better chance, uh, the moment that normal design or visual designers, um, will use sound, which instead of the opposite, very specialized people in sound design and sonification trying to, to do data visualization project. Right.

GS (22:32):

Or that they just work together, I suppose. Yeah.

Sara (22:36):

That would be, that will be ideal. But then by budget constraint thing, yes. It's not so easy. I don't allow, I don't. Anyway, I, in the, in the niche, I see it growing quite much, even just the attention to sound from, from the early two thousands when I started working, at least the idea of, um, crossmodal communication is, is quite, is more given for granted, even in companies, in brands. It didn't used to be that way, but it goes so slowly. And so little, almost unnoticed, but in Density I'm the first one working with sound and we already had two master's students, other PhD project using sound. So, okay.

GS (23:38):

Well, I hope this is the year and, uh, I would, I would love

Gabi (23:46):

If have you can you send me a link to the thing you were talking about with the forest and the, um, security?

Sara (23:53):

Oh, yes, sure. Yeah.

GS (23:57):

There's this thing called the worldwide wood that people are talking about. I don't know if you've come across it yet.

Sara (24:05):

Um, no,

GS (24:07):

It's like, um, looking at the way that trees communicate, um, and similar to the way that the internet communicates our wild, sorry, wood wide web. Um, okay. And like how, yeah. So how should we secretly communicate to each other, Well, not secretly, they communicate to each other, um, in lots of different ways, but if you Google it, you'll find lots of stuff about it. It just reminded me of your project.

Sara (24:32):

Uh huh. Wow. Thanks. I don't know if I knew, I knew Bruno Latour was working on something or forests. We were supposed to do something that then, um, the pandemic came, came over and then like a physical installation using what I'm doing to talk about trees. So I don't know if it's related. That's why.

GS (24:58):

Nice. Yeah, because I love, I know you briefly talked about it, but I was, I had to resist the urge to ask you so many more questions because it's so interesting. This project you just described, like the alert system, the training of ears

Sara (25:10):

All of those things. Oh, wow. Thanks. Thanks. That will be the practical part of my thesis.

GS (25:17):

Yeah. I would love to read anything you have about it. That would be really, I find that really interesting.

Sara (25:21):

All right. Thanks. Yeah, yeah, yeah. Certainly. And working out a new prototype, which goes the one I have doesn't really? Yeah. Something's not satisfactory, but yeah, whatever I have now, when more things okay. I think I have a lot of information

GS (25:41):

I'm I am glad I am. Yeah. I'm sorry. I'm not an active, uh, um, just someone who just dipped into it briefly. Okay.

Sara (25:49):

Yeah. Yeah. But that's great. That's great.

GS (25:54):

Yeah. It was so interesting for me to hear about, I mean, like I said, my husband's a sound designer. He works at Native Instruments and he makes all the sounds. So there's only a few of them and uh, it's just very interesting to, to him or about

Sara (26:10):

You see? So this very good chimes, I use Native Instruments product. Very good quality. It just always sounds good. So you tend to lean too easy.

GS (26:38):

Oh, it, it was really nice to meet you

Sara (26:40):

Yeah. Likewise. And uh, yeah, I, I, I was, I sent you this perfect things and good luck with everything. Thank you so much. You too. We'd cross

paths. I would like, bye. Have a good day.

Interviewee 3 - Niklas Ronnberg

Bio:

Niklas Rönnberg is Associate Professor in Sound Technology at the Department of Science and Technology, Linköping University, Sweden. His background is in Media and Communication Studies, and his bachelor thesis explored composers' working methods and views on film music, and his master thesis explored music as a form of communication and a bringer of emotional expression. He has a PhD in Medical Sciences focusing on Technical Audiology, i.e., signal processing in relation to audiology and cognitive psychology, from Linköping University. He teaches undergraduate and graduate level courses in Scientific Methods, Sound Technology, and User-centred Evaluation in Visualization. He has docent competence in visualization and media technology. His main research interest is in sonification and auditory display in connection with information visualization and user interaction. His work has, among other things, explored sonification support for visual perception, sonification of density levels in different visualization techniques, as well as techniques to provide peripheral information in Air Traffic Control.

Full text:

Niklas (00:02):

No, I just need to remember to say, okay. Yeah, I just got a message. I'm not that used in or skilled in Teams.

Sara (00:12):

Neither I am, but my university seems to use it so much that I decided that.

Niklas (00:17):

So, uh, so let's see my background. Um, yeah, I started at the uni in 1992 and let's start, did I have, I have different backgrounds? So to say, well, let's start with academic one. So I studied, um, behavior sciences, uh, sociology, um, theoretical philosophy for a few years. I didn't really know where to go and what to do. Um, you know, 19 years old and, and exploring the world in a way towards the end of my time as a student, I started to study media and communication theorists. So media communication studies. Uh, so it's much more about, um, mass communication or communication, um, conversation analysis, uh, different aspects of media and media society, media, uh, social things. Um, I had a dream to work with sound or music maybe when I

was younger. Uh, but I decided I didn't want to become a professional performer.

Niklas (01:40):

I wanted to have that as my sort of hobby as my way of escaping things, go into the music finding sort of just me. Um, I played the clarinet well, when I was young, I played it for 15 years or so when then it was really fun to play together with other musicians, musicians, uh, but practicing on my own. Wasn't that fun. So I started to, to play around with synthesizers and computers and then in the early 90 and 93 or so I bought a PC and media interface. Yeah. And since then I've been, been working with synthesizers, send the software synthesizes and music, production editing, arranging, or whatever. I prefer, eh, electronic sounding instruments, but it doesn't really matter. Uh, I mean, I listened to lots of different types of music because I think I will always learn so I can go to more, uh, those kind of drove noise, more art orientated music, pharmacists, and maybe I don't like it, or I don't like all of it, but I will always learn something new that, that helped me all of us.

Niklas (03:00):

So within the music, I think so studying, um, and the orientation towards media communication studies. Um, and then I worked a bit, I did my master and then I was, I started to work at the technical faculty in 1999, and then I've worked as a, uh, lecturer. So I was teaching, uh, full time teaching, uh, teaching interactive course interactive things like, uh, back in the day we talked about flash and director and you could code, uh, different interactive games or whatever, uh, and some music sound technology. Uh, but I was then working at the technical faculty, but my, my background is from the, um, philosophic cure approach more so I'm not a monster of science. My, my background is bachelor and master of philosophy. Um, and I was working a few years, maybe two, three years as started to think about a PhD because as, as a lecturer, you're teaching 100% and then you have maybe a 2% that is sort of personal development.

Niklas (04:21):

You need to update the course and you need to stay well, you need to keep the courses on the good level. So you need to keep track or things that change in the subject area, but you don't have time to, to do research, um, not in Sweden anyway you don't have that, those possibilities to actually develop yourself and continue to grow. So I

started to think about a PhD. Um, uh, and I tried to find out interesting aspects. Um, the problem was of course, um, money or funding. Also, Uh, I was at the technical faculty and my background was not technical. So they were a bit worried. You don't tell the right math skills. No, I'm not going to be there. That, that was the plan. Yes. I asked that, uh, that was the main idea. And I had a few ideas. I was in contact with KTH, uh, in Stockholm, uh, but the funding was, was a problem.

Niklas (05:24):

And then after almost 10 years as a sort of a teacher at the uni, um, there were a few changes in the study programs. So suddenly I, I didn't really have any courses anymore. Uh, so I was given notice, uh, because yeah, they didn't really need me, so that was bit tough. Uh, um, but then I, yeah, I found a PhD position at the same university, but on the medical faculty, Oh, this is interesting. What's this a, it was about technical audiology. So hearing science uh, cognition, speech, and noise, signal processing, uh, together. So it was quite interesting. And I thought that, well, I'm interested in sound. I quite good in sound. I'm mostly interested in communication and that aspect but this is something for me. Uh, so I did my PhD at the medical faculty.

Niklas (06:33):

So the third faculty, and when I was done in 2014, uh, then, uh, in January, 2015, I actually came back to the university to the same department that I was before my PhD, but I came back as a, as a senior lecture instead. Um, so that was kind of cool. I am, I had my sound and technician technology, sound technology and music background. Uh, I had my sort of media and science, uh, media, um, communication studies. I were affected at the technical faculty. I did my PhD on the medical faculty, and now I come back to the technical faculty. But the difference is that now I have had a PhD. So that means that I have researching as part of my, my work tasks and also having a PhD. You can more or less decide yourself, what do you want to do your research about, or of course, sometimes you get funding to do something specific, but otherwise you can decide quite a lot, but, uh, by yourself.

Niklas (07:47):

And I was thinking, going back in the head, I did my, my bachelor thesis about film music, and how to actually use that to communicate, or to transmit emotion or affect the audience. I did my master thesis about music and communication. So how can you use music to communicate in a way, or, yeah, and this was at the medical

department back in the days, and they more or less only worked with conversation analysis. And that's what I would like to do my master that about music. No, you can't do that because that's not the language.

Niklas (08:40):

Uh, so, but I did it in a way of course, because I'm a bit stubborn. Um, so it was about, uh, communication and sort of evoking. I was in contact with a composer because I didn't want to do the music myself doing music, uh, doing analysis, people experienced it. And then no, that was sort of be a bit too colored by my own ideas. So I was in contact with, um, uh, and a composer. And he had a few ideas. This, this piece will, uh, my idea with this piece is to convey, uh, happiness or anger or so, and then I, I did experiments and in interviews to see how people actually experienced this. So I thought back when I came back, um, to the university in 2015, yeah I thought back on my background, why I wanted to do early 2000, like, um, sound and music for communication, sort of continuing on my, my bachelor master work, but as a PhD, that didn't happen back then.

Niklas (09:44):

So what can I do, uh, now in 2015, and that sort of ties my background together, my interests together and using sound and music, uh, at the department where I work, we have a quite strong tradition of, um, visualization, uh, scientific visualization, or, or, uh, information visualization and computer graphics. And we have quite a lot of people working with interaction design, um, and so on. So, okay. What can I do that sort of connects to these guys around here, because I was, I changed faculty and department, um, I didn't really want to continue to work with my old supervisor. I wanted to do something new, but I also thought can I use these, these guys around me to learn? And so when you combine sound in music and visualization interaction, I think you you're coming quite close to sonification. So, um, I started, I wrote a short paper together with a professor in design about, um, for a workshop at a conference that was held in 26, in 2015, I guess. Um, I, sorry

Niklas (11:18):

That Infoviz

Sara(11:21):

Uh, this, this is about the, the, what did you call it? It's the sound proposal for visualization research or something like that.

Sara (11:29):

Yeah, yeah. I've read it. I now realize it was you, it was one of the first things I read. And I remember because I quoted it to my supervisor who is absolutely, you know, he knows infoviz, but this is the big thing,

Niklas (11:48):

Uh, this was for I UI intelligent user interfaces.

Niklas (11:52):

Yeah, I think so.

Niklas (11:55):

Let's see if I can remember it. I'm getting old. Uh,

Sara (12:07):

But anyway, I remember quoting because it was, it was definitely Linkoping, I'm not sure how you pronounce it, it was two authors, but then, I don't know. But I used it as a proof that there was something going on. Yes. There it is, The sound challenge to visualization research.

Niklas (12:37):

Yes. So just me, uh, actually my first paper after my PhD, uh, and together with [inaudible], who's a professor in design and I used Jonas as a mentor in a way, uh, since, I mean, he's really nice to work with. Uh, he provides at the same amount of energy as I do. Sometimes you work with those black holes, you sort of work and you try to get, get people engaged in the task. And no one is, uh, uh, so that was the first paper. Um, and then we wrote, I made another one, um, for the ISon conference that was in the autumn of. Oh yeah. My re yeah, I started to work in 2015. I didn't have research until January, 2016. Yes. That's the, so that's it. Yes. Uh, so that, that, that paper, uh, together with Jonas was the first paper. And then he and I another guy also called Jonas

Niklas (13:41):

And we worked on the, uh, sort of the design idea for peripheral sonification for air traffic control. Yeah. And then I also had a master student working two master's students working with a, a simple sonification of scatterplots actually. Uh, so those were sort of the first, um, tries I did, uh, to see what, what, what I could do and what was possible. And also it was a good way of reading to this subject area and their research areas of sonification. Uh, the ice and conference in 2016 was in Bielefeld. So where Uh, Thomas Herman. Um, and so on, and

so that was really, really nice, even smaller than the ICAD conference. So you had the chance to talk to everyone. So it's more of a workshop actually. Uh, but it's a really good way. So I had two papers on that in the autumn of 2016.

Niklas (14:49):

Yes. It was a really good way of meeting, sort of the sonification community to me. Um, so if we go back my background, so I'm the only sound guy I have these visualization, people around me, some design people, some interaction design to people. Yeah.

Sara (15:10):

But that's it, but you are not a programmer.

Niklas (15:15):

Um, I, I do. I write all my code for interactive sonification and, and supercollider which is the tool I use. Yeah. That's there the next question or that, yeah, your current role. This is really, really interesting. Um, I, I do all the work myself if I don't have a master thesis doing stuff, but then that I was supervising them. But when I do research, I, I sort of, I do the coding and I use different tools: for the sonification I use Supercollider, uh, I, I like it. It's not a very nice or beautiful language or coding environment, but every aspect of the sound, I can manipulate that with code

Niklas (16:06):

Uh, so that that's really, really cool. Um, and the sorry, synthesis part, I mean, doing a, I need an oscillator and type of filter and doing what I want with those stuff. That's that simple because I've been working with synthesizers since like towards the end or the eighties or so, uh, so analog synthesizer, digital, it doesn't really matter. So to me, it's not really challenging to get to since working in supercollider because I know the building blocks by heart sort of thing. Um, then building sort of a user interface, um, and that, that sort of the test protocol, recording response, time analysis, and doing that that's a bit more tricky. Uh, but it's doable. Um, I have two master's students. They are currently working with a sonification, uh, of the solar system. Uh, we have a huge software, uh, an open source software, which is called open space.

Niklas (17:16):

I have the open space project, which, um, you can download and use and it's, it's access is all known data about the universe and it visualize it, but there are no sound in it. So at the moment we're working with

sonification for that. And then we're using the open space platform. And then we use OSC open sound control to send information from that, which has interaction information like, uh, which planet is in focus. And what's the difference, sorry, the distance to that planet. So we send that information to supercollider and then we sonify um, data in supercollider. So you can use different frameworks for, for the direction or for the... user interface like processing or whatever. It doesn't really matter. But most often I do everything in supercollider. Um, it's convenient,

Sara (18:19):

Sound quality is very good. Awesome. I mean, this, for example, to pure data where I'm talking about years ago, when, when all this started you know to be on the, on the market so to speak, I found that it was far more advanced in terms of sound quality than even Max/MSp Now they have all these ready made objects inside and you can use it in a different way, but in terms of synthesizing sounds, I think supercollider is the best.

Niklas (18:52):

I do agree. But then if, if you don't know, you don't have the knowledge to get sort of a

Sara (18:58):

Yeah. Like me.

Niklas (19:02):

Yeah. So, um, I do the coding, I code in different environments. I use MATLAB, um, supercollider Processing, JavaScript, um, whatever I need actually, uh, I quite often use, uh, Arduino microcontrollers, uh, because maybe it's because I'm a geek. I think it's fun. Uh, so using, I use Arduino for teaching signal processing. The quality is horrible, but I like it because the students come very close to the hardware and it's limited when it comes to their motor processing power and memory and so on. So they need to think first and then code. Um, so I use I wouldn't say I'm a coder or programmer, but I use coding for designing or for sketching. So to me, it's just a tool. It's a really convenient tool, uh, because you can do so much with it. Um, so it's a convenient tool for, for prototyping or sketching or designing. I think an artist, not, I wouldn't say I'm an artist. I do a lot of music we perform sometimes, but I'm not musician. I'm not really, uh, an artist. Artist sounds so.. That you need to be good in something.

Sara (20:30):

No, no, of course, of course I would never even define myself as an artist, even if I did a lot of sound art or whatever we want to call it, but I come from well I graduate...well. I studied piano until the eighth year. And then I basically did not take the diploma.. I was 17, too many things I dropped out, but it's the only instrument I still play because then I, I did graduate in saxophone. Oh. And I went, and I've been a saxophone performer in contemporary music for a few years working quite much, but then I just got bored.

Sara (21:16):

And then I started electroacoustic music at the conservatory, as a formal education. And then after that, I got more into sound design, but, but anyway, I did a lot of, of, um, sound art-ish experimental music that, that sort of scene, but I wouldn't define myself as such. It's just, this is just to tell you what, where I was coming from with that question is that I'm, I'm working a little bit now on the concept of intentionality in, in that data sonification, which will be, why are we doing that? So, so sometimes the purpose is only, only is, is it explicitly or even implicitly, artistic, which is to create experiences for people data experiences, but not really to understand what the data mean. So, I mean, to, to get insights into data, which, which will be that the goal of someone that uses sonification for scientific analysis or for analysis of sort, in ICAD I'm sure there's a lot of people. So there was that. And then there is the whole world in between like designing sonification for maybe different specific goals. And it's where I'm trying to define a framework, basically.

Niklas (22:44):

Yes. Uh, I think this you're touching on something that's really, really important, um, where this, I, I tend to use musical sonification together because I think it's, we must have, uh, an aesthetic approach to sonification maybe based on music theory, but maybe you don't need to be a composer or music theorist, musicologist, maybe that's the word, uh, to, to create the sonification, but you need to be able to say, well, this sounds nice. And I think if sonification can both sound nice or good or interesting or pleasant or what we should call it and provide information about the data in different ways. Uh, when I said musical sonification that I, once I talked to Thomas Herman, and he said, I don't like that because all sounds can be a musical. Yes, that's true. I mean, you know, that you, you have your background, uh, uh, noise can be quite interesting and pleasant in a way, uh, it might evoke emotions or

whatever.

Niklas (24:08):

Um, but if we only take the, the, the frequency of the data and translate into pitch all the time, it's kind of boring. And there are so many examples of sonification, if you YouTube it search for sonification, then you will have sort of water levels from rain and they will translate that into piano and it will sound 'plupluplupluf' and you won't really understand anything. And it's not interesting, and it does not sound good. So I think we should start with 'wow this sounds interesting. This sounds good.' And then we can manipulate different aspects or different parameters in the sound, um, that provide information about the data, but it still sounds good or interesting or nice. So I, that, that's my approach all the time. And eh, you need to be able to code this in a way or design it. You need to have some, probably some kind of artistic mind, somewhere in the back of your head that this sounds good together.

Niklas (25:16):

I don't know if I manage to do that. Um, you need to think about interaction design, because someone is going to listen to it or maybe actually interact with it to explore the data. And if it sounds horrible, then they will lose interest. And if they lose interest, then they won't learn anything about the data anyway. So we need to have, I think you need to be all of this in a way, or you need to build group that together can, can have these sort of roles to be able to do something that's, um, useful. And then we, you need to define, I guess, what is useful and what does it mean? some of my sonification are quite boring, I think, but sometimes you need to see it. I was interested in using the timbre the, the, the quality of the tone and change that according to data. Will people be able to hear and distinguish between sort of the sounds, yes or no? Uh, and, and so I try, I have done a few, what I call the green studies because I, I made, I don't know, can I share this screen? I think let's see my sonification folder be,

Sara (26:44):

Are you on browser or you downloaded teams?

Niklas (26:48):

Oh, it's the app actually,

Sara (26:50):

Then you can, because on browser you cannot.

Niklas (26:53):

Okay. Let's let's I don't know how to do it. That teams would like to record these computers here. Okay. Yeah. That's okay. I'm not going to write it in there. Huh?

Sara (27:07):

There's a, there's an icon with a screen and an arrow pointing.

Niklas (27:10):

Yes. Yeah. But now it all, okay. I need to say, um, Okay. No, I can't do, I can't do that because of that. I need to quit teams and restart it. So, so let's not do that. Um, so I have, Oh, maybe I can do this in maybe instead of sharing the screen, I can send you a link instead, because sometimes it might be necessary to be a bit boring in this sonification, but

Sara (27:54):

It sounds to me like basic basic research. I mean, all this area is completely empty. I found something like this. There is something on the quite old anyways, early nineties usage metaphors and, uh, okay. Like two people writing on that. I mean, of course it is a very tiny world and then usage of, of, um, universally valid metaphors. So to speak

Sara (28:25):

In terms of, as you were saying, pitch going up, um, data going up and going down that are going to that sort of things. But to me, when it's out of context is a little bit, uh, it is something you can, you can use, then you should validate it in every case. But this is the only thing that they are. There's nothing. Yeah. I was doing some first case I did with a master student tood on water network networks. And the same we were, we didn't know whether to use tune sounds if we don't want to go to music or non tuned sound. And my supervisor said, is there any basic research that tells you what is better? Said, no, then you have to use both and we see, yes.

Sara (29:09):

So you have to do this boring.

Niklas (29:11):

Yeah. I, I totally agree with you. Yeah. Yeah. I agree. Let's see if I can share this. No, let's share this screen. Let us send this in the chat Um, I guess if you check the chat and you don't need to look at the video now, uh, I, and I know I, maybe I should open the same link, so I know

how, it looks like, so I made these green bars. And my idea is that, uh, in visualization, there are a few different challenges for the visual visual perception. And one of these are what we call simultaneous brightness contrast, which means that a, uh, an area which is quite bright, but surrounded by darker areas, you, you experience that as brighter than a bright area surrounded by bright areas. Um, do you understand how, how, I mean, uh, and if we look at this, can you see the green bar?

Sara (30:24):

Yes.

Niklas (30:24):

And the task for the, um, the use, it was to Mark the vertical line that was brightest and, and they moved the slider and they click continue. it's in Swedish, sorry. And they've got a new image and they did this in quiet and in, in, and with the sonification where this certification was mapped to the intensity or the brightness of the, of the vertical bars. And then I've done this in two different papers, uh, with slighty different, uh, map to amplitude map, to pitch and so on to see what, what are the tools I can use to create the interesting, the more interesting sonification cause this is sort of the boring research in a way. Um, and it turned out that it doesn't really matter. As long as, as long as you have sound, you have the extra information you would perform better because the vision con can't cope with sort of the challenges.

Niklas (31:25):

And when I have all these researchers around me and they are working on visualization, and they are doing it incredibly cool and sometimes very complicated visualization or visual representations of different stuff, everything from small cell levels in the body or to the universe. And we have these challenges, uh, for the visual perception. And they talk about visual analytics tools and the research that can use this tool to see these interesting facts. Yeah. But if they can't see it really because they, their eyes can't really cope with it, with the complex visualizations or because there are too many visual things. So you start to misinformation because they're too much information. Um, maybe we could just use sound as well. Uh, so I started here and I did sort of this, um, uh, this is, let's see if I can remember first, it was amplitude mapped to the brightness of the green color. It was also the kind of frequency of a band pass filter. So in the darker you have a more shhhh sounds and more zzz in the bright areas.

Niklas (32:40):

And I did a combination between these and I tied to compare to no sound, and it didn't really matter. You can use any, any sound, as long as you use sound you will perform better, but there might have been a tendency that the combination of both amplitude and the frequency content, uh, was better. So in the second study, I used that combination. I tested that and, and the one without sonification, and then with pitch connected to brightest, which is not very beautiful because it sounds like 'uououo', but after a while, you will hear if you are in the right place and you can compare it, which you can't do. You can click here Bo Bo, Bo Bo, and you will like, okay, this is brighter and you can look back and forth. It doesn't provide you more information by looking, but when you use sound, you get more.

Niklas (33:32):

And then also tried, uh, each of the, um, that there's sort of a chord with probably, I don't remember anymore, maybe six or eight tones as a very large C major chord, not very exciting to listen to, but each of these tones consists of three or five oscillators, and they are slightly, detuned like 5 cents or 10 cents. And these detuning crates I mean, it doesn't sound like they are out of harmony or they're out of tune to each other, but they create sort of a more alive feeling to the sound. But what I do is that I take this 5 cents around in the middle of frequency and then increase it when it goes darker, really horrible sounds risk, like hitting the pedal like this, instead of taking separate notes when it's dark, and then when it come closer and it's at its brightest, it's perfect pitch.

Niklas (34:32):

Perfect. And still, this was the best method because, and I think, um, when you have the disharmony slightly disharmony, at least you get the beating, you know, three instruments that are, are almost, but not perfectly it, you get this sort of the feeling that more it's going on, but when it's perfect in pitch, you're going to get one toe and it's easy to do in the synthesizer or in super glider. It's much harder to do if you have to live instruments, even if you are perfect in, in, in tune to each other, you still hear that, that there's some small variations that creates this live and amazing feeling, which is music. So this turned out to be a quite strong, uh, cue and that, uh, in that experiment, uh, and I've been thinking, I would like to add a few other stuff like tempo. So you can, uh, you know, when you re reversed the car and you have a sort of the radar 'tttttt' and so on, so you can use that.

Niklas (35:37):

And when it's dark, it can go slower. So this is sort of a quite, I think, boring, but good experiments. Yeah. Try out these different parameters Can they use these in sonification? And when someone says, because it happens quite often in the ICAD that it's not good to update that to pitch, this is quite overstudy at the ICAD conferences. Well, it is, it's much better to map data to pitch that without any sonification I had the proof. So I think this is really, this is a good way of doing it, sort of the basic research, a bit boring, maybe, but still quite useful to actually use that for the more interesting stuff.

Niklas (00:00):

Uh, had I had done the first experiment set up with the screen, sort of that I called the green study because it, the green sort of images. And I thought, wait, green is only one or the color channels, right? What's happened. If I do individual sonification of red, green, and blue channels in, in an, digging a photo, then I could listen to a photo because if I have an, uh, a yellow, that's a combination of red and green, but if I go from yellow to green color, I will have, uh, the red sonification, the green sonification. And when it goes in the yellow, and when I go, it goes from, from yellow to green, the red will disappear and then it will only have the green sonification and then it can, or a photo will consist of all the colors. Um, and then I did quite a lot of it during my summer vacation.

Niklas (01:06):

I spent two weeks in the mornings, uh, writing the code and then inserting photos. And then I played around And the idea was that you, I thought in the back of my head that this is cool because I will do a sonification of a color image. So you could actually listen to the photo. And then I started, I mean, there were quite a lot of research challenges here because one of the things that I did was I divided the, the, uh, it's RGB colors. So eight bits. So you have a zero with black and 255 is maximum in that color. So it's full green is that, and then I thought, okay, I can divide these in discrete steps. So I have like a backend cord that would change sort of according to the green study that I used, that has a harmony in it, but these discrete steps will provide a melody or bomb bomb, and they would go, goes darker.

Niklas (02:11):

Bomp bomp on the melody would go downwards. So if you blend red, a red goes to black and green and being green goes to black and you will play this, explore this back and forth. You allow upwards

and downwards going melodies in the different color cell in the same time. And this is fun. So I had to sort of come up with, I don't know, I don't want to say compose because it's sounds really like, I know composition in a very good way, but I have to design maybe or create harmonies that worked. So you had red channel sounds good, but red sounds good together with blue as well. And together with green and all three together, and the combinations of green and blue and stuff would sort of create different musical expressions and it would sound slightly different. And then I started to just sort of explore the photo and my idea was to listen to the photo. But after a while I realized that I was not only listened to the photo. I was actually using the photo to create music. Now I'm here, Oh, I need to go to a darker area. So I get this part of the music. Um, and I think

Sara (03:33):

Becuase the user let's go, let's go him or her. We're going to be able to, to interact. No? I, I think I understood. So there was something that you could look at the image and then take your time and explore it sonically. Yes,

Niklas (03:50):

Yes, exactly. So I read the pixel value and the mouse cursor, uh, in, in this, in the first version and then the, at the science center, which is connected to the university, uh, where I work, uh, they wanted to have this as a touchscreen. So I had to sort of in changes slightly in the code. And, uh, and in 2018, we published a paper about this. And the interesting thing is that it started as, as a play. I want to listen to the photo to becoming I'm using the photo as an instrument to listen to the music. And then after a while, I wasn't really sure, we made, I made both of it. It was sort of a new experience. Uh, and we call that as sort of a 'modal synergy effect' where the visual and the audio comes together and the interaction is sort of the glue that combines the visual and they audio together.

Niklas (04:53):

And then we did a user study, um, at the science center with this, and we publish that in, uh, at ICAD in 2019 last year. Yes. And then I also actually wrote a proposal for, for the sonification concert. And so I took a photo from Newcastle where the conference was, and then I sort of rehearsed a path in the photo, uh, to explore the music and the photo, uh, live, um, and so on. And so I performed it maybe a five minute piece, or how I should call it, uh, based on the photo on the sonification.

And this is sort of what I find the interesting stuff. It's not in the green part, only sort of the green study of the basic research is good because it helps me to understand how the different tools and parameters work. But this is where I want to go. Where I combine data, or maybe this wasn't real data, but the information in this case, in the pixel values, it could have been data, data, of course, and the, the visual and the audio and the interaction, those three together is really, really important, I think.

Niklas (06:06):

And I think we can do so much more than only sonified data. We can create themes that will help you to understand or provide more information. Um, and you can go from one musical theme to another musical theme, depending on what's going on in the data, but within each theme you can manipulate, um, frequencies or, or timbre or amplitude according to the data. And then you can, you can do a lot or I think quite, I mean, not quite, but very interesting sonifications that might touch you as a listener or as a user. You, uh, but also that provides additional information. So data certification doesn't need to be boring or sound horrible. It might be a very interesting experience, I think.

Sara (07:04):

Yes, I agree. Totally. Actually, when I, when they call me to talk about sound design or sound branding as I used to do, I actually, my opening sentence was always that for me, sound is, is an inextricable. Well, a union of information and emotion. Yeah. Always because you always get an information from the environment or from yourself or from whatever sound source it comes from and the always an emotional reaction. Yeah. So I totally agree that we have to use this in sonification too. Why not? Why in any other usage of sound, but sonification seems to.., There is a lot of debate to be honest in using more aesthetics, using more design using more, but then I don't really see in, in, in concrete also a big problem of course, is when you read things, even things of some years ago, and then you try to listen to the results and it's difficult to find them.

Niklas (08:12):

Yeah. Yeah. That's true.

Sara (08:14):

There's no website or so,

Niklas (08:17):

Yeah. That's true. And publishing within a visualization, you print the paper or you have the PDF and you can look at it that that works, but you can't really have the PDF of the sonification doesn't really work. You need to have the audio as well. I think. Yeah, yeah,

Sara (08:36):

Yeah. Lately I'm doing well with this. We presented at ICAD last year, but my student went to masters to students water plants, the cyber attacks to water plants. Then we did a whole website, which is still there, this describing all the process with all the software, a whole website, it was on GitHub, but at least it's a resource that will be permanently there.

Niklas (09:02):

That's good. Yeah. I think that's very good. So

Sara (09:08):

Questions you've made me think that, do you, I don't want to give you the answer at the same time, so I'm not sure how I should formulate the question, not to lead you to the answer, but because you said that you were at the beginning of your career, you were studying, uh, sound for, music for, for film, mostly experiences. Of course. I don't know if you studied Chion back then, but of course is a name that obviously comes to mind in terms of using, uh, emotional, uh, emotions and music. And, uh, Do you think, it influences your way of doing certification? Because I do, I mean, many things that you said I can relate them to

Niklas (09:55):

Yes.

Sara (09:57):

To the usage or I don't know.

Sara (10:00):

to that,

Niklas (10:03):

Yeah. Yeah. Um, as I said earlier, I think the one very important thing is that the, the sonification should be interesting or, or pleasant or entertaining or something like that to listen to. Uh, so you need to have that approach. And I think if we have that, uh, sort of aesthetic or music, yeah, musical approach to sonification, we will end up doing

nicer or better or more useful and sonification sonifications. Um, and I don't think we, it's really hard to disconnect, um, the experience of this sonification from, from the sonification. You might, as I say, it might be pleasant or interesting, but there are also other ways of, I think, shortcuts in a way to reach, uh, a user or listener, or however you should call the person. And I think we should use this more. I mean, when it comes to emotion, uh, or you want to have a direction or the variable they are measuring, let's say that we are sonifying

Sara (11:27):

Yeah.

Niklas (11:31):

Computer networks and intrusions to that network. People outside are trying to do bad stuff with our computer network. And when everything is good, they sonification should either be quiet because you might not want to have sonification all the time, or it might be just pleasant background certification. But when something is happening, something bad, you should use that possibility to create direction, uh, at, uh, for the listener. And not only it gets louder, but it might be out of tune or loud, or it goes from a quite pleasant, um, timbre to a very harsh sounding thing. So you can use that. And I think it will create sort of a shortcut to your brain in a way it will tell something. Uh, and, and this is not new. I mean, this is something that has been done in classical music for hundreds of years.

Niklas (12:32):

And then in, in film music and film music is using it extremely, extremely good. I think. So I think you can't really connect, disconnect this from, um, sonification. Oh, you, if you do, you will not succeed with your sonification. If I say like that, you can do it, you can do rain levels and it's just a blink blink blink and it won't create a feeling. It won't create an effect. It won't really communicate in a good way. So I think you need to, to, to have the approach or, and film music is a very good example. Um, when I started, I, I studied among others Uh, let's see, Phillip Tagg, I don't know if you know him,Philip Tagg is a musicologist at university or Liverpool or something like that. His PhD was about, uh, the opening title to, uh, to the, um, crime TV series.

Niklas (13:37):

Kojak, the seventies or eighties or so. And it, um, let's see if I can find that when I talked to colleagues in the beginning and they said, well,

yeah, but you can't really do that..What is pitch? What is melody? What does that has to do with anything? Uh, I just need to do to probably Philip Tagg.... And I use that as, um, Oh, uh, too many, too many. There's a British television series. Um, Emmerdale Farm, uh, it's been running like forever in, in the UK. It's been running in Sweden on the tv as well. Uh, it's about a small, a small village and outside that you have the farm and it's about tradition, uh, British values and how to behave in this society or whatever, everything. And it's been running since like since early seventies, I think. And the music, the, the intro, uh, Phillip Tagg, that's another 50 seconds old television music. That was his PhD. I, if I remember correctly and then Ememrdale farm, and let's see if I can find it.

Niklas (15:08):

No. Oh, he took the, this classical music. It's sort of a bit like the Moonlight serenade sounding, uh, introduction, music to the television. And they just asked people who hadn't seen the TV, how do you experience the music? And they said, Oh, it sounds like countryside. Why does it, they say to countryside when they don't know what's music is about, Oh, it sounds like tradition, uh, British, uh, culture and so on. And then he changed the music and he took the incorrect music, uh, which sounds more like a horror movie music. And then he said, okay, what, what kind of expressions or impressions, sorry, do you get from this? Well, it sounds like this is about a murder or a so on. And he, he made the point that you could change the entire impression of the opening scene depending on the music. And I am trying to find the video. I have obviously found it before because I used it in presentations and lectures. And, and you have some of these sort of, uh, you know, boring visualization guys saying. Well, that's not interesting. And they see this short movie and they're like, Oh, okay, sorry. Yeah,

Sara (16:30):

Yeah. Now I get it.

Niklas (16:32):

Ah, so they are experiencing the, the opening scene so differently. I'm trying to find it. No. Okay. If I find it. Yeah. So Emmerdale farm, uh, is the name of the television series. Yeah.

Sara (16:52):

Yeah. I would, I would research because, so, so basically, yeah, I totally

agree that we, we should, for example, sorry, because I'm thinking many things. So this time I'm quite impressed by why many articles or papers or around ICAD, where, where people introduce their work saying, and this is parameter mapping or this, or I do parameter mapping sonification I do model me something. I never would have thought of what I do because maybe I use some parameters, but then I'm not obsessed with parameterizing everything, if it doesn't work. So I was, you can still tweak it, not like you do generative art, let's say, but then if what comes out is horrible, then maybe you tweak the system right. So it's a bit that approach. So it might be not theoretically coherent, but then something better there was, um, uh, I I'm collecting certifications of of COVID-19 course. There's, um, there's a few out there. And, uh, I was comparing two - I'm planning to write something on it, but they never have time, but comparing to two very similar projects because they use pitch. But then one is by a guy then is in his, uh, day life is a UX designer. And honestly you can tell because he started with pitch, but then simply data we're growing so much that, of course there was not enough pitch

Sara (18:39):

For it to be audible. So it's starting using, um, resonances and, and, uh, and un-tuning dis-harmonies, as you were saying, which is very good. Because even if you lose track of, of where the data is going, you certainly get the idea that it's growing a lot. And the anxiety as well, connected to this, growth, whereas is the other project is very stubborn in using only pitch. And then of course he reaches the person, the composer, well the sonifyer, he reaches the band, you know, the threshold, and then he starts subtracting adding, or, you know, just doing maths.

Sara (19:24):

With were the results that suddenly that pitch there was growing linearly starts becoming, sometimes it goes up, then you hear lower notes. And so then you think you completely lose it because you use also MIDI notes. So this notes the first they were growing and then they start 'pi pam pi pam'. Of course you can read the instructions. They say, this is because I reached 20,000 where it will be less than that threshold. And I started subtracting a Hertz, um, proportional to the amount of the number that, you know, goes beyond the threshold. Just you can read it, but while you listen to it, you just completely lose attention. Yeah. I've tried, but so it is the same, uh, the same parameter mapping, but used - tweaked very different. So, so these shortcuts shortcuts that you are

saying,

Sara (20:29):

It's something like that, right

Niklas (20:31):

Yeah. But I, I think, um, I think we should use it and necessarily if it's not nice to listen to you, you will stop listening. And then what, why should it have some of geisha that people doesn't listen to? If they don't listen, then it's not, it's useless. Right. So we need to make it nice. And I, I, I use the words musical sonification because my idea is that we should have a musical approach and a step - aesthetic approach to it. But that doesn't, that doesn't mean that we can't do parimeter mapping. So if you take a, let's say an F minor, and then you manipulate the amplitude or that cord between, let's say 30% and 90%, depending on what day in the week it is, then you will have different levels for different, for different days in the data.

Niklas (21:36):

Then you will do something else. Maybe you will adjust the, the harmonics, the harmonics creating it. It's if everything is good, it's a very simple, maybe a sinusoid no harmonics at all, just three tones together, but when it gets less good, you increase number of harmonics and you create a more harsh sound and that's that, and the changes in amplitude that's Parameter mapping. But yeah, but we can create a musical theme. That sounds nice. Uh, but still, um, tell something about the data. And then there's another thing, uh, that, which is important to me and that's is that I don't use sonification by itself, but together with something. And we can use it together with some visual information, because then you have information in two channels. So to say in two modalities, and I think that would provide more information for you as a user.

Niklas (22:40):

Uh, it might also be that the, the, I think it's not every time maybe, but often it's important to have an interactive approach. So if it, if you're expected to explore, understand something, then you should be able to move around and hear the changes and the, see the changes. If there are visual information that changes as well. If you want that, there'd been some studies on the auditory graphs. I don't know if you've read about those. So that might be like a line graph and you listen from the beginning and we could, you create that of the COVID cases. And we

start down here and it increase in pitch or amplitude or, or from calm to alarming sounds maybe. But if you want to compare two different positions in time, you need to remember it. And that's impossible if you do it visually, you can just, uh, okay, it's this is where something happened.

Niklas (23:43):

So you need, in that case, you need to make it interactive so you can explore it in a good way. And then you need to have, you can't really, Oh, you might use MIDI notes, but I really prefer to use tools like supercollider while I, where I can actually affect every single parameter in the sound, depending on the input from the user. So I use musical sonification, even though some people say, well, you shouldn't use musical because this is real science. And we do research, proper research with parameter mapping and all songs can be musical or not. Yeah, sure. But you can also do something which is musical and nice as well as parameter mapped,

Sara (24:38):

I think. Yes. And do you use to then try your applications with people? I mean, besides what you published of course, where they are there, there's a, there's a testing protocol, but let's say as a matter of principle.

Niklas (24:57):

Yeah, I think so. Uh, I try, so I now use colleagues quite often, I use colleagues in many different levels, late, um, levels of the research I have an idea. What do you think about this idea? I think that's idea stupid. Okay. Maybe I, should re-think so, you know?

Sara (25:15):

Yeah. That's what I meant. Yeah. That's what I meant. Just continuous feedback. Not only experimental protocols when you have to, for publications.

Niklas (25:26):

Of course. So I do that and I, while I present my, my sound ideas, um, because sometimes you realize it and I guess this would be the case for you as well. You're so used to listen and you you're, you know what to listen for, and you might also have words for what you're hearing, but some of my interaction design colleagues, they don't listen or they're not used to listen. And they say, yeah, there was some kind of change there or ? yeah. The pitch and the tone has changed a lot. Oh really? Okay. Obviously I need to consider my mapping between the data and

the, and the sounds, so I think it's important, but then you also need to use your colleagues when as a sort of pilot test. Um, can I do this question? Can I ask this question? Does it work?

Niklas (26:22):

Do you understand what I mean? and so on on, because the worst thing that can happen is that you have a participant that doing their best choice on your strange question, but they're not understanding what they are supposed to do and you get really strange data. But I, I try to use, um, uh, colleagues, uh, mainly, uh, for, for my quite early in the process, not too early though, because if my thought hasn't really come together, if I present a too early prototype or sketch, it might be so sketchy. So they don't understand. It's like, you know, when you're, when you're, if you have a customer and you are doing a mix of some music or remix and you, and you present a draft let's, I don't know if you can hear me. Yes, they are. So if you're presented like a draft of a mix or remix on some music and you haven't adjusted something, this, the vocal sounds really horrible. And you say, yeah, we'll fix that later, but what do you think about it? And they will say, I don't like it because it's too unfinished. So to say, so you need to sort of have a decent, uh, level of the sonification before you connected to, to your colleagues.

Sara (27:46):

Yeah. Yeah. Also they will never forget. I, and so many in my industry life, then you say, yeah, yeah. But later it will be first. They don't have the aural auditory imagination that we do, so they cannot imagine it done. And also they will never, ever forget the first version. It's true. Big mistake that I learned making the mistake. Of course.

Niklas (28:13):

Yes. Yeah, it's true. Um, usually I start with thr brain, so I have an idea. I could do this. Maybe I could do this, or what about that? Okay. Let's try. And usually then I either take it a synthesizer. Uh, but more often nowadays I sort of get an idea and then I start to code it in, in supercollider to sort of create that sound idea that I have in mind. And the good thing then is that, that I can connect it to, to, to interaction immediately, even if it's only sort of where I have the mouse cursor on the screen, I can affect and change the, the, the frequency or, or whatever to, to listen and see if it works or not. Uh, and then what I sort of, okay. I have a basic idea that works. Let's see, uh, let's get a colleague and some coffee and, and listen and discuss and hear what they say. And sometimes more often than not, I think my ideas are not

ideas, but my, the mapping, for example, there's too small differences because I know what I'm going to listen to listen fo, what type of change will that be in the sound. And they don't really understand that. So usually I need to sort of increase or make the changes more obvious. Okay. Um, and then, then, yeah, it's stayed quite far before, I guess start collecting data or, or, I mean, using real, um, really persons to actually try the data.

Sara (29:56):

Yeah. Yeah, absolutely. Awesome. Thanks a lot.

Niklas (30:06):

Yeah. Have you got the, the ideas you wnated?

Sara (30:11):

Absolutely. Absolutely. I'm not thinking that maybe I'm, I, I reached out to like minded people because I really like the way you work. And, uh, maybe at the end I will, uh, you know, everybody supporting what I already wanted to say. Maybe I should reach out to Hermann or traditional ICADders

Niklas (30:42):

Yes, exactly. Um, but this, yeah, this is true in how we're actually ever met at the acred conference. You and I?

Sara (30:52):

Yeah, no, because I came back from Singapore in 2017. And until that I knew about sonification, it was a sort of, yeah. Always there at the back of my mind to experiment with it. But I was so absorbed by my, my say industry job that I was out of, of all this. And then when I came back, I had the first publication in 2018, but it was in Michigan and finally it finally Philart, gave me the option to present remote.

Niklas (31:25):

Oh, yes, that's true. Now, remember I was there, uh,

Sara (31:29):

So it was doing things with objects, but my very, very first experiments, but eh, naive thinking of it now. Uh, yes, because with my, with my PhD fund traveling all the way to Michigan was, was too much since there was the option. I took it. And then last year I was pregnant and then this year it was canceled.

Niklas (31:54):

Okay. Yeah. This is interesting because, uh, in this, uh, the photos that I, I caught that Pho-tone for fun. So it's photo and tone together just for, it's a silly play of words, but, uh, that, uh, I present the first in Michigan at the ICAD conference and I also had an installation that is so people could, uh, explore it themselves. And I remember Philart say, Oh, this is interesting. This is actually a sonification that sounds nice. Yeah. That I, and I think that's the way you should go. Sonification that actually sounds nice.

Sara (32:36):

Yes. Yes. I remember this. I remember watching the Vimenovideo for the colors. Yeah.

Niklas (32:42):

Okay. So, well, that's quite a lot on me.

Sara (32:48):

Yeah, it looks so I was up to date with your work more than what I was aware of now. Also they, everything very, very interesting because I think this is the thing with, uh, with being a design department. I am now challenged maybe with not having enough design education, um, to translate into words that they can relate to these sort of practice, because the way you do things for now, for me and my colleagues there, you will see, you will see, they would say, you think as a designer, yes, you have an idea. You have an idea, but you immediately think of how this could be, could solve a problem or create an experience or add a value for a real person out there. You start sketching based on your judgment. I mean, when typical computer music, computer scientists, ICADders there's a say, Oh, this is music.

Sara (33:47):

This is a, and not science. This is whatever our designer would say, this is music because I say it's music, or it's not music because I say he's not music or is nice because I say, it's nice. Yeah. And then I will prove it the moment I put it out there, you know, and it will do what I, I wanted to do or not, as simple as that. That's why the parameter, the mapping problem and all these things that are quite in the community there for my design colleagues, they say, yep, it's a non-problem. It's a design problem.

Niklas (34:26):

Yes. This is interesting because the background, my PhD thesis work was okay, I'm going, I'm interested in this. So I need to measure the

temporary solution that years in milliseconds, or then I need to do a frequency, frequency discrimination tests. I know how the percentage that people can actually perceive differences in pitch and so on. That's just my wife. And so I have this sort of empirical background and doing a user tests to explore stuff empirically. And then I came back to the department of where I am. And in 2016, I got research as a part of my job. And we talked about sonification and espcially o, uh, the, the air traffic control sonification. So how should I do it? Yep. One or the interaction design guy said, what do one example? Let's see how it works. Yeah. But how should I know, the, if the, is each sound is equally in audible, how do I measure that in decibels? Should we do what and so.. No, no, no. Stop. Let's do an example and see if it works. What do you, what do you mean? Should I just do it? Yeah. Do something you like, let's try it. And this was a bit scary. Uh, but I can't even imagine going back to measuring every small detail because then I would spend like 10 years before I have a sonification that probably will sound boring.

Niklas (36:15):

And so it's much better to try, I think, um, yeah, they didn't like this, this didn't work. Okay. What can I learn for this? How can I continue my work as a designer sonification designer or interaction, Sonic interaction designer, I don't know what you should call it and explore how it actually works with, with real people and in preferably real situations as well.

Sara (36:43):

Yes, absolutely. Absolutely. So now I'm trying to one side to use, or this to disseminate into the ICAD community, you know, these seeds, this, these things. And at the same time, try to, ideally my thesis should be a sort of manual if you, if you wish for normal designers to integrate sound. Yes. Because they want to, of course they don't have the competence to reach a certain level, but still a good designer could find a simple way to use sound and they want to, because everybody's aware that visualizations are just bi-dimensional visualization. So that's just not enough anymore. So I'm, I'm, I'm trying to talk to these two worlds and it's interesting. That's really interesting. Okay. Thank you. I don't want to take more of your time. It's so nice talking to you. Yeah, same, same likewise. Hope we would meet in person.

Niklas (37:46):

Yes. Maybe next summer. We'll see if the world is slightly more back to normal. I hope so. Yeah. Stay safe. Um, and let's text later on.

Sara (37:59):

Yeah. Same to you. And yet I will keep you updated and let's keep talking. Sounds good. Okay. Bye. You too. Bye.

Interviewee 4 - Pedro Rebelo

Bio:

Pedro is professor at the Sonic Arts Research Center at Queen's University in Belfast.He is a composer, sound artist and performer. In 2002, he was awarded a PhD by the University of Edinburgh where he conducted research in both music and architecture.Pedro has recently led participatory projects involving communities in Belfast, favelas in Maré, Rio de Janeiro, travelling communities in Portugal and a slum town in Mozambique. This work has resulted in sound art exhibitions at venues such as the Metropolitan Arts Centre, Belfast, Espaço Ecco in Brasilia and Parque Lage and Museu da Maré in Rio and MAC Nitéroi. His music has been presented in venues such as the Melbourne Recital Hall, National Concert Hall Dublin, Queen Elizabeth Hall, Ars Electronica, Casa da Música, and in events such as Weimarer Frühjahrstage fur zeitgenössische Musik, Wien Modern Festival, Cynetart and Música Viva. His work as a pianist and improvisor has been released by Creative Source Recordings and he has collaborated with musicians such as Chris Brown, Mark Applebaum, Carlos Zingaro, Evan Parker and Pauline Oliveros.

Full text:

Sara (00:02):

And here we are. And how are things? Their classes were suspended, I reckon, right. If any,

Pedro (00:07):

Yeah, they were, well, they moved online fairly quickly. I'm on sabbatical at the moment, so I'm not teaching, but, um, yeah, all classes were moved online and that will be the same for the coming semester as well. So mostly will happen through, um, yeah, online. So, but a lot of stuff got, I had an, I had five installations around different places and they're all got postponed or canceled obviously. So, um, well re replanning some of that. So next year might be busy.

Sara (00:43):

Yes. Yes. That's it. Yeah. we are heading for a couple of busy years. Uh, yeah, I had, I was notified today that I got an installation accepted at ICCC that by the way should be in Coimbra. And they're still trying to, um, to have a physical version, I mean, on a face to face conference. So the computational creativity and we presented a project based on The Sound Outside, basically just using the material and the podcasts

that we make on this soundscape soundscapes for a very, very simple setup because yeah, it's not times to plan too complex installations. I'm afraid. Hmm. Okay. So, um, early September. Yeah, because they changed the, they changed the date, um, several times, so I kind of lost track. So they say they had so many submissions, uh, that I kind of forgot about it, you know? And, and then I was notified today from seventh to 11th of September.

Sara (02:05):

Yeah. And they are still, as far as I know, planning, uh, uh, live, I mean, onsite conference. Let's see what happens. I'd be happy to go. Okay. So I don't want to take too much of your time. And so we can, we can proceed. Um, basically I'm yeah. I'm interviewing, um, authors and say 'sonifiers' have different, um, extractions (?), different working in different fields or so working in the industry or in research trying need for it to be as much variety as possible. Um, because in this, this would be basically the first part, the theoretical part of my, of my thesis and because I'm in a design department, what I will be trying to do is to, um, identify a design space for doing sonification I have been working on an approach, uh, that is not yet a fully flat framework or guidelines or however, we'll end up calling this thing.

Sara (03:22):

Um, I did the experiments as for the experimental protocol. So I have all this, this part clear but somehow. I wanted to see if what I think is a design contribution of possible design meant as, as a formal discipline, uh, contribution to the world to the practice of certification, it's really an, um, original contribution. Or if I, if I find point of con points of contacts with, with the practice of, of other people, right. Basically, so this, so this design space can, can emerge bottom up, sort of. So I've been working with the concept of intentionality in, in sonification to, to try to delineate the first sort of taxonomy for, for the sonification works that I've been collecting. So how much they intention of the author to consciously communicate a message from the data, um, emerges through then the process of creating this unification in terms of, uh, choice of data, choice of sound, material choices during the mapping process and final outcome. And, uh, and I'm expecting other concepts besides intentionality to, to emerge during these interviews process. I already have a few and, um, and that's it. And today I'm collecting something else. And so I had these three sort of questions. I, I only know your work for COVID. So I really don't know if you work with sonification on our more standard basis, um, your work. Yeah. In fact, it didn't, it didn't

seem so right

Pedro (05:18):

Over the years, um, a little bit, but not, not specifically. Um, but yeah, sometimes I do things that could be called sonification and I don't call them sonifications. So I was working with a colleague in London on a food and sound uh, experience with, uh, with sergeant peppers that has kind of an element of mapping, but it's no, it's not specifically data-driven, but could, could, could be conceived as sonification in the sense that, uh, there are, there's an element of kind of information or, or more kind of a sensation kind of, uh, experience communicated through sound that, that aims to enhance and frame the tasting experience temporarily. If that makes sense. That if you like, but the, yeah, the COVID thing is the more standards kind of data-driven sonification thing.

Sara (06:26):

Yeah. So what is your, your background?

Pedro (06:31):

So I started with, uh, music, uh, and, uh, studied my degree in Edinburgh and music, uh, then did a master's in composition. Uh, and then, uh, did a PhD in an architecture school, uh, looking at sound and space relationships through practice. So the number of site-specific works and, um, that kind of changed my, my approach and I was teaching and design courses at the time as well. Um, so the, my work became kind of influenced by architecture practice and, and, and readings. Um, and then, yeah, then I started teaching that in Ediburgh. I moved here to SARC

Sara (07:23):

And, and you teach composition, or is it related to computer music, any interested to know how much you use or you are, um, proficient in, in coding? Is it part of your practice or of your teaching or,

Pedro (07:44):

Yes. I mean, I teach thing, addition, sonic arts, modularity to sound design for screen. Um, and I teach social engaged, uh, sound art practices, uh, so involving kind of organizations outside academia, uh, and some, I don't teach technical courses, but some of the modules, Sonic arts type thing would involve things like max MSP with which is what I use for most things that involve some kind of yeah coding element

Sara (08:21):

Yeah, yeah. Yeah. Well, I guess this is unavoidable to some extent.

Pedro (08:25):

Yeah. So start U started with max in that, in Edinburgh, in the nineties. So it's become a kind of a, I'm not very good at it, but it's become a kind of a familiar language.

Sara (08:37):

Yeah. Yeah. So I think if, if the COVID thing is like, um, the sonification project, w you could just describe to me how you, you proceeded, would it be okay, so, so I can, I can more or less take of your process. and then maybe I would ask you some questions as we go.

Pedro (09:00):

Okay, that's fine. Yeah. Um, so it's, I guess like a number of, a lot of people was started with the, the, kind of the astonishing numbers that, that started to evolve in these, uh, world health organization reports. And, uh, just kind of started as a way of trying to make sense of it, kind of engage with it and maybe try to create something that will be interesting for, uh, for people to, to experience. And one of the, um, issues actually I have, and that's why I don't do a lot of sonification, perhaps. One of the issues I have is that, um, it often seems to me arbitrary, uh, elements of the mapping that take for granted, uh, quite a lot of, um, well, arbitrary musical, um, frameworks. So, um, so I deliberately wanted to do something that wasn't that, uh, so I think sometimes when mapping things to a major scale or whatever, uh, there's there there's a lot in, um, in how a major scale works, functionally that, uh, doesn't often, um, it's not often reflected in the mapping of the data itself, if that makes sense.

Pedro (10:30):

Anyway, so I wanted to do something that was frequency based. Um, so I started let's see. Um, yeah, so there are two elements looking at my own notes here, cause it's been some time. So I was looking at the number of infected people. So this is kind of daily reports, uh, number of infected the number of new deaths from the 21st of January to the 25th of March. Um, so I wanted to then, well, the side part represent that over time. So I ended up with allocating one second per day for these two figures, um, and then simply was, uh, translating the data into Hertz. Um, so, and one thing that I was keen on, um, demonstrating or articulating was the exponential, uh, aspects of, of the

curve. So I thought I could do that. And, uh, I kind of a timbre wise and the way that mapping does a little bit of that.

Pedro (11:39):

So as it kind of evolves the, the, the combination of timbre get more, gets more complex. The spectrum gets more complex because you're adding more frequencies, obviously. But on top of that, then I wanted to add another element, which I can talk about. So just before I do that, um, I then decided to obviously limit the mapping to Hertz, to the human hearing kind of notional 20 to 20,000 Hertz, uh, range. So whenever the number goes over 20,000 Hertz, 20,000 gets subtractive or multiple of 20,000, uh, so that generates a kind of, um, you know, the, the, the frequency has got to go higher and higher. And then at some point they fall back into, into the hearing, uh, range. Uh, and whenever that happens, there's another sound element, which is a sharp attack kind of woodblock type attack. So that kind of demonstrates when there's a significant spike over. So the faster in the, in the final thing, uh, there are increasingly more of these sharp attacks at the end, which articulate to the exponential nature. So they arise more quickly. Therefore you need to subtract 20,000 more and more times as the thing develops, if that makes sense.

Sara (13:03):

Yeah, yeah, yeah, absolutely. Yeah.Also The explanation on the word webpage was very, um, clear. Eh, I wondered how, um, did you how, um, how can I say..What I, I certainly agree that there is a problem in them mapping process. Well, where would they, even in this sonification community it's called the mapping problem, which is this, these arbitrary decisions that you take mainly when you choose.. I think it's mainly a, I see it as a design problem. I mean, is the moment you choose the sound material more than the moment you choose the mapping rules, in my opinion, and based on my experience, because I think that is the sound material that influences the listening experience most. So I'm trying a little bit to experiment with natural sounds, tuned sounds, non tuned sounds because there's not much literature out there that can grant you that using certain material, you will have certain effects. Um, but, uh, have you, was it that the, say the choice of material, was it driven by the mapping decisions? I mean, um, a technical technical thing, let's say you decide the mapping rule, then you, uh, set out to, to code your max patch and you use the synthesizer of whatever is available there. Or,

Pedro (14:42):

So the idea with this is that the, uh, the sound material, so to speak the the resulting sound will be emergent from the accumulation data. So it's, it's literally a bunch of, literally a bunch of sine waves and a saw tooth wave, uh, and it accumulates. So by the end, they're 61 or 60, whatever it is, 65 of each. Um, so, so the, the, the core materials are basically sine waves and saw waves. Uh, but then the resulting complex timbre is, uh, is the result of the mapping and the accumulation of these tones. And so the patch is, Uh, yeah, the patch kind of generates these also laters and reads from the data. Um, and then there's the visual element as well. The numbers.

Sara (15:44):

Yeah. So the, the focus is on them. Um, algorithmic let's say part, or they have this sonification, and then you had to tweak it because the numbers were not allowing for a direct correspondence. Right?

Pedro (15:59):

Yeah. Well, that was very clear from the beginning that the numbers would go over to, it would go over 20,000.

Sara (16:10):

Yeah. I find that this, I think it's a, in this sense, I think that the, um, let's say choices in terms of the sound material might help to overcome the fact that then, um, because there is very often not a linear correspondence between the numbers and the, and the possibilities given by the sound, I mean, the acoustic rules, then you have to start, um, you have to basically start making it more complex. I'm thinking in terms of listening experience, because then the listener will have to remember another sound, will have to lookout, look out for another sound cue, which is the wooden sound to, to then reverse-engineering what what's going on with the data. Then I find this, this, uh, Hey.

Pedro (17:10):

Yeah. So I guess the, the aim was to try and convey the acceleration of the curve, you know, the exponential elements with the curve rather than obviously the numbers themselves. Yeah. So it's this kind of, um, uh, yeah, growth, exponential, exponential growth, which I think gets, gets conveyed by the woodblock elements, um, which is there not only to kind of signal when that subtraction happens, but, but also to, uh, to convey that kind of sense of, uh, exponential growth that together with the complexity of the timbre, that's just kind of generates itself from

adding more, um, oscillators.

Sara (17:59):

Yeah. Yeah. Okay. So the reason I will say, Oh, here there was a big jump sort of Okay. Nice. Nice. So, do, do you, um, imagine a specific user or a specific need or curiosity that the user might have, or it was more of an experiment? I mean, I mean, um, the idea, in fact of conveying them a more engaging representation of what was going on, like a way to, to, for the listener to gain awareness of the situation, or did you think about that? Or in terms of,

Pedro (18:44):

I think it was partly me wanting to do something with the, with the situation partly wanted to share perhaps a slightly different way of engaging with the numbers. I think this was done kind of relatively at the early stages of all this Um, so, and I might think of doing another one if think when things kind of start shifting direction perhaps. Um, but, um, yeah, it was kind of just a different way of engaging with the figures. So it wasn't done it. Wasn't intended to have a specifically kind of scientific knowledge or anything like that, but, um, um, yeah, it was a way of engaging with the figures.

Sara (19:34):

Yeah, yeah. For, for the general public, so to speak a lay listener. Yeah. That's a, that's an area where I think that sonification can, can really, uh, help, um, also provide a different modality because of course the need for the general public to, to gain awareness on, on data sets will be more and more increasing, I guess. So, um, there is potentially different sonification to, to provide, uh, an alternative way or possible possibly complimentary way.

Pedro (20:10):

Yeah, I think, I mean, one thing that I felt this was doing is because as opposed to all the graphs, which obviously as they, um, um, represent a longer periods of time, they just get condensed to the graph. The graph is always the same size, right? So you kind of lose a sense of the granularity. So you can look at, in this case, a curve for, I don't know, one week or a car for six months, and this is the size of the graph is kind of the same. So you, you it's, I think easy to lose that perspective of time and sound can contribute to that. So if you know that what you're listening is that they a sec, the second per day, uh, you kind of get that sense of duration, I guess.

Sara (21:00):

Oh, that's interesting

Pedro (21:01):

And, you know, imagine that, uh, hopefully some of this will stop at some point and that of will, will be brought down. And if I was to do another one, and if I was to keep the same rules, it would become a very long thing at increasing complexity, uh, gradually will exponentially up to a point where it then starts. So you have to kind of endure those. I don't know how long it would be, uh, 20, 30 minutes of whatever kind of increasing before that starts falling. And that's a, you don't get that with a graph. So it's a kind of more bodily experientials thing. Yes,

Sara (21:45):

Yes, yes, yes, absolutely. And, um, even more so probably if experienced in a space working with, with space, uh, that will be very impactful. I think. Because then, then of course we, what I feel more difficult is to, um, really make sonification and an added value to the to the experience of, or, I mean, when you experience it through a computer with headphones, that's a real challenge because of course that it is required to you that you look at the screen, but your focus is on the listening experience. So there is this disconnect that is not easy to, it's not easy to make it valuable for the listener just to stick there. Whereas if experienced while you are doing something else, but it somehow captures your attention or you are a physical installation of physical space. Hmm that's right.

Pedro (22:53):

Absolutely. Yeah.

Sara (22:54):

I've been, in fact also in the, in the communication of, of social issues, I think that it has also a very, very high potentiality, but you didn't, what would you be interested in a interested or do you have any um, opinion in experimenting with, um, um, more, let's say musical, uh, rules or material or soundscapes, have you ever thought of it, of different of, you know, posing the accent on the material rather than the mapping process?

Pedro (23:32):

Yeah, so the, the Sergeant pepper thing is, is more like that. So it's an, uh, they're all, so it's not synthesized, they're all, uh, field recordings

or studio recordings of, you know, kind of electrical stick type sound sources, uh, that are, that are well... There is a synthesized element, which I don't know if you know, the sergeant pepper gives you this tingling sensation on the tongue, which has been measured around 48 to 50 Hertz. So that frequencies is kind of in there synthesized. So as you, right, I'll start from the beginning. So if you put these things in your mouth and you start crunching them, uh, you started there is obviously a crunchy texture that you feel then the first kind of tones are very citrusy kind of lemony. Uh, and then as you kind of keep munching away, uh, after about a minute or so this kind of deep, um, frequency sensation starts on your tongue and your lips and your mouth and so on, uh, which then eventually kind of dies away depending on how many you eat and depending on different people.

Pedro (24:41):

Uh, so the, the experience, um, tries to divide tries to map out those different sensations from the first kind of crunchiness light thing to the citrusy thing, to then this kind of deep, uh, deep tone. And that's all created with, um, um, sound, you know, sound recordings. So I can send you that if you're interested it's not public anywhere, but I've done. So I've done. I normally do that in, um, um, yeah, physically in a space and everybody kind of eat So everybody kind of eat t the same time, and you cannot play it over speakers and so on. Um, so it's been done in a few places like that and that's, yeah, I think that kind of adds to the experience as well.

Sara (25:33):

Yeah. I've been talking to two people that would, would tell me I do musical sonification. So I strictly use, um, music as, um, as a raw material either, either synthesize sounds but tuned so well, so to speak or, or even samples of different, uh, uh, like plunderphonia or, or sound material that then the rules in which the combined depends on the, on the sonification, I mean, on the behavior of data. And I do that, they would tell me, because I believe that music gives a higher level of engagement to the listener. Um, which I don't know. I didn't come to a conclusion myself

Pedro (26:23):

And what is it that you mean by music? Yeah.

Sara (26:26):

Well, what they, what, what they mean? Yeah, because this is another

big question in, in the, the typical definition on certification, it would exclude somehow not, it wouldn't really exclude music, but the way they intended for example I talked to this person that uses only samples of music or the pieces of samples extracted by compositions of other people. Okay. And then the, how they behave depends on the rules that he gives for the mapping data to sound. Uh, but the final goal is to build another composition. So there will be like a final structure musical structure. You mentioned the rapsody so do to me, or it could be a forma sonata (not sure how you say it in English), he said, Rhapsody, and this will be the final goal of the ùsonification. So the process is, is driven to us building a musical composition with a, with a defined structure.

Sara (27:35):

Okay. Um, uh, another person told me, no, I use music in the sense that the result of the sonification has to be a musical in that it has to be like a song that is pleasant to listen to, uh, possibly changes over time because this person in particular, there's also interactive sonification. So for example, you can you move your mouse around an image and, uh, and the music will change, but all the points in the image are mapped to chords that are always in tune, for example. So whatever happens, it will be like a randomized process generative process, but you will obtain a sort of, you will obtain music. Um, and this is because this will create a higher engagement in, in the listener. But what I found in some of the tests I did with my first use case for the PhD is that even using even more so using, um, eh, um, concrete sounds, listeners tended to attribute a meaning themselves. And that was pretty engaging because the meaning would come from their personal experience or their memories or objects that they have, and this will help them remember what that sound meant. So I'm not so sure that music is necessarily, um, higher, um, means to engage.

Pedro (29:23):

Yeah. I mean, I think if, if by music you mention conventional tonal harmony, I don't see how that should be the case because it's also, there's huge differences across musical cultures in the world, and to limit everything to a major scale seems, um, reductive, uh, but the way I see this work is so it's, I, I would classify the COVID thing that I did as music. So in the very broad sense of the words sound and music. So I think a lot of this has also to do with the context, what the experience is, and obviously online there's relatively little control over what that is, but with the sergeant pepper thing, people are listening to a piece of music,

basically there's, it's often in a festival concert type situation. So, uh, it is a musical experience.

Sara (30:28):

Yes, exactly. I think that the experience is the, the, the context of the experience is what, um, gives the best definition and also defines the, the borders or the engagement or how much you can intervene there,

Pedro (30:44):

I think an issue with the top kind of tonal sonification is often that it's not clear what, you know, there needs to be, as you said before, you know, if, if you do something and it's all the cords are always in tune, well, how does the listener know what's what the set of rules are, are to make this thing in tune all the time and what the sonification and what the data is, what the sonification is doing? Does that make sense? So there needs to be a kind of a framework for making it all pretty sounding. Um, and then where, where does, where does the data kind of, um, where does the data come in? You know, so, and also, um, yeah, I think, you know what you said before, I think there's an, I felt that too, the seargeant pepper thing, there is quite a, quite a lot of, um, association going on if people are listening to, uh, concrete sounds, uh, to either by recognizing the sounds themselves or by recognizing properties of the sound. So there is texture which is particularly relevant for the food thing. Um, and so you get a lot of information from that, that you don't get from a C major chord, if that makes, if that makes sense.

Sara (32:06):

Yeah, yeah, yeah, absolutely. Also, because in this case, the, there is, um, um I'd say intentional connection between the sounds that you use and that, and the phenomenon, if we don't want to say the data in this case that they represent, that's another point that I'm trying to tackle in this, in this design approach. Um, so

Pedro (32:33):

Yeah, that makes sense for that. That's an important decision that should not be arbitrary either. So there's an associative element to do with yeah. What is this? Is this climate data or is it whatever, so what's it, in terms of the choice, which was one of your first questions in terms of the choice of the sound materials? What, what would that be?

Sara (32:55):

Yeah, because I think this will help overcoming this mapping problem. I mean, if it's contextualized in, in the, in the frame of the phenomenon

you want to represent, and I mean, if you are representing this phenomenon, because you took a conscious decision in, in something that you want to communicate related to this phenomenon, um, then arbitrariness, somehow disappears, I mean, it's there, but it's a design decision that you can justify even as a personal decision, which, you know, based on experience or based on your, your, um, poetic approach based on, you know, whatever your, your professional judgment, which to me is perfectly fine. Yeah. I wouldn't consider it arbitrary at that point, if it is related to what you are, you are representing. Um, so yes, let's see. I see there's, there are things moving in the world of sonification mainly because yeah, even in my lab, which is a data visualization team, but they are, (and I'm the only one working with sound) I see that they are, um, incoming call. Where ingyou? Did you have the, yeah, yeah. The record, because my call with you was still ongoing.

Pedro (34:32):

I really, sorry. I dropped off altogether.

Sara (34:35):

No, uh, yes. Yes. I think that these will just, I mean, being more, um, possibly reasoning, which is an exercise that in, in design disciplines, uh, they are more used to do. It's, it's pretty new to me too, because I don't have a formal education in design, but this exercise of, of, um, making explicit the rationale of your choices that would help overcoming some of the problems that are daunting, the certification community. I don't know if, you know, ICAD the international community..? And they, there's always this talking about the mapping problem. So this idea of the, um, arbitrariness yeah.

Pedro (35:24):

The map, the mapping, it's interesting. I don't know if that connection that software made, but that mapping problem is also there in different types of kind of interaction, uh, for music. So to design a musical instruments. So the NIME community, there's also this mapping problem. So when you're looking at designing new instruments with, uh, sensors, actuators, activators, et cetera, uh, you get this bunch of data and you need to map it to something. And the problem is exactly the same. So there might be an interesting connection there.

Sara (36:00):

Yeah, no, I was not aware. So there will be for user interface.

Pedro (36:04):

Yeah. So yes,

Sara (36:06):

Basically visual, physical, physical, physical, physical.

Pedro (36:10):

Yeah. So you know, anything from attaching and there's a long tradition of this, going back to the sixties, uh, attaching accelerometers and gyroscopes, do you wear gloves on your hands or your body, and then you make, your perform by moving your body. And then the question is, what's the relationship between the gesture that you make with your arms or your hands. And

Pedro (36:33):

So it's a very similar it's. So, I mean, yeah, they don't call it sonification in that world because it's more a performative thing or in fact, an interaction design thing as well. Yeah. But it's the same kind of process really. And the same, uh, the same issues emerge so there are people will, would be concerned with, uh, things always sounding in a certain way, regardless of what you do, uh, and then create this kind of framework to make that happen. Um, yeah. And it's huge. It's a kind of a huge kind of field in itself, but I think it shares some similarities with sonification.

Sara (37:19):

Yeah, yeah, yeah, no, I didn't know it. Thank you. There will be also discussion about embodiment, I suppose. No, there will be a lot. Yeah, because there is an embodied sonification approach too that I'm quite quite interested in. I think it helps overcoming, uh, overcoming some of these issues also because...visualization has a lot of, um, codifying of, I mean, a lot of the metaphors that can be used or are normally used, are codified without the need to go into, um, uh, visual properties of images as we do in sound. Because then when it starts going down to acoustic, properties of sound is something that is very technical, very specific. And the listener will probably have a hard time distinguishing unless they have very evident, uh, visual language has been codified so well that there are standard ways of visualizing or standard visual metaphors that you can use.

Sara (38:25):

And nobody really questions...insounds there's still a long way to go

before you get there. So yeah, there is this minoritarian approach in embodied sonification, which I, which I personally I'm quite attracted to. So I will look into it, definitely NIME this in a user interface. Um, thank you. I think I have, I have quite a lot of information. I mean, I don't know what to ask you else so, but maybe, maybe when I do the transcript and I start analyzing, if I have any questions, can I get back to you? I can just do that through email.

Pedro (39:13):

Yeah, no, that's, that's fine. Yeah, no problem. No, it was nice to speak to you.

Sara (39:17):

Yeah. Same, same,

Pedro (39:19):

And good luck with all the work and the writing and so on.

Sara (39:23):

Thanks. Thanks. Thanks. This it's it feels like a very short time. Yeah, it will be so, so I'm trying to,

Pedro (39:35):

It sounds like at the timely projects to kind of get up, but soon in terms of the discussions that are going on in these different fields and have some readers.

Sara (39:49):

Great. Great. Hopefully, hopefully let's see. What's next. Okay. Thank you. And I've been watching out for Sergeant pepper to see if you, if you're finally performing anywhere nearby. Hmm.

Pedro (40:03):

Oh, okay. Yes. Yeah. Okay. Thanks. All right. Okay. Speak soon. Bye.

Interviewee 5 - Stephen Roddy

Bio:

Stephen Roddy is a researcher and musician working at the intersection of Computer Science and the Sonic Arts. He holds a Ph.D. in Sonification, the use of sound to perceptualize data, and is a Research & Teaching Fellow at Trinity College Dublin. Stephen's work explores the multimodal representation of complex multivariate data (gestural data, IoT/sensor networks) and the application of autonomous, intelligent systems in human-computer interaction (HCI) as well as creative and music technology contexts.

Stephen has a vibrant and diverse creative arts practice spanning a variety of media and styles including music, sound, and interactive art. This work explores similar themes to his research and has been described as eclectic, dark, and experimental. His pieces are frequently performed and installed at home and abroad. Previous events have included the New York Electroacoustic Music Festival, Helicotrema Recorded Audio Festival in Venice, Dublin Dance Festival's Embodied at the GPO, and the Sonorities Contemporary Music Festival.

Full text:

Sara (00:00):

Okay.

Sara (00:04):

Okay. Somehow recording.

Sara (00:08):

Yeah, I think it is

Sara (00:09):

This noise. Do you hear it?

Stephen (00:11):

Yeah, I think the quality kind of dropped when he hit record

Sara (00:15):

Quite much. Well, okay. Okay. Just in case for transcription, but I'll deal with that. So yeah. Very nice talking to you. I think yours were the first thing. I think the first thing I read was your thesis actually.

Stephen (00:33):

Really? Wow. That's great. Thanks.

Sara (00:38):

Yeah, it was because I was struggling to...When I started yeah. This very first paper for, for ICAD, but there was based on an experiment with, with sonification where river data in my region, but through objects, I mean the audio went through objects. It was an installation, physical installation in a, in an attempt to engage the public more basically. And then I did some little survey to see how we went and I was, I've been struggling with it with Thomas Hermann's definition of sonification...you know my master's degrees in philosophy. My background is in philosophy, very influenced by Varela Maturana an stuff. And um, and then one day I had this enlightenment and I think, yeah, because what I'm looking for is something is embodied sonification. And I think I invented it and I say,

Stephen (01:40):

I was, so I had a, have another friend who does sonification stuff. And he was like, yeah, when I called it embody sonification he was like, that's such a mean move

Sara (01:53):

In class and, uh, ethics in research. And, and I say, ah, God, then I have to rewrite the paper. Right. That would be,

Stephen (02:05):

Can I have it?

Sara (02:07):

Well, no, it doesn't work. Just basically quoting you, but there was a discovery. So, so I read yeah. Basically everything up to then that you wrote everything when I'm not sure about what the embodies sonification was there, Oh, a thank you for that.

Stephen (02:27):

Thank you for reading.

Sara (02:29):

And now I'm at the final stages trying to try to, um, formalize more the results of these three years research. So part of my problem, if we want to call it, the problem is that I'm in a design department. So I would have a PhD in design, but I didn't have a formal education in design. So I started last week and music at the Conservatoire. So of course I had to make up for a lot of design theory. Um, and, and basically what my thesis will be trying to do is to, for one side, try to Mmm, seed more

in the ICAT community, the idea that, you know, designers, meaning people that work with, with design artifacts and have a formal education in design can contribute yeah. to sonification um, for it to open up a little bit more and becoming something that is really used.

Sara (03:32):

And on the other side, I't ll be designers. I mean, a lab where we do data visualization mainly, and there are in that world. There's a growing interest in expanding modalities to represent data. Mostly if you work with the public, uh, which I didn't do for my thesis, I worked with experts, but of course were when you need instead to work with citizens and so, or specific groups, uh, then even more so it's, you know, you have to improve the way you communicate with sound. I think so. So the other side would be, uh, finding or at least delineating a design space or, or guidelines or something that can help traditional designers to integrate sound as a possible modality. So what I'm trying to do now is to see if this potential role of design is something, something that's already there just not being made explicit, or if really there is, um, um, a polarization, even inside ICAD just to identify a group, um, with those that are doing sort of scientific sonification that have no end-user basically like for, for the sake of the experiment and those who are that, uh, at least considering, uh, how, and if the listener do really get the meaning of that, finally,

Stephen (05:05):

That's interesting. Did you ever come across, um, lobbying for the ear? It was a PhD thesis, uh, and I need to find out, let me just Google really quick and below, but it was by a girl who, I think she's a sociologist and she spent time. Yup. Alexandra Stopper. She spent time, I'll send you on the list.

Sara (05:30):

No, the name doesn't ring a bell.

Stephen (05:33):

She kind of embedded herself with ICAD people and she interviewed an awful lot of different ICAD people. And she was trying to figure out if there was like a room for, um, well, first of all, she was trying to figure out if there was a divide between people who saw it as purely artistic sonification people who saw it as purely scientific. And she was trying to see if there was a tension there between the two and to kind of work it out and see if it could be bridged, but she did, um, that's a paper of

hers, but she also had a PhD thesis that you might find useful for this because it's, uh, it's not the exact same, but it's, it might be useful, uh, source of information. Cause she interviewed an awful lot of people about whether they, they thought like sonification was like a scientific or artistic and it was like someone was like really Um, what's the right word? Um, aggressive, I guess it's quite, it's quite entertaining to read. Uh, yeah. You know what, I'll just make a note to send on the full pieces when I can find it.

Sara (06:43):

Oh, thanks. Thanks. That will be awesome.

Stephen (06:47):

You might be able to interview her about some of this stuff as well. She might have some interesting information on it.

Sara (06:53):

Yeah, absolutely.

Stephen (06:57):

From my point of view, um, I kind of feel like when I started, I got involved in starting my PhD in 2012 and I, I got involved with a supervisor who was very interested in body in embodied cognition and specifically, uh, Francisco Varela his work, um, more so than he was involved in, interested in sonification. So he cared about the embodied cognition side of things and he introduced me to some stuff in that world. Uh, but he was his own work is more audio engineering. So it was in an engineering department and I kind of found myself in the same boat as you to a certain degree. Cause my undergraduate studies were all music technology and they're in a computer science department, which isn't, I guess I never thought of a computer science department as being a thousand miles away from an engineering department in my mind, they were like technical places.

Stephen (07:59):

But, um, they're so different. And especially like the electronic engineers think of themselves as very different and they use different techniques and they try to do everything in an almost abstract mathematical way as opposed to creating, um, like a piece of software or a program to do stuff for you. But I came from a music technology background and a more arts background where yeah, we learned how to code and we learned how to program. We did some maths and stuff, but it was very much like my undergraduate and master's degrees were

very much, here's some technical skills, but we're using this technical skills to create these artistic works, you know, that kind of way. So I found it strange working in an engineering department and there was almost this split, you know, uh, like anything that was engineering was kind of more important than the artistic stuff.

Stephen (08:51):

Uh, now my supervisor himself isn't like that. He like started a music technology course and he's quite open minded and that's why I chose to work with him. But within the wider department, there was definitely that kind of view of that stuff. And I have found over the years at different conferences, you tend to find that old divide, like I've often felt that like there was a definite divide between, uh, an engineering and sciency approach and an arts approach. And also there also seems to be an awful lot of psychological research, especially psychoacoustic research, psychoacoustic scaling and that kind of stuff. That is, um, again a way on its own in its own little bracket. So I think there's definitely something there and that like there has been divides over the years. Have you come across any of the, um, did the stuff on Sonic information design?

Sara (09:50):

Yeah, yeah. Yeah. I was aware of this many years ago, because for, for, uh, for a few years I had a company, my own company that was doing sound branding, but mainly was Sonic interaction design for brands. So I worked with cars, um, home appliances space a lot, even if it's space is slightly different, but so Stefania Serafin and all the group of yeah. Sonic interaction design from early 2000. I was quite much in contact with, with them. Fascinating. Yeah. Yeah. And I was doing this in the industry basically. It's just lately when I, when I, when I worked with some startups as well marketing director, but basically my role was to take a sound product that they were mainly doing R and D and, and transform it into something sellable. And we used a lot of data, consumers data. Yeah. Not, not technical data for the product, but this, you know, certification, the idea of certification was always there at the back of my mind.

Sara (11:02):

But then when I, because this was in, in Asia, in Singapore where I lived for a few years, and then when I came back to Europe, I just decided to take a break and take a PhD on that. So yeah, I'd say I'm aware of that debate. I'm not, uh, fully confident on my own, my competence and

knowledge in, uh, acoustics psychoacoustics and all their engineering side, because my, my sound design and my sound competencies from the conservatoire basically. So it's, it's very artistic. Even if, of course you deal with machines, you deal with software, you have to learn bit of coding. Uh, it's not the same thing as you say, as being a engineer by background or a computer scientist. So I struggled quite much in even in reading the papers, you know, the type of results that they come up with. Um, it's very difficult for me to find the relevance, honestly, to find an application and even the very definition of sonification that they, they saying this supposedly opposed group... But this, this current, um, that they all seem to take for granted this, this, uh, wait, because I had it open here.

Sara (12:26):

Um, so it was reading a recent paper for, for ICAD, uh, that talks about sonification design theory. But then again, I say, okay, we don't question the starting point, which is 'sonification is a transformation of data relations into perceived relations in acoustic signal.' So, well, I can't really find a fallacy in this sentence, but it is it misses. Yeah. Yeah. It's very accurate. So you can't really say, no, it's not this, but, and then non speech audio. Fine. I understand that you don't want to use a language or speech, but then again, why do I have to limit myself even before I'm, I'm, I'm, you know, bumping into a potential real world application and if, if speech works okay, maybe I don't call it sonification, but I might have a couple of words there and then can I call sonification or not?

Sara (13:28):

Yeah, I know it's strange. It's very, very, I always had a problem with that. Like it, my PhD, the first thing I did on like the first chapter was I tried to redefine it.

Stephen (13:40):

Yeah. Yeah. In fact, I was invited last year to the Ecole Normale well in Lyon, um, it was a data expanding, you know, the modalities to represent data and, uh, and I did this, I use your definition. I mean, I, I used the one on Hermann and as a tact, we can try to widen it a little bit considering the listener at least. Yeah. So was your, your major, I mean, your, um, your postgraduate too, in, in music technology.

Stephen (14:12):

Yeah. Music, technology, it undergrad, then a post-grad in, master's in music technology as well. Yeah, because I just have always loved

music and played music since I was a teenager, very involved in music. And when it was time to like go to college, I wanted to do, I almost like computers as well. And I was like, Hey, go somewhere in the middle. And there's this new course starting in Limerick, which is the city. And so I went down there for four years and did that course. That was great. And then I stuck around for an extra year to do, uh, a master's in music technology and then partly through that. Master's I started working in web development and I did that for about a year and then started, um, the PhD in 2012. Yeah. And then after that, the PhD finished in 2015 and then I began postdoc work in, um, well, two different places.

Stephen (15:14):

So first in a different department in Trinity college, uh, Connect Center. So it's a research center and they're focused on the internet of things. So that was all focused on IOT data and trying to find ways of representing IOT data. That was a real challenge actually, because again, I was in a center where there was a group of, um, arts researchers. And I was put into the group of arts researchers and there was, scientific researchers, like technology, people and arts people, and they didn't cross over. And it was really tough actually, because trying to do anything that had a technical slant, no one in the arts group wanted to take part. They were like, Oh no, that's for the technical people. We just do art stuff. And it was really, then you'd go to the technical people and they'd be like, well, that's like, you know, all our applications are like purely scientific or else they're commercial.

Stephen (16:11):

And we don't care about the artistic side of it. And trying to find a way of integrating them was tough. Like really tough. I did that for three years and that was really strange. I think this divide between technical and like artistic is everywhere in academia. I mean my experience of academia to date, and I've been in this stuff since 2012 has been so defined by like this pull and push between the two, you know, I mean, yeah. Design, like, I dunno, like it should unite the two and it should be like this middle ground. But I find that because I have been the places I've spent time because there wasn't a strong enough design culture in those colleges anyway, they don't have big design departments that the idea of design doesn't work its way into stuff. Like before we were talking today, I had a meeting with three students.

Stephen (17:06):

I mean, everyone's like dispersed all over the world now because

of coronavirus, but..So I'm teaching at the moment on a music technology course, but I'm using human computer interaction and interaction design techniques and walking those guys through like how to apply those kinds of techniques and how to do design led research. And it's just kind of, um, it's even funny that I have to spend so much time explaining the techniques to them and stuff. We spent so much time just going through, well, this is like, this is how you do something like card sorting. And this is how you structure a survey. And it seems that like the techniques that are used, I don't know, they seem to be discipline-dependent and not necessarily focused towards getting the best result for the person who's actually going to use the sonification.

Sara (17:58):

Yes, absolutely. I think part of the problem is, well Politecnico di Milano has a very strong design department, but, and of course it could, I think, really think that design can provide these hybrid figures that are also skilled in evaluating with, with real users and also adapting, um, the experimental protocol inventing experimental protocols. This is probably what's scary. I mean, because it's, it's so much less structured than hard sciences engineering. So it's a continuous challenge in a way there's a lot of codification of this challenge but somehow you never managed to reach the status of real science, even if baby just got up. And, um, there is a lot of debate, but somehow it doesn't just go through. That's part of what I would like to do. I mean, design research literature is very solid now it's just, unless you have a, quite a well rooted design culture, it just, it just tends to be underestimated basically, but it will, it will provide a very good approach, I think because it's also very flexible. Just these of course entails more, work, more work, a different type of work because you have to adapt, you have to even somehow invent your protocols, but also justify them. So you will never find a manual to do that. You will never find something that's been done before.

Stephen (19:35):

I much prefer that though. I like the idea that the methods adapt to making something that's actually useful.

Sara (19:41):

Yeah. Because the potentials are very high of doing something that has an impact. So I'm working now with this idea of intentionality in sonification that will be intention to, to be understood intention, to communicate and to see our values degrees of, you know, for example,

it does have the, the author would consider the listener or, or would make a message explicit before facing the sonification and, um, and see where, and, and just try to map out what is, what is out there. Yeah. But I feel that those that are more in more like-minded or that, that, that are, you know, thinking along the same lines are people that work with with interaction design to some degrees basically, which also obliges you to do something fast. I mean, prototype and have a feedback. And you have people really trying out and using what you do. That's the key. Right.

Stephen (20:45):

Totally. I was exposed to that at, um, undergraduate and master's level, uh, by, um, I mean, I was on a music technology course, but our sister course was an interaction design course. So we shared an awful lot of modules with them, but while they focused more on interaction design, then we'd focus more on the audio side of things. But then fom my master's project. I worked with the guy who used to run the interaction design group to create an instrument. And that's kind of where I got interested in these techniques and I've been using them ever since, but even in my own PhD, I had to use an awful lot of techniques that I wasn't happy with because I was in a I was in an engineering school and that's, you know, it wouldn't have gotten by, you know, if I didn't use those techniques been, you know, showed me the door at some point.

Stephen (21:40):

So I just had to do it. And it was like, it didn't feel great. And I was never very happy with how it went as a result. I mean, it's only in the last two years, three years, I've gotten to kind of return to that kind of stuff. Um, I think probably because people like David Warral and Steven Barrass have started to talk more about design and their work too. Yeah. And I think there, there is, I think there's a spot, like a space beginning to open up in the ICAD and the auditory display community for design. And I think people like that who have been around, you know, they've all been like David Warral, Steven Barrass were around at like day one when the ICAD started, when all that was starting around and they're still kind of big figures, but now they're embracing this kind of design thing. I think that that's a positive step in the right direction. Yeah. That's probably good for the future of the area.

Sara (22:36):

Yeah. I do agree. I like in particular Barass way of writing, too, it's nice. It's easy to read, goes to the point...it's written for humans. Yeah. So

how would you define your process? It's very well explained by the way, in your portfolio, a huge amount of work there. Right. To describe this, I was going through it today. I said, wow. Gosh!

Stephen (23:03):

it took me weeks.

Stephen (23:06):

Two or three do the whole thing. Yeah. My, I guess I start off with a kind of like, I know the data that I'm going to use and if not the actual data set, I at least see what I mean by that is since I've started working with, um, sensors that are networks of sensors around cities, you don't know exactly what the data is going to be, but you know, what kind of data you're going to get and you know, what kind of things it can tell you. So I usually, um, think about the data first and then try to think about, try to like contextualize it all in terms of embodied cognition stuff. So the thing about water, how are people going to make sense of this? Like what previous experiences could you draw on to make sense of this kind of data? And then I try to use the sound as a way of guiding people to their own previous embodied knowledge that they can then use to interpret what's happening in the data.

Stephen (23:59):

So rather than, rather than just taking the data and trying to like treat it, like there's some objective inherent meaning in there, I kind of take the data on one side and then take what we know a person, not what we know, but models of how a person might make sense of the world and treat that as important as the data. And then try to use sound as just this connective tissue between the two, you know, so yeah, you end up, I ended up thinking a lot in terms of conceptual blends and metaphors. There was a, obviously George Lakoff and Mark Johnson stuff was hugely important for me, uh, in a lot of this research, but also a book by, Imas and Benyon at the two guys. So I think it's Manuel Imas, David Benyon who died recently, but, uh, they had a really good book called designing from the lens and they talk about the computer interface and the desktop and the desktop is a metaphor.

Stephen (25:03):

It's not a real desktop there's stuff going on in the memory of the computer. And we use, we visualize this metaphor, we call it a desktop and we blend in these other ideas, like our recycling bin. And we build these kinds of like fake worlds using these blends of metaphors. And

we use that like everybody pretty much who, you know, grown up in the last 40 years knows how to use a computer, knows how to interact with those kinds of setups. And I try to do that kind of approach for audio and for sound and for sonification to give people a set of metaphors and like a blended kind of reality, almost that they can make sense of on the basis of experiences that they will already have had if you know what I mean, previous embodied experiences that they can provide. That's pretty much my approach.

Sara (25:55):

Yeah. Actually I think one of the, um, I did a couple of use cases where design actions for, for the PhD one was for them, um, monitoring of water infrastructure for cyber attacks. Yes. So it, and, um, uh, we, we managed to involve six, seven, seven experts that tried it in their, in their work time. So in their offices and it was nice. It was quite interesting that we used some tuned sounds some non- tuned sounds and with the non-tuned, which were synthesis sounds like, like, or sometimes concrete sounds just a bunch of different things to test out. They, um, attributed a meaning. I mean, they, to call them something even, you know, I don't know frog, or, or a metallic frog or cartoon or manga something or weird instrument. I mean, they even gave them names too. That's great to remember, or to just, you know, um, identify them based on one told me, Oh, this is just based on Japanese cartoons that I like.

Sara (27:06):

It was awesome. It was awesome. I'd never expect that. So we did six scenarios. I think about we tested out for none of them was the winner. Another thing against, uh, let's say, hard science is testing in this field because then how can you really, do you really have relevant results that you can use in another project? Um, honestly I never, I never, never, never found any, there are results that are papers that present results that are interesting, but then I can use them with a certainty that they will work in my context. So I wouldn't say there was a winner, but this sort of, this sort of feedbacks are very important for designing better experience. And in this case they will fit in a, in an embodied experience of course framework very well. Hmm. So do you work with, um, or did you, in your experience so far work with experts mainly or expert users? I mean, do they have a task to perform with a sonification or

Stephen (28:11):

Sometimes not always. So a lot of the early work , the PhD work, everything up into 2015 was meant to be finding way mapping strategies that were very generalizable. So I purposely went the opposite direction. Uh, I tested, uh, against, you know, got loads of people from all over the world, different places at different levels of, um, you know, technical literacy in different levels of musical literacy to use, uh, different sonifications and see what, see if they worked. Because my thought was, you know, if this, if the reading an embodied basis for this, then pretty much anyone should be able to do it and they shouldn't need any training. Uh, after that and the postdoc work in, um, the Connect Center, which is now T-research center, I did work with a group of, uh, experts. So there were guys who had created a network and they created a nationwide IOT network.

Stephen (29:09):

And I worked with them in that we had meetings originally to decide what they wanted. And then we kind of got a feedback loop going where I'd send them prototypes. They'd listen to them and say, Oh, well maybe what if you did it like this? And what if you did it like that? And we changed stuff as we went. And yeah, that kind of went on for about maybe a year and a half. So yeah, that one had experts a more recently, again, more recent stuff I've done. No, but yeah, for that one project, we worked with the guys who had designed and run that network to try and get something up and running for them.

Sara (00:00):

I just wondered if, if there was a difference in your approach, whether you work for, you know, tasks, task based certification, or

Stephen (00:10):

I found it completely different. I found it really, really hard to, I felt really hard. I realized how hard it is to explain the embodied cognition to stuff, or have people stuff to people who haven't heard it before. And I found that really hard to work into that work. You know, like I wanted to approach the sounds from own embodied cognition, point of view, uh, and often working with, uh, experts in the field for the IOT network in particular. They just wanted to know when something was wrong and they pretty much wanted a system of alarms like alarms that would go up when something was wrong. And they also wanted some kind of system that would tell them when someone was likely accessing the network illegally. Right. So, you know, by you allowing sends so much information on, um, every duty cycle and this specific band of radio

frequencies that they were using for the network.

Stephen (01:09):

And these, you know, you can only send, you know, whatever was X amount of megabytes per second, over this frequency, but the, uh, devices and the network would work on three different frequencies. So people would go on, they'd send their three megabytes, which was their limit for that minute. Then switched to the next frequency and then send more. So we're looking for that kind of like people have just found ways of hacking around the system to, uh, exploit it a little bit. So pretty much, yeah. They wanted to explore detection and they wanted an overall sense of how many people are on the network and how well the different devices were working. And, uh, I found it really hard to talk to them about the embodied cognition stuff. So after a while, I just stopped and started to do prototypes on the basis of those ideas myself, and then sending them the prototypes to see what they thought of those prototypes, you know? So it did change un that I realized, okay, this is actually really hard working with other people because like they know what they want and they know what they want you to do, but I guess they don't know the process involved, so kind of gets complicated. And that could be a bit of a mismatch. Yeah. I found it tough.

Sara (02:22):

Yes. Yeah. Also I guess it costs, um, it costs a lot to people to get familiar with the old, to open up to the idea of using sound. So most of the time, probably they just want to have something that they're used to like visualization translated into sound is just that that would be too much information. So for, for the designer, let's say to, to decide what, you know, what part actually, we shouldn't even think of what is visualized and try to reproduce it. I think this is the origin of sin, many times too many times. It's just that it's difficult to get people to get out of that box. I think they're pretty much doing something, catching something, send it out and have these iterative processes. The only is basically the only way otherwise they will not get out of their, of their box.

Stephen (03:18):

That was another buy- in for the iterative process, actually, because these were guys who were very much engineers who will go and make a solution and, uh, we'll work on the thing until they think it, it solves the problem. There's some objectives, really quantifiable problem. They

need to solve. Like we need you saying, you know, X amount, more data. So the work on the problem until they can send X amount more data and that's it. So they're used to get them one solution so that it was hard to get buy in for that sort of thing. Like I noticed after what, as you're sending, um, different iterations, more people were dropping out of the conversation as we went along. And, uh, also the people who stayed in were obviously more junior down to level who were just being told, you know, you deal with that guy.

Stephen (04:04):

Like he's sending us a goddamn, another thing I thought he sent us like three last week, what's going on...So yeah, I felt like there was a mismatch there in terms of what their expectations were. I also though, I guess we need to plan, keep in mind there that these were, they built this system, but they built it within an academic institution. And I think if you were working commercially, you'd be more used of an iterative approach, you know, but that, wasn't something in engineering and computer science within that specific research group, amongst a group of academics, that wasn't something that they were comfortable with. You know, that was a problem.

Sara (04:46):

Yeah, yeah, yeah. Of course this would be a typical, a typical design problem. I mean, a 'wicked' problem that you can't give one solution, but of course you have to set time for, for really trying this, these iterations in your daily routine. Otherwise it just doesn't work. So it depends if you believe in the project enough to set out that time, that's the problem of design. That's why designers are so badly paid compared roles in every field, you know, in the world, because then you come and you can find a brilliant solution. It's just that the process doesn't guarantee the result. Yeah. It's a collaborative process basically. So unless you want to engage in it, the result will never be something that matches your expectations. So did they have a visual system already?

Stephen (05:39):

No, Well, they didn't have a, like a visualization system. They just had Rita. No, like, um, they were just pulling log files. So pretty much CSV files of this activity happened. And that activity happened to be honest. That was one of the interesting things about it was that this is, we started back in 2016, 2017, 2017. Yeah. 2017. And, um, the system, some of the systems for like, uh, monitoring IOT network traffic, so

archaic, they pretty much just pull all of the information and they drop it into like massive CSV files and they're like, yeah, you can visualize it. But it's like basic visualization. Like you'd get in like Microsoft Excel or something, you know, it's not really, it's probably, that's part of why we want it to do. I think part of why we got the funding to do the project was because there are such massive shortcomings on that, you know, visualizing network data for IOT networks at the time I have no one it's like, no, that was three years ago. But yeah, no, it's crazy.

Sara (06:53):

Well, it's the same case as the one I'm working on now, the second case they want for internet networks where I'm using soundscape. We remember we had an exchange? It's for our software house here in Spain, one of the, of the biggest, and they're using that out of their own, um, data center. But the goal is to build a anomaly detection machine learning algorithm to yeah to detect intrusions as well. Um, and same they don't have, um, a visualization system. They just built the algorithm where they built them. Of course, the collecting, collecting data system, storing, organizing, and data, mining, all stuff. Then the model that has different, um, levels, hierarchy, hierarchical levels of detail. So I'm working at the first one cause otherwise the amount of that it's so massive that is so difficult to, to manage. So, uh, and then the same, they just pass me these, these CVS 7,000 data.

Sara (07:58):

Um, so yeah, now we are taking decisions with the person that hleps me with the programming. Like we are passing only the most serious anomaly every second, otherwise. And then the idea is that they use sound - this is something I quite believe in, honestly, at least with the cases that I faced so far - using sound to guide you more efficiently source your information somewhere else really think that in this case use cases, sound can compete with visualization. If you want, you need to do is really to go and find where the system is failing because you need so much analytical detail that it will be just crazy to try to, to convey it through sound. So I see it as more as a, as a, as a yeah. A guide to do that more efficiently and faster and a guide that you can just keep hearing to, while you are doing your stuff. Yeah. Your normal job.

Stephen (08:57):

So it plays as a soundscape while they're working.

Sara (08:59):

Yeah. That's why it's enough for soundscape. This is something they asked for. So it's something they can keep in the background. And my, my idea, even if it will take me some, some time that is not in the scope of my PhD to prove is that I think if you use, um, soundscape or yeah, embodied sonification, sounds that you are used to already, so you don't need cognitive effort, you can recognize them very well. Actually our ability to of course detect information from sound in natural soundscapes is very sophisticated. So if we just use that with time, I think that operators will be able to detect so many changes that I cannot, I cannot preview. I cannot forssee I built the soundscape model and then it will be fed by the, by them, uh, AI model. And then it will become something like, you know, an entity and the changes in this, in this entity will become more and more interesting for the operator. The more they know the system, the more they know what they are hearing. So there will be someone that will be better at it. And somehow they will be worse because with, with, you know, sound I'm better at sound than at visuals, for example, detecting differences in color...t's not really my thing. So I think that they will be able to, to see anomalies coming or to, to predict the behavior of the system based on this peripheral monitoring. So I'm not too concerned in that they really understand the specific instructions.

Stephen (10:37):

Yeah. I think that's really hard though. I mean like so much of the sonification research seems to be about like sound as data. Do you know? And that like, you know, you listen to the sound and you meant to understand the data. It doesn't really make a lot of sense often. You know, I don't really think I've never seen a work, you know, that you listen to the thing and you're like, Oh, I completely understand tha you usually get a sense of something you often get to say, I find with stuff I do. You get a sense of something about the data that may not be as obvious when looking at the data graphed out, you know, but it's not, unless it's like something that's very obviously, you know, a sine wave and this thing went up, so the sign goes up and down is down. Like with that stuff aside auditory graph and stuff, which can be quite straightforward for very simple data sets that might make sense. But for the most part, it's really hard to kind of like pack data into sound and expect people to make that.

Sara (11:40):

Yeah. Yeah, yeah, yeah, absolutely. Absolutely. Um, unless it's for a sort of holistic understanding of the behavior and then you go and find the

data there,

Stephen (11:52):

but the actual numbers

Stephen (11:54):

You're never going to get from listening to this stuff.

Sara (11:57):

No, no, actually my, my mates at the lab. They always told me 'Oh, okay. I see what they are trying to do with sound. Or even in, in research that compares these visuals with, with sound, with auditory cues and they proved that sound worked a bit better. They, my mates would tell me yes, because the visualization is badly done. Instead of going through the pain,

Stephen (12:26):

they might have a point there

Sara (12:27):

of building a sound System, just make a better visualization, not a non efficient visualization systems.

Stephen (12:35):

Partly true.

Sara (12:38):

And what about the, the mapping problem? I'm trying to understand whether for me it's a problem at all or not.

Speaker 2 (12:50):

From my reading of it. Uh, putting aside the whole, you know, problem of as pitch increases volume increases, that kind of stuff is whatever the psychoacoustic effects are..Some are, you know, undeniable, you know, you're never going to be able to make it. You're never going to be able to change that. So you're always going to have to account for the fact that as pitch increases, people are going to perceive the volume as increasing. But the thing I find interesting about the mapping problem is it just looks like the mind-body problem. It just looks like the exact same thing in a new domain of sonification and like how people talking about it as a problem makes it even sound like, um, like I've done loads on it because I find it fascinating because like, it just looks like the mind body problem. You're talking about this idea of there being objective data and subjective interpretations of sound and how do we bridge the two?

Stephen (13:44):

It just sounds so like just Cartesian or something, you know, I think it's just a rep, a reproduction of the mind body problem in sonification. I think a lot of the ways people go about trying to solve it are almost these like technical implementations. And it's like, it's not going to work. You're not going to find a technical implementation to solve the mind body problem. You have to change the way you look at it. It's like it's looking at it that way in the first place as the data is objective and this sound is subjective coming at it from that kind of point of view in the first place. I think it misses the point. Like it misses it just misses the point.

Sara (14:28):

Yeah, yeah, yeah. It's totally decontextualized. It's basically a projection projection of your, of your mind and about the sound material, so to speak because I interviewed, um, someone that told me I do musical sonification because I think that, you know, music provides that added value of engagement for the listener. And, um, for example, actually more than one person or the aesthetic, the relevance of the aesthetic component that music can, can give you. Yeah. So do you have any, any a priory approach to this or just cause I listened to your thing and I know you use different materials depending on different projects.

Stephen (15:17):

I don't mind using music, but I don't think, uh, I think there's a lot more to aesthetics than just sounding good if you know what I mean? I think of aesthetics as a way of communicating information, you know? So to me in my mind, like people often, yeah, I've heard that argument of like, I'm doing a music sonification for the aesthetics. When I feel like what they mean is like cosmetic. It's like to make the things sound listenable and to sound good because I like to think of a statics as like, you know, if you just think of a band, you can have two bands play the exact same song. You know, if you have someone like John Hopkins cover a Rolling Stone song, it's going to sound very, very different. And instead there's two completely different aesthetics going on there. And there is the same content, just the same, you know, musical content or whatever, but aesthetically completely different.

Stephen (16:13):

And I like the idea of using aesthetics to convey information. I think we kind of like reduce aesthetics down to just like cosmetics. And does it sound good or does it sound bad and can I make it some better and more listenable available where I kind of liked the idea of like a, want to

be able to glean information about data from the aesthetic choices that the person has made and designed in a sonification if you know what I mean? I think aesthetic is massively important, not just for making it sound good as an actual dimension of conveying information, you know?

Sara (16:50):

Yeah. Because then from then to doing generative art, basically the step is very short. I think that is like a gray gray area, which is of course perfectly legitimate. Just again, what's, what's the intent intention behind using the data to, I mean, are you using it to create music or to, to let people, you know, improve their knowledge of the phenomenon behind the data?

Speaker 2 (17:22):

Yeah. I don't mind using the data to create music either. For me, it's all context. When I started, I wanted to avoid, I wanted to avoid music altogether, but I actually found that I was learning a lot about how to Sonify the data by making pieces of music with the title. Like I learned an awful lot about the different ways you could map data by making pieces of data driven music, and it was way easier do that. And then I could learn different dimensions, like different parameters I could map to, you know, synthesis, parameters and things that I hadn't considered when I was just thinking in standard sonification terms, then I could go back and make, you know, a standard sonification that used those dimensions. So I mean, a lot of the research I've done it usually starts with making a piece of data driven music, which never sees the light of day.

Stephen (18:15):

So I guess part of the process I'll make very musical sounding artifacts with data, but I will rarely you there they're like exaggerated forms of the sonification I guess then I'll try to throw that away afterwards. It will, I won't throw it away and hold on to it myself and I'll go on like, just map the data to the kinds of dimensions I found when I was making the musical piece. I find that's for me a useful way of doing things, but that's probably just because I make music anyway. Uh, outside of all this, I always made music. So it's kind of, uh, an advantage or language that I have access to. So it allows me to work a little bit quicker if you know what I mean, that, uh, the standard approach to sonification I can work quicker if I approach it as music, but often I tent.

Stephen (19:10):

Then if the sonification is for a specific task, they need to go back and say, okay, so what can I take from what I've just learned there? What mapping strategies might be useful if we were to try to give this to a person do you know what I mean, like introduce it to another human being who might make sense at these useful dimensions, because yeah.. I use it to kind of explore what's possible. How can I map this data, what different ways? And it usually sounds ridiculous and cartoony, but um, some of them over the years I've played at concerts, I'll make them and I'll be like, that sounds crazy. And I'll play them for someone and go, you know, is that legitimate? And then put it in for a different concert, like an ICAD concert or something. Yeah. I definitely hear them over the years, but they're not actual pieces of sonification really, it's like, here's something that came about during the sonification process. Here's a piece of music I made when I was trying to figure out how to map stuff. That's generally how that goes for me. Yeah.

Sara (20:14):

That's very interesting. And how about, and then, and then I let you go, I mean, I have a lot of information, but how about the, the phenomenon that's behind the data? How do you take it into account? Because they, the piece on Irish migrants, Irish migration, there was quite a, maybe you did different versions or I'm not sure what I listened to the one with the sea, the boats and the crackling that was quite emotional, which I think it was meant to be, I suppose. I mean, there will be quite strong connection for the listener, with the story it tells.

Stephen (20:48):

Yeah. Uh, what I did there and I do this sometimes is I'll look at the data set, um, what it's representing. So it was representing immigration, you know, people leaving the country. So then I look at the, um, literature on conceptual metaphors for immigration. So when I went and looked at the conceptual metaphors, representing immigration has all these really negative, like racist stereotypes about immigration being like a float of people into, or out of a country, this kind of stuff. And I was like, okay, can you take these metaphors and kind of twist them so that you can use them in a way that isn't so horrible. So there was an analysis of newspapers doing on immigration by, I think out of Poland immigration out of Poland, during the the 20th century, a Polish guy got a lot of newspaper, old newspapers, went through them and looked at the metaphors that were most used to describe immigration.

Stephen (21:52):

And it was described as a flood of people out of our, into a country. And also, so I took that idea of a flood and water. And then I looked at, because in my mind, you know, that's, the data was representing immigration and that's a direct metaphor for it. But in my mind it also was a, uh, a representation of a country going through like the recession on a hard time. So it kind of looked at how people, the metaphor conceptual metaphors people use to represent hard times and they were all weather and sailing metaphors. So like, you know, all this stormy weather ahead and, uh, our Oh no it's smooth sailing, those kinds of ideas. So I found that they were the related metaphors to what I thought I was as the source underlying the data. And I try to just realize them by using soundscape recordings and did the musical thing, the musical stuff happened because I put it in for a conference and they told me it wasn't music.

Stephen (22:56):

And I was like, okay, well, that's ridiculous. So I recorded some kind of ambient guitar material. That was pretty much just, I was trying to follow along so that the pitch of the playing was a, you know, very straightforward pitch mapping idea, but with a person actually playing the instrument. And then I mapped the actual data to distort that and to cause that, to break down and glitch on the basis of the data. So as things get bad, that thing starts to glitch out. Yeah. So that's where that one came from. So I like to think of the, I like to try to represent the underlying data source if possible in the sound and then have the data itself, be some kind of fluctuation of that sound if you know what I mean.

Sara (23:48):

Yeah, yeah. The behavior of, yeah, for me too, is a matter of, I mean, data is not really the, the, um, relationships between data. I don't know. I always defined, it's like the data behaves in a certain way and this behavior should be reflected in the behavior of the sound that comes out. How, how, how deep you go into the parameterization is just a context context based to me. Yeah. Would you use a similar approach for the experts? Maybe the engineering group was not the best. I mean, internet networks tend to represent because that was pure, pure synth sounds right. That you used

Stephen (24:36):

Some of them were. Yeah. Um, but I try to was one, um, implementation we did in the end, what ended up being the, uh,

finished implemented product was, uh, the sound. Okay. So there's this whole concept of like in the internet of things, it's the idea of, um, machines talking to other machines. So you've got sensors somewhere and they talk to a base station and that takes their information. And then it sends it back to the network, to the main server. And it's this idea of machine to machine communication. And the more I learned about IOT, the more I learned about this concept of machine, to machine communication, being key, where most of the time it's machine to human, the machine tells the human something, the human goes does it with IOT stuff. Is that like crappy example of, Oh, you can have an IOT fridge.

Stephen (25:28):

And when you run out of milk, it will contact the shop for you, that kind of thing. So if the machine doesn't bother telling you, it's just orders milk itself, so some machine to machine communication. So I took that idea. And then I looked at, um, metaphors for machine to machine metaphors for communication and try to pick sounds that sounded like communication, if you know what I mean? So, um, some of the sounds in the end, we wrote about this in a, uh, paper for the sound studies journal, Sonic studies. Um, yeah. Well, I think we put some examples in there too. We just went with the metaphor of communication and of talking. We tried to create, I know you're not meant to use speech sounds, but whatever we tried to make, this sounds, sound like speech. So when things were going well and the network, it sounds like positive, upbeat speech, that type of thing, when things are going less well, the, the prosody of those sounds changes. So there's no actual worth, we're trying to map the prosody. I've always looked at idea anyway. And then with the IOT stuff, I was like, here's an excuse to try to do more prosody the mapping stuff. So just jumped into it. So yeah, that's the main thing there. The main metaphor there was machine to machine communication, and we're just trying to recreate that kind of idea of two machines. What were two machines talking to each other sound like? So there's very like cutesy robots sounds

Sara (26:52):

Okay. Yeah, yeah, yeah. It reminds me of challenges for film actually. Um, cinema stuff

Stephen (26:59):

Came from R2D2. Like those kinds of robots.

Sara (27:07):

I used to get my students first year students of, of sound design for film this exercise. I mean, invent, um, acoustic audit, whatever sound language for whatever non-human, but that the listeners do understand it's a language of sort. Yeah. Well, great. Thank you, Stephen. A lot of things, I think I've asked you pretty much everything. Of course we could keep talking, but, but maybe after it, I will do a first round of analysis of, for the results I have. And maybe if I, if something is not clear, I write to you or

Stephen (27:49):

Yeah, yeah. Let's do it again to clear stuff up as well. Yeah. More than happy to do, you know, um, have you seen Otter AI online? It's um, it, what it does is it listens to audio recordings and it automatically transcribes them for you now. It's not perfect, but, um, I've got students and they're doing an awful lot of, um, uh, you know, workshop stuff. So we're like, you know, they're working on their master's projects, but we've been using Otter AI so that like, you can interview people long form like this, and then it will convert the majority of it for you. It's such a time saver.

Sara (28:27):

Yeah, yeah, yeah. I'm using Temi.

Stephen (28:30):

Oh yeah. Does it work? Is it good?

Sara (28:32):

Yeah. Very, very, just I'm trying to use, I mean, if I work with five, six interviews, then it's, it's doable because they give you a free, free 45 minutes. So I'm using all the possible email addresses of mine friends. Cause, cause I'm not ready yet to invest a lot of money. Otherwise it's 25 cents per minute.

Stephen (28:55):

That would get expensive.

Sara (28:57):

Yeah. That's why, that's why if I enter that, then I will not, not, you know, control the expense, but it's very good. Very good. Just I have one in Italian with an Italian person. And as long as you have English, then you have options. Not many but good options, but with Italian, I will have to end up transcribing it myself because there's not. Yeah. The one you want is you mentioned author AI.

Stephen (29:25):

Oh, T T E R. Yeah. Wow. It's good. But it's the only one I've used. So it might not be as good. I don't know.

Sara (29:34):

No, I never, I didn't have it. This Temi. Yes, this is good. Okay. Brilliant.

Stephen (29:43):

Thank you.

Sara (29:44):

Likewise. So we'll meet one day in person.

Stephen (29:47):

Yeah.

Sara (29:49):

Permitting. Yeah. And say hi to Don Loughrie for me please.

Stephen (29:56):

It's not the worst place to be stuck on lockdown.

Sara (29:58):

No, no. A couple of summers I spent there. Lovely, lovely memories... good,

Stephen (30:05):

But anyway, thank you. See ya. Bye.

Interviewee 6 - Chelidon Fame (aka Alessio Premoli)

Bio:

Chelidon Frame is an experimental electronic music project that mainly works with field recordings, radio interferences, guitars and processed sounds.

His installations are experience-based and suggest a dialogue between the location (both virtual and physical) and the sounds proposed, aiming to deliver a message in the simpler yet most effective way. The use of code, data analysis and data-driven sounds, allow information to be experienced anew.

In his studio works and live sets, different layers of sounds - guitars, synthesizers and custom-made instruments - pile up creating unexpected new soundscapes.

Full text:

Sara:

Il mio dottorato che è al Politecnico in questo gruppo si chiama density design che si occupa principalmente di visualizzazione di dati io sono l'unica che lavora col suono e quello che sto facendo..io non ho una formazione formale appunto in design perché io ho studiato musica al Conservatorio insomma vari tipi di musica di diplomi certo e filosofia però adesso quello che sto cercando di fare è cioè il mio argomento è che nel mondo della sonificazione tra quelli che fanno snificazione con l'obiettivo di fare analisi di dati e quelli che la usano invece quasi come una scusa per della generative art o comunque che fanno più sound art o comunque che vogliono comunicare a un grande pubblico però senza l' intenzione di far capire esattamente cosa significhi noi dati, perlomeno non per un'analisi scientifica, c'è uno spazio per il design come disciplina che comunque mette al centro lo 'user' diciamo e che si pone come obiettivo di risolvere dei problemi specifici e secondo me nella nel mondo della quindi proprio della community dura e pura di quelli che fanno sonification o auditory display cioè da qualche anno un dibattito su gioco che ruolo gioca l'estetica che ruolo gioca il design anche al limite commerciale fra virgolette, il sound design, cosa si può imparare da queste pratiche quindi io ho fatto due casi e sviluppati da me uno per dice di sonificazione per il monitoraggio in tempo reale di anomalie: uno e sui cyber attacks a acquedotti o comunque infrastrutture idriche e le città, con l'università di Singapore e che ha fatto la parte algoritmica e io e un'altra persona densità abbiamo fatto la parte di suono quindi hai lavorato vari prototipi e varie strategie perché

gli operatori monito possono monitorare in tempo reale potenziali attacchi hacker tramite il suono. Il secondo caso invece è sulle reti informatiche con una società qui spagnola dove io vivo in Spagna. Una software house una grossa software house che il loro centro dati ha sviluppato sempre un algoritmo di anomaly detection e io ho fatto la parte di sonificazione in questo caso usando un soundscape di foresta vabbè nei casi ho cercato di lavorare molto sul design del suono e su questo approccio user centered diciamo adesso la ultima parte della ricerca è formalizzare questo approccio quindi arrivare a costruire nella mia ambizione delle linee guida cioè più per più per designer non sonori cioè per magari designer che fanno information design o visualization e vogliono integrare il suono cosa che adesso si sta un pochino diffondendo Però riguardo a quelli che fanno proprio sonificazione portare un po' questo argomento di insomma come un approccio design-driven diciamo possa contribuire a migliori sonificazioni 'migliori', che poi la gente vuole usare davvero perché finora in realtà non è successo, rimangono degli esperimenti o delle esperienze artistiche piuttosto.

Chelidon F.:

Comunque molto localizzate. sì sì sono d'accordo

Sara:

Si intriga però poi simbolo di fatto non è che si possa usare davvero poi proprio capire però dipende un po' dall' obiettivo che uno si pone quindi adesso io sto cercando di appunto intervistare persone il cui lavoro mi interessa nel campo della sonificazione e capire da che mondo vengono quindi le mie domande sarebbero qual è la tua formazione, cosa ti consideri tu non solo nell'approccio alla sonificazione che magari è una domanda un po' più complessa, ci arriviamo dopo, però proprio nel tuo insomma nel tuo lavoro, diciamo quindi più non so no non lo so perché non ci conosciamo di fatto però più artista più cioè nell'ottica per me di capire poi quali sono i passi che fai, che hai fatto per esempio in questo progetto che conosco io sul covid proprio i passi concreti, il workflow diciamo nell'approcciare la sonificazione e che poi sarà utile per me per capire se davvero questo approccio che propongo io ha delle connotazioni diverse oppure no oppure che punti in comune ci sono

Chelidon F.:

Allora inizio dalla parte facile che è la formazione. Allora io sono laureato in matematica triennale laura breve nel parallelo in realtà da un

po' prima di quando ho fatto l'università ho iniziato a studiare chitarra principalmente diciamo un 70% da autodidatta un 30% da con maestri. Ormai sono 20 anni fa che iniziato però intanto che ero abbastanza piccolo sono avuto una fase da metallaro e poi a un certo punto sono passato alla un po' diciamo principalmente jazz ed elettronica infatti il progetto Chelidon Frame in realtà è abbastanza recente comunque perché alla fine è nato nel 2014 rispetto ad altre cose io però ho finito la triennale in matematica e mi sono subito fiondato nel mondo della programmazione non spinto da una grande voglia proprio di lavorare ma più che altro da lasciarmi un po' le spalle l'esperienza dell'università che non mi ha non mi ha molto entusiasmato. Quindi diciamo il mio approccio fondamentalmente è duplice da una parte io sono uno sviluppatore sono sia nella vita lavorativa che anche nella vita musicale perché comunque uno strumento che integro il più possibile sia utilizzando Pure Data piuttosto che Supercollider quindi nei linguaggi sia visuali che proprio di scrivere codice e sono mi reputo diciamo anche musicista nel senso di gruppi più convenzionali in cui faccio magari folk comunque anche jazz e poi questo mio progetto di elettronica che chiamo anche sperimentale ma non sembra lo è diciamo però l' approccio quanto più sperimentale, provare cose nuove cose che mi interessano senza avere necessariamente l'obiettivo di chi mi ascolta ma è più una specie di playground in cui sperimentare mio con delle cose e basta questi sono i due grandi mondi che mi muovono quindi il mondo della matematica declinato nella programmazione il mondo della musica che si vanno necessariamente un po' intersecare. Giustamente mi ha chiesto come mi considero io di più, mi piacerebbe considerarmi più artista, al momento sto cercando di spostare la mia attività lavorativa il più possibile verso un'attività autonoma in cui togliermi dalle palle il lavoro dipendente essere un po' più in autonomia cercare di far convivere di più le due i due mondi. Non è il momento migliore per farlo, lo riconosco diciamo che gli ultimi mesi sono stati un po' movimentati però sto iniziando a buttare un po' di spero basi. Allora, l' approccio algoritmico è una roba a cui mi sono dedicato abbastanza di recente, perché comunque la prima idea che mi è venuta in mente è stata un paio di anni fa in cui mi sia sbloccato qualcosa diciamo dal 'ho un'idea' e 'riesco a farla' o ho gli strumenti per farla per portarla avanti concretamente ed è stata quell'installazione che ho fatto a settembre dell'anno scorso in in Bocconi. Lì è stato proprio l'idea di riuscire a trasformare un qualcosa non soltanto di informaticamente fattibile concretamente, ma anche un qualcosa anche di fisicamente realizzabile quindi trovare lo strumento che mi facesse portare l'audio

multicanale nel in un posto che non fosse la mia stanza o il mio studio e lì a questo punto si è sbloccato qualcosa. Ho avuto una serie di di passi che mi hanno portato a chiudere questo progetto lì l'idea è non è l'idea di un audio in real time ma è proprio l'idea di un piccolo computerino che riproduce ciclicamente una lunga composizione che è una lunga composizione algoritmica. Il dispositivo è questo che è un Rasberry Pi si ah qui c'è attaccato una scheda audio multicanale a cui sua volta poi si attacca in quel caso quattro altoparlanti. La composizione la chiamo algoritmica ma di fatto è stato lanciare uno script scritto in Python che mi convertisse tutto il set di dati da cui partivo, che era questa lista di morti nelle nei flussi migratori verso l'Europa dal 93 fino al 2018, convertirla in pezzi di tracce mid,i i pezzi eran limitati dal fatto che quella libreria che ho utilizzato aveva una massima lunghezza per i fan che produceva quindi dovuto farne tot poi ricomporli diciamo su logic. Avendo pronti questi MIDI sul logic sono riuscito poi con un campionatore ad associargli un suonop per realizzare questa questa composizione. L'unica roba su cui non ero molto entusiasta era il fatto che comunque il set di dati rispetto le regole che mi ero dato poneva dei limiti: la regola che mi ero dato era quella di generare un suono per altoparlante, inizialmente un suono corrisponde a una vita persa ovviamente ci sono dei giorni che sono drammatici e non hai più spazio per poterli gestire in questo modo, quindi l'idea è stata quando esaurisco i quattro altoparlanti aumento suono di un'ottava. Anche questo non era sufficiente quindi ho detto una volta che ho esaurito le ottave udibili aumento di un semitono e vado avanti e vado avanti finché non esaurisco tutto lo spettro sonoro che avevo. Anche questo non è stato sufficiente quindi dovuto mettere un limite superiore oltre il cui dare un suono per me tipo un gigantesco block chord di un secondo proprio per per motivi tecnici di come l'avevo come l'avevo impostata. Questa cosa non mi ha entusiasmato molto perché comunque ho dovuto limare in qualche modo il set di dati e piegarlo un po' alle mie esigenze e che un è un fatto su cui rifletto molto, anche leggendo o studiando comunque l'approccio alla dei dati alla sonificazione che comunque c'è un intervento, quanto meno in quelli che cercano di dichiararsi artistici, c'è sempre un intervento necessario tuo te lo stai facendo, ci metti comunque tutta una serie di tue decisioni di tue scelte e tende un po' a mitigare o intervenire sul risultato finale diciamo che pieghi un pochino il tuo set di dati a un'esigenza che hai. L'esempio che mi viene in mente tipo gli articoli un po' come dire giusto per fare click che escono su il suono dei pianeti che poi lo senti è un do maggiore

Sara:

Quello è però tutto un settore divulgativo

Chelidon F.:

Sì esatto è una cosa che comunque non mi aveva molto entusiasmato però è un compromesso che ho diciamo compromesso che ho fatto più dal punto di vista teorico poi dal punto di vista pratico l'ho un po' ignorato però mi è rimasta un po' questa quest'idea dell'intervento. Uno dei modi con cui ha cercato di tirarmi fuori da da queste scelte è stato scegliere un suono che non fosse piacevole, banalmente che avesse un significato simbolico: in questo caso era il suono di un sonar quindi un piccolo impulso di una sinusoide con un po' di riverbero. Questo mi permetteva oltre a gestirlo su più ottave senza avere artefatti quindi nella trasposizione nel campionamento, sia di avere un suono comunque legato no al tema comunque del dello spostamento delle migrazioni, della traversata in in mare non troppo estraneo al al discorso e questo è un po diciamo è è stato il pequel quel diciamo del di quello che ti ho poi ti ho poi condiviso. L'idea sul covid in realtà mi è stata suggerita da un collega che mi aveva dato un paio di consigli sulla precedente installazione ha detto guarda c'è questo sviluppatore americano credo fosse che ha messo pubblicamente disponibile un servizio di API consultabili liberamente che davano i dati giornalieri aggregati per nazioni piuttosto che per per continenti della situazione man mano che si voleva con il covid. Ed era penso fosse inizio marzo quando mi ha passato questa idea qua, quindi cioè la cosa ci stava esplodendo un po' tra le mani no e lui mi ha detto sarebbe figo riuscire in qualche modo a fare una roba simile a quella che avevi fatto ai tempi in Bocconi. Ho detto sì è molto bella l'idea però di fatto siamo tutti a casa quindi come faccio ad arrivare il più possibile alla gente e l'idea è stata quella di fare un'installazione web-based quindi di fatto una piccola applicazione web un piccolo sito che leggendo questi dati riuscisse in qualche modo a tramutarli in suono. Allora anche qui ho dovuto fare no e quindi non ho dovuto fare dei grandi compromessi perché l'idea che ho avuto di base è stata questa: ho tre dati per ogni giorno limitandomi in Italia, oh tre dati per un giorno che sono numero di ricoverati il numero di morti e il numero di casi risolti quindi dimessi in modo positivo quindi di ho tre numeri che girano quotidianamente. Questi tre numeri controllano tre oscillatori di un'onda non mi ricordo se quadrata se onda quadrata o onda quadra o triangolare, una delle due. Che cosa fanno questi tre numeri: mi sono dato una nota di partenza e una nota di arrivo

distante un'ottava ei tre numeri modulano il discostamento dal punto iniziale rispetto al punto finale quindi ho mappato l'ottava e man mano che il numero aumenta la nota si avvicina alla frequenza di partenza la frequenza di arrivo ma a mano che diminuisce ritorna indietro quando i numeri sono a zero ovviamente tutti i trascinatori sono consonanti sulla stessa nota. Questa cosa qua ho notato che faceva produrre, ovviamente i tre numeri non sono correlati tra di loro almeno non apparentemente, quindi man mano che i numeri si evolvono il discostamento microtonale rispetto alla nota di partenza genera una situazione molto caotica molto imprevedibile molto drammatica anche e soprattutto un side effect di questa cosa è stata quella di generare dei battimenti tra le tre frequenze che venivano riprodotte. In questo modo oltre a Il caos di avere delle note praticamente 99/100 stonate avevi anche il caos di queste frequenze fantasma tendenzialmente a bassa a bassa frequenza perché comunque all'interno di note che si muovono dell'ottava a che si andava a sommare ai suoni che già c'erano. E questo spalmato nell'arco di tempo dal primo caso registrato che era verso l'ultima settimana di febbraio mi pare, al momento in cui tu fai click sull'applicazione. Quindi questo risponde da una parte al portarlo ovunque a tutti, anche se siamo chiusi in casa e dall'altra parte risponde al dare un'idea di questa cosa qua, quanto è realmente caotica perché comunque ciò che ha mosso sia la precedente installazione che questa qui è un diciamo una mia idea, un mio un mio sentimento, che tendiamo ad addomesticare i numeri man mano che ci vengono buttati addosso soprattutto se abbiamo il bollettino quotidiano o addirittura più volte al giorno, dopo un certo punto non pensiamo più al numero come un qualcosa che si rifà a un'entità reale reale - il numero di morti di ricoverati - ma anche banalmente al numero di auto vendute – ci son solo tutti i dati che man mano che ci vengono sparati addosso a un certo punto ne perdiamo la consistenza ne prendiamo un po' il tatto. Soprattutto quando sono grandi numeri come ci sono adesso non non entro nel dettaglio però ci sono tante ricerche di chiamiamola psicologia di numeri che oltre una certa quantità ci è difficile capire realmente quanto è grosso quel numero lì 100.000 1.000.010 miliardi, sono dei numeri che da un certo punto in poi perdiamo un po' l'idea di che cosa rappresentano realmente, e quindi in questo modo dando un approccio aurale quindi un suono confuso che si evolve verso uno stato sempre più caotico man mano che i numeri aumentano e il ritorno in uno stato un po' più tranquillo calmo, man mano che i numeri tendono a diminuire, da' proprio cioè ti riconcilia un po' con il numero. Il numero non è più unicamente un dato che a a un

certo punto non capisci più realmente cosa vuol dire, ma è un suono, un qualcosa che ti deve infastidire ti cerca di provocare una reazione e questo è stato un po' l'approccio iniziale.

Poi ovviamente se tu la fai partire vedi che c'è anche questa figura che muta mentre cambiano i numeri: quello è stato un consiglio che mi è stato dato da una mia amica che mi diceva, di fatto il web è un mezzo visuale, non è un mezzo acustico quindi se non hai una specie di marchio, un qualche un simbolo, un una rappresentazione con la quale tu puoi accompagnare questa tua cosa, il pubblico o comunque le persone che possono ricevere questa questa cosa risulta notevolmente diminuito. Quindi per fare un po' un compromesso con l'idea della comunicazione web avere giusto un'immagine che faccia da gancio nel primo secondo di attenzione che hai sui social o comunque su internet, e poi ti porti ad aprire le orecchie, ad ascoltare quello che sta accadendo, ho pensato a questa specie di figura, che altro non sono che i numeri in coordinate polari e quindi fanno queste figure direi floreali che ti accompagnano nella nell'esecuzione. Poi ho aggiunto che ne so il tasto per aumentare la velocità, perché ogni giorno corrisponde a 10 secondi però ovviamente man mano che il tempo passa questa roba diventa lunghissima, sono mezz'ora, 40 minuti ed è uno span di attenzione che su internet è completamente impensabile. Quindi l'utente può cliccare. Quando ho pubblicato il sito ci ho infilato dentro uno script che mi dice quanto quante volte la gente clicca sul tasto Start e quante volte la gente clicca sul tasto avanti e rispetto al numero di start il numero di avanti sono molto minori di quelli che mi aspettavo, quindi il dato che ho recuperato è che chi arriva sul sito magari inizia, tante volte manda avanti poi quando la situazione si faceva un po' più caotica, quindi comunque acusticamente interessante, si fermavano. La tecnologia che usato è banalmente javascript per il sito cioè la libreria che genera delle onde molto banali. Era quello che mi serviva in quel momento.

Sara:

Sì sì sì è molto efficace infatti ipnotica. Io che sono stata ad ascoltare senza senza voler saltare in realtà, perché da ascoltatore l'approccio è più proprio quello dell'esperienza, cioè dell'esperienza poetica quindi ti ti ti cattura dai, hai voglia di capire come si è evoluta, anche se in realtà è nel passato rispetto al momento in cui ti trovi tu proprio perché c'è comunque, poi con questa mappatura c'è molto il senso del dell' evoluzione si. In realtà quindi non hai la sensazione che a volte succede nelle sonificazioni, specie quelle che usano note intonate, io

trovo, di una struttura che non va da nessuna parte, quindi dopo un po' perdi attenzione si. E quindi non vorrei subito saltare alle conclusioni, no soprattutto non voglio dirti cioè metterti in bocca cose che poi non hai non l'hai detto tu, però stavo prendendo i miei appunti e per esempio, ho analizzato molto il lavoro di una di un artista insomma che si chiama data driven dj e cioè il suo sito si chiama data driven dj, e lui ha fatto tantissimi lavori tra cui tra l'altro sulle migrazioni, non sui morti ma, si chiama Distance from Home ed è sulle distante percorse dai dai migranti quindi usa usa dei dati delle Nazioni Unite quindi proprio sui flussi migratori dagli anni 70. E però poi lui dice in tante occasioni che si occupa in realtà di temi sociali di temi caldi se vogliamo di interesse pubblico, però poi dice di essere agnostico rispetto ai dati cioè nel momento in cui si trova fare la la scelta del suono - lui anche fa fa ha un approccio algoritmico - e però ci vuole cioè nel senso che poi lui quando si trova a fare la scelta del materiale sonoro e sostiene di avere appunto questo approccio agnostico, per cui lui non vuole usare un materiale sonoro che possa poi dare al pubblico un giudizio di valore sui dati stessi. Per esempio ho fatto un lavoro Two Trains sulle differenze di...usa i dati delle differenze economiche di income, scusa sono un disastro con le traduzioni,

Chelidon:

No no va bene va bene in inglese

Sara:

Quindi praticamente sulle differenze di income in nei quartieri di New York attraversati dalla linea due della metro che praticamente vada dal Bronx a Manhattan e passa per queens eccetera e usa delle dei dei samples di presi da canzone, quindi dalla scena musicale di New York, per fare un omaggio già che c'era ai musicisti newyorchesi, visto che si parla di New York però tante volte questo comporta alla fine che nei quartieri dove il salario è più basso la musica è allegra molto allegra. Si viene creando quasi un effetto contrario, però giustamente lui dice mi tiro fuori rispetto al perché uno che è più povero deve essere triste no e con le con le migrazioni usa suoni da collezione di di campioni di musica folk praticamente di di vari varie origini però poi si perde perché c'è tanta roba, perché i dati da rappresentare, soltanto le grandezze sono tante e quindi non se non l' avessi letto poi magari lo ascolterai, non non avrei detto... Quindi diciamo che nel suo caso l' intenzione perché una mia domanda che appunto non ti voglio dare di cui non ti voglio dare la risposta però mi sembra che tu abbia una intenzione di comunicare poi con chi ascolta no eh cioè...

Io mi sono appuntata tre cose: l'obiettivo c'è che che vorrei approfondire qual è il tuo obiettivo e un po' meno me l'hai detto, nel senso che essendo tu una figura ibrida tra appunto avere le competenze tecniche per per poi la programmazione che tante volte serve io cioè quante volte quando si lavora con una grossa mole di dati è necessaria, io per esempio non ce l'ho, io mi devo fare aiutare e questo mi ha portato a esplorare altre modalità appunto di design di sound design se vuoi artigianale. Però poi quando hai a che fare con tanti dati soprattutto in tempo reale è inevitabile e però con l' approccio artistico che quindi ha degli obiettivi suoi propri che potremmo stare a parlarne per decenni no poi mi interessa appunto l'uso che fai del suono legato al tuo obiettivo perché mi sembra che tu ne faccia un uso metaforico un po', cioè che tu usi poi appunto suoni che hanno un significato rispetto ai dati che rappresentano, significato metaforico - che è una parola che si usa tanto nella rappresentazione dei dati in design l'uso di metafore, cioè che che traducano poi quello che i dati vogliono dire in quello che è il mezzo che tu, cioè del mezzo che tu scegli di usare, che può essere visivo e appunto per esempio nel visivo tutto il lavoro sul fatto che dice come rappresenti appunto dei dati che tu consideri drammatici: morti per armi da fuoco negli Stati Uniti magari non usi farfalline cuoricini o magari sì però perché. Allora mi chiedevo se conosci quest'altra questa cosa che è molto dibattuta in sonificazione diciamo tecnica che si chiama il mapping problem quindi io direi che che tu usi un il parameter mapping cosiddetto, direi cioè quindi alle dimensioni del suono tu tu associ dei parametri poi di di codice che che che poi scusa le dimensioni del dato esatto e questo mapping problem è un po' un tema caldo e nella così nella community della sonificazione e nella letteratura scientifica soprattutto accademica, ma perché appunto un po' appunto un po' il nocciolo di questo approccio perché se tu no cioè il punto è che spesso questo questo mapping non è compreso poi da chi che tante volte si usano dimensioni acustiche (il pitch la l'ampiezza) ovviamente chiare a chi lo fa, non necessariamente chiare a chi ascolta ascolta eh oh non oh non bastano forse. Non lo so per esempio c'è un altro esempio di sonificazione dei dati del covid di un mio collega dell'università di Belfast che c'è un centro sulle Sonic Arts. Era online perché ultimamente lo stavo cercando per scrivere questo famoso post se ce la faccio e non lo trovo più cioè mi risulta la pagina sia...intanto magari io lo cerco. E lui usa lo stesso usa il pitch cioè un pitch crescente al crescere dei dati, anche lui si è scontrato poi col problema che non ci stava più e e quindi ha anche lui ha trovato un po' una sua strategia

però usa dei suoni non capisco se usa dei suoni così di sintesi un po' nudi e crudi per cui in realtà tu poi comincii a sentire tutta questa sovrapposizione di sinusoidi fondamentalmente e non capisci più niente appunto anche perché non avendo più spazio poi anche lui ha cominciato a usare frequenze più gravi frequenza adesso non mi ricordo esattamente il principio cioè il mapping e boh il risultato è che tu senti tutta questa accozzaglia però il suono in sé non ti dice niente. La metafora di cui parlo, questo linguaggio, non ti dice niente, però poi uno può dire non m'interessa appunto come dice data driven Dj, dice quindi io sto sto riflettendo un po' su questi su questi temi perché nel design tutto sommato quest'idea del mapping problem un po' non esiste perché dipende molto da cioè dalle scelte che fai. tu le fai in base al problema specifico che che vuoi risolvere e a cosa vuoi esattamente comunicare a chi ascolta, quindi questo accento forte sulla comunicazione a chi ascolta ti fa fare il lavoro a ritroso che hai fatto anche tu, ripeto, non ti voglio...però se non sbaglio tu in entrambi i casi, prima mi hai parlato della composizione cioè come se l'ho visto in mente dove volevi arrivare sono riccamente forse non so si nel primo caso si nel primo caso soprattutto lo so appuntato e poi e poi appunto sei andato a ritroso a vedere come come arrivare a quel punto lì.

Chelidon F.:

Sicuramente sulla prima sì, avevo in testa l'idea proprio di metaforica di metafora è la parola che hai detto te, però sì la metafora che avevo in testa era l'idea di una pioggia di suoni e per far questo il suono doveva essere il più breve possibile e il più concentrato possibile, quindi poco riverberato, molto a livello di impulso e via dicendo. Da quello, da quell'idea iniziale, dal voler trasformare quei dati in forma sensibile ho fatto appunto il salto: all'inizio diciamo partiamo dal numero, sistemiamo questi dati, cerchiamo di convertirlo in un qualcosa di fatto il primo è stato un orrore, nel senso che provavo delle varie soluzioni funziona non funziona...man mano che faccio queste sperimentazioni di fatto tiro fuori delle nuove regole, e queste sono poi diventate le regole dell'interazione finale. Però diciamo che sul primo l'obiettivo era trovare un modo di comunicare quel dato lì, non necessariamente comunicare nella sua interezza quindi far sì che una persona immersa all'interno di questa installazione potesse capire in ogni istante cosa stava accadendo. Mi interessava più una reazione di pancia, quindi vengo travolto da questo flusso sonoro e capisco in maniera il più intuitiva possibile quanto questo flusso sonoro corrisponda un aspetto terrificante della nostra realtà e per far questo effettivamente poi l'idea

del dei suoni localizzati, che man mano aumentano man mano che aumentano i numeri e però rimangono comunque sempre molto minuti, molto appunto a livello di impulso, ha fatto sì che chi passava in mezzo in quella via, rimanesse in qualche modo colpito perché qual è stato il il il punto di forza di quella scelta lì: prima di tutto averlo messo nella Hall della Bocconi in cui passano penso 6000 persone al giorno, quindi metterla in un posto non vorrei dire scomodo però un posto in cui tendenzialmente una persona passa o al più si ferma per che ne so, a parlare con gli amici piuttosto che a fumarsi una sigaretta, cioè un posto comunque informale, e quindi l'idea è stata ok piazziamo questa cosa che deve essere fastidiosa in un posto informale, in cui una persona che sta passando non sta sicuramente riflettendo su quell'aspetto lì. A un certo punto viene investito da un qualcosa e qualcosa doveva essere un qualcosa che comunicasse con lo spazio, se io ti metto un drone che va avanti per tre ore di fila tu passi lo senti dal fondo del corridoio man mano che ti avvicini continui a sentirlo ti allontani, lo continui a sentire torni la sera il suono è più o meno lo stesso magari aumentato di pitch magari, però è quel tipo di timbro lì. Invece avendo un suono che di fatto rompe il silenzio, tu puoi passare la mattina ed essere super tranquillo, c'è un bip ogni tanto, è una cosa che magari non non ti non ti interessa neanche più di tanto. Però man mano che la cosa si evolve, passi da un altro punto della giornata in una cascata completamente diversa di suoni, passi in un altro momento ancora diverso. Tutti i suoni comunque tendenzialmente rompono il silenzio, quindi è un qualcosa che tu non ti aspetti e in quel contesto lì se rivelato vincente più che altro andando a posteriori a recuperare alcune delle opinioni di qualcuno che comunque ha detto ha voluto esprimere la sua opinione, sia in modo positivo che negativo, c'è qualcuno che mi ha detto, a me sta roba qua molto fastidio perché quello lì è un posto in cui io voglio casseggiare e con una roba del genere non posso, mi da' fastidio. E tra tutti i ritorni ho detto bene, questo qua è il ritorno migliore, perché vuol dire che questa cosa qua in qualche modo ha raggiunto un po' l'obiettivo che mi ero dato cioè confrontarti con il problema in un momento in cui non ci stai pensando.

Quindi diciamo per fare un po' il riassunto della roba è stato anche un po' l'ambiente che mi ha dato in qualche modo l'idea di come scegliere il suono, quindi non c'è stata inizialmente né un obiettivo preciso nel senso l'obiettivo molto teorico quindi portare questi numeri questa idea qua si è andata un po' a innestare sul luogo in cui veniva rappresentato. Il luogo in qualche modo ha suggerito forse anche un po' per antitesi, qual era la scelta migliore dal punto di vista del suono da portare poi nel

suono. Effettivamente io c'ho infilato un senso metaforico, non volevo che fossero solo a caso, aveva delle sue connotazioni, quindi essere appunto un impulso molto facilmente pitchabile sulla scala e via dicendo, ciò volutamente il suono di sonar perché in qualche modo era un suono che nella mia testa si come dire adattava bene al messaggio nella sua globalità. Perché comunque mi trovo un po' in contrasto con quello di data driven dj, nel senso che se tu scegli di sonificare un dato set di numeri, può essere in positivo o in negativo quel dataset in qualche modo ti interessa, non e non puoi secondo me tirarti completamente fuori da quello che stai facendo e esternalizzati completamente, a perché comunque necessariament e un certo punto almeno due decisioni devi prendere: devi scegliere che numeri portare e che suono dare a quei numeri anche il scegliere che ne so ho un set di 1000 suoni casuali e estraggo casualmente comunque un set, ho costruito anche la scelta di non scegliere specificatamente e comunque è una è una scelta alla fine. Quindi se ti puoi tirare quanto vuoi all'infuori, ma non completamente cioè c'è un comunque un bordo secondo me oltre il quale non puoi fare più passi all'esterno altrimenti non è che stai facendo dell'altro non lo stai proprio facendo secondo me, e quindi sì lì la scelta è stata molto legata all'ambiente. Su quella del covid invece in realtà mi è proprio cioè non è stata una scelta ragionata, perché ovviamente la cosa più semplice è rifaccio alla stessa roba che ho fatto prima per quanto riguarda i dati della lista con i dati del covid, però i dati della lista funzionavano perché essendo dal vivo ed essendo multicanale tu passi ti senti un po' circondato, comunque hai questo muro di cose che ti arrivano. Qui la fruizione è comunque stereofonica, molto frequentemente dalle casse del computer piuttosto che dall'autoparlante del telefono, in qualche caso con delle cuffie. Quindi un suono vago che arriva rompe il silenzio, non è molto legato al medium su cui si sta rapportando, perché comunque in questo caso tu hai un'interazione attiva cioè sei finito su un sito, qui sotto ti dice di cliccare su un bottone per far partire una cosa, quando clicchi sul bottone parte la cosa, quindi ci sono tutte le scelte una serie di scelte che fa alla fine l'utente finale che nell'altro caso non c'erano. Questa scelta questo tipo anche in questo caso quindi sembra sembra direi che è stato l'ambiente in questo caso digitale fittizio a condizionare un po' la scelta del suono. In questo caso non ho cercato un suono significativo perché banalmente non me ne è venuto in mente nessuno, ho pensato quale fosse il suono più facilmente caotico da una parte e parallelamente il più semplice possibile da generare. Il più semplice possibile da generare erano ovviamente delle onde base

quindi a dente di sega ho scelto quella che ho scelto non mi ricordo se triangolare o quadrata, perché sono quelle ho avuto l' impressione su vari tentativi che ascoltando le cuffie fossero più evidenti quindi le le senti subito quando attacchi le cuffie, invece onda sinusoidale rischiava di rimanere un po' sotto la soglia di percezione diciamo, invece comunque, sono onde che hanno dentro tanti e tanti armoniche ed è più facile diciamo rimanerne in qualche modo attaccati. Era più facilmente caoticizzabile perché parti io faccio variare dei parametri minimi, in questo caso il pitch, mi basta pochissimo per generare un qualcosa che sia che sia caotico. In questo caso qua si c'era un intento anche in questo caso c'è un intento ben preciso, che era quello di dare l'idea del caos di una situazione che comunque ci c'era sfuggita di mano, non ne avevamo secondo me grande polso, più che per tutta la serie di motivi perché eravamo fondamentalmente la maggior parte chiusi in casa, quindi il modo con cui percepiamo il il fatto era la televisione, internet, eravamo in un cioè un infermiere in quel frangente viveva una situazione infernale, completamente diversa di quella percepita da noi. Non mi piace la metafora della guerra, però effettivamente su alcune cose è stata molto funzionale, nel senso che comunque alla fine un infermiere non era molto lontano da una trincea, c'era più la prima linea, anche se questo linguaggio militare comunque non mi entusiasma, noi comunque eravamo tanti di noi chiusi in casa, fruivamo questa cosa come dei dati come dei numeri come delle voci dicendo quindi se avevamo 8000 ricoverati in un giorno quanto sono 8002, un giorno boh cioè si si si fa differenza con 6000 fa differenza con 10.000 e questo questa cosa qua è stata un po' l'obiettivo invece di questa seconda seconda cosa: dare l'idea del caos in un momento in cui non ce l'abbiamo o se ce l' avevamo l' avevamo nel modo secondo me non completo, qualche modo annacquato annebbiato stemperato poi, nel senso che chiusi in casa c'è qualcuno che ce l'aveva non dico degli altri problemi, però avevi il problema degli affetti, delle persone con cui condividi la casa problemi molto più quotidiani diciamo dovute al lockdown. Quindi c'era comunque un qualche modo un distanziarsi da quel tipo di dati, che però erano il fatto fondamentale il motivo per cui stavamo chiusi in cas,a era il motivo per cui per andare a far la spesa devo fare la fila tutta una serie di di riflessioni sulla vita quotidiana alla fine. Sul mapping problem che hai cercato un po' di introdurmi prima, allora non saprei dire cioè diciamo l' approccio che ho sempre avuto è stato tenere le cose il più semplici possibili perché ho avuto la percezione che chi fosse dall'altra parte non gli interessasse molto: ah guarda questi 5 numeri faccio variare 40 parametri un

sintetizzatore...non arriva molto arriva molto la pancia a chi non è diciamo un ascoltatore educateo e sa come ascoltare e via dicendo. Quindi sono un po' che le le cose che vengono percepite, sia inconsciamente che consciamente, da un ascoltatore diciamo occasionale e queste sono banalmente l'altezza del suono la lunghezza il timbro, magari sia un po' più acido un po' meno acido un po' più limato meno limato, e quindi cerco sempre determinati parametri il più immediati possibile e soprattutto in entrambi i casi ho avuto un approccio dal punto di vista dello l'ascoltatore occasionale. Quindi banalmente ho chiuso gli occhi, ho aperto soltanto le cuffie, ho ascoltato cercando cioè una specie di ascolto ridotto ma allo stesso tempo come dire casuale, non troppo impegnato, per cercare di capire in cercando di toglimi un po' da me stesso, se effettivamente quello che stavo ascoltando stava comunicando qualcosa di immediato. Che realmente poi è qualcosa che io all'inizio ho cercato di dare come senso sulla lista sì e c'è stato c'è stato un momento in cui avevo installato qui in questa stanza che è il mio studio e l'ho fatta girare un po' di volte per capire se rasberry reggeva oltre due ore e mezza senza prendermi fuoco. Ce l'ha fatta e però a un certo punto l'ho lasciato andare ho fatto le mie cose in casa cenato a un certo punto stavo andando in bagno sono passato e suonava in un certo punto ho avuto proprio la reazione da da ascoltatore, ho detto cacchio sta suonando e questo vuol dire qualcosa e' stato proprio un momento da sai proprio quando terremo un flash no istantaneo dici ah ok sta funzionando nel modo in cui l'ho pensata, però l'avevo proprio percepito più che intellettualizzato diciamo. Sul COVID non ho avuto un'esperienza simile eh eh però diciamo nelle fasi un po' embrionali l'ho fatto ascoltare a qualcuno che poi sono le persone che mi hanno aiutato sulla parte diciamo più comunicazione, ed effettivamente la prima persona a cui ho fatto ascoltare mai detto ok mi hai fatto passare 5 minuti di angoscia perché ho fatto l'esperimento, e quindi la prima reazione è stata effettivamente di angoscia quindi vuol dire che quel tipo di combinazione di parametri minimi stavano generando un qualcosa di direzionato in quello che mi ero prefissato all'inizio e poi entrando poi nel dettaglio allora si si è svelata anche la a il significato è una cosa poi che ho anche raccolto a posteriori un po' come per per per la lista questo caso sui social e via dicendo i vari commenti le reazioni erano proprio più di angoscia di paura e di sconforto, di reazioni di pancia giustamente perché purtroppo alla fine il mezzo del social ti permett di comunicare quel tipo poi si magari riusciamo a discutere mentre uno in occuparsene un po' più profondità però il la

prima risposta è quella. Però se questa interazione ha fatto sì che qualcuno ha preso voglia di commentare sotto questa cosa e dare una propria un proprio feedback, vuol dire che in mezzo in mezzo c'è stato un qualcosa che ha funzionato rispetto agli obiettivi. Quindi ritornando appunto questo problema del mapping, tendenzialmente io cerco di tenermi il più semplice possibile perché anche come ascoltatore mi sono accorto che se in alcuni casi di sonorizzazione facciamo prima l'esempio banale delle musiche dei pianeti ma anche delle cose magari un po' più strutturate e via dicendo, rischi che un certo punto dici minchia figata sta roba, va che suoni e via dicendo, ma cosa sta accadendo, sta accadendo qualcosa? Se arrivo fra un'ora questa cosa è diversa perché sono diversi dati o diverso perché sotto c'è qualcosa che la fa cambiare? Molto spesso perdi un po' la percezione come ascoltatore su questa cosa.

Sara:

Sì sì sì sì assolutamente. Tutto molto molto interessante appunto non ti non voglio ri commentare troppo perché sennò poi non so più se non cose che sai e ti ho involontariamente fatto dire, però tutto utilissimo quello che mi stai dicendo ecco. Molto interessante il tuo lavoro, il tuo approccio. Posso chiederti se insomma quello che mi puoi dire di più del tuo lavoro normale normale che sì, in che campo ti muovi perché vorrei capire se ci sono delle sei corrispondente nel tuo approccio.

Chelidon:

Io sono sviluppatore e faccio software al 90% per banche quindi le comunicazioni sono dal punto di vista tecnico perché quello che imparo sul lavoro tendenzialmente lo sfrutto per i fatti miei eh eh non lo lascio soltanto al grande capitale diciamo così, ma lo uso anche per le mie attività e soprattutto ho imparato a maneggiare grossi set di dati che è una cosa che mi ha semplificato terribilmente la vita in una certa fase di queste cose. Però diciamo che dal punto di vista degli esiti direi che non c'è assolutamente sovrapposizione tra i due mondi, nel senso che il lavoro che faccio tendenzialmente è orientato a emettere polizze si forse fare qualche grafico per qualche utente un po' più progressista diciamo però...sono cose tipo cioè software di di come dire la banca per il cliente o per i clienti delle banche, applicazioni di gestione di dati, sia tu che vai vuoi fare la polizza vita per i fatti tuoi sia tu dall'altra parte dello sportello che devi che ne so inserire i dati della persona che ti è arrivata piuttosto che dire vabbè voglio investire 10.000 € quali sono i rischi quanto ci guadagno quanto ci perde...dentro quella roba lì io faccio el'interfaccia anche cioè comunque il meccanismo di calcolo

che c'è dietro, si quello che si chiama full stack nel senso che si occupa del fronte anche del back end.

Sara:

Ah vedi no perché secondo me c'è una influenza, nel senso che probabilmente una attitudine acquisita tua di di ragionare su poi chi ascolta che ti dico è quello che io vedo, che chiamerei anche parte di un di un approccio di di design nel senso soprattutto design di prodotti digitali, quindi comunque una attenzione alla all'usabilità e e comunque a alla user experience eccetera, che ti posso assicurare dopo tre anni di ricerca a tempo pieno che non è assolutamente l'attitudine più comune in questo campo, cioè il tipico sonificatore che sta dentro l'accademia non ha nessuna assolutamente idea di di cosa provi o non gli interessa nemmeno quello che ascolta. Quindi davvero questa centralità della parte di di mappatura dei parametri diventa la cosa principale, senza cioè, perdendo poi di vista tutto il resto e anche tanti artisti e adesso secondo me questo è un vantaggio forse imprevisto che tu hai, che ti viene però anche dall'altro lavoro, non vorrei dirlo ecco come dire per quello che ho potuto per la mia anche conoscenza di diciamo che anch'io vengo dall'industria tra virgolette e e quindi la l'abitudine di pensare poi a chi ascolta non è non è così diffusa fatto vedi l'arte contemporanea tante volte no che non riesce poi a comunicare perché ha un po' perso l'idea...Quindi hai familiarità con user testing anche test user testing o no?

Chelidon F.:

Assolutamente sì

Sara:

Sì sì sì no ma infatti me lo aspettavo, perché secondo me da quello poi che hai fatto cioè comunque fare un prototipo fra virgolette di sonificazione comunque artistiche a farlo sentire ad altre persone e utilizzare il feedback che loro ti hanno dato per questo e non è non è un approccio comune, però secondo me si vede poi l'efficacia perché dico rispetto alla sonificazione del covid di questa persona professore di di Belfast che secondo me è un puro esperimento ok sì sì una canzone dei numeri con il mezzo sonoro qualcosa cioè se ovviamente si adatta per farlo funzionare però sì sì chiaro chiaro sì forse tu sarai un po' l'unica figura di questo tipo figura diciamo così che persona no l'unico artista di con queste caratteristiche speciali secondo me perché comunque dai non ci si può chiamare fuori come dici tu nel momento in cui si lavora con i dati in questa società ormai non ci si può esimere dal

voler essere compresi. Comunque ho scelto questi dati da cosa ritengo interessante far arrivare fuori e ovviamente a partire da questo già c'è una presa di posizione sennò sarebbe banalmente cioè se ti volessi davvero tirare fuori ma siamo sempre lì cioè potresti girarti un set di dati completamente casuale però anche la non scelta comunque è un fatto politico alla fine, si cioè è inevitabile certo soprattutto se poi lavori o comunichi con il con un pubblico di cui poi tu non puoi prevedere le caratteristiche certo perché il lavoro che ho fatto io in questi in questi ultimi anni è per user esperti che comunque hanno degli obiettivi specifici delle task specifiche da portare a termine, e anche un profilo specifico. Sto lavorando ad un progetto di sonificazione per quanto riguardava una software house per poter come dire interpretare sonicamente attacchi hacker

Chelidon F.:

M'ha fatto venire in mente una cosa che c'entra in qualche modo che questo questa estensione che è stata fatta per Chrome e per Firefox che praticamente emette dei suoni in base al tipo di cookie che vengono salvati sul sul computer in base alla diciamo alla malevolenza del cookie quindi che ne so emette un suono diverso più o meno fastidioso. Mi era capitato di aprire tipo alla pagina di ali express è uscita una roba cacofonica in un modo incredibile però è è stato poi ti tel e ti giro il nome, adesso devo recuperarla che non mi ricordo. Per il browser l'ho installata e è molto affascinante perché ti capita molto spesso che ne so, sto compilando un form banalissimo e a certo punto senti questo suono tipo a tipo onda triangolare che compare ogni volta che magari metti qualcosa, una parola dentro un input piuttosto che clicchi su un bottone, sono tutte delle cose che ma alle volte magari servono semplicemente per misurarti la user experience, migliorarti cioè la volta dopo che ritorni trovi il form già compilato, piuttosto che di suggerimenti però alle volte sono proprio dei cookie di tracciamento quando fai che ne so navigazione su FB e suonano come dei suoni super riverberati e danno proprio l'idea di delle cose che come del fumo nero che ti sta ti sta circondando. Molto affascinante come come strumento. Anche perché poi in realtà rende visibile cioè udibile in questo caso però è lì l'invisibile e soprattutto collegato a gesti di cui tu non sei assolutamente consapevole nemmeno che stai facendo tanto esattamente sono automatizzati.

Sara:

Molto interessante no io sto sto usando un paesaggio sonoro di foresta anche perché mi è stato chiesto da da loro ok che comunque loro

lo devono ascoltare in ufficio tutto il giorno, quindi ci sarebbero dei problemi di usabilità nell'usare anch'io pensavo di usare la distorsione inizialmente però a parte che non è semplice perché i dati sono tanti e arrivano continuamente sono proprio realtà in realtà in quella dell'acquedotto no in realtà è in pseudo real time su ogni quarto d'ora perché comunque sono sistemi che collassano potenzialmente molto più lentamente quindi anche se c'è un attacco in ogni quarto d'ora va più che bene. Però lì invece le le reti internet ovviamente sì sì sì certo viaggiano in realtà mi arrivano comunque un sacco di dati e quindi se comincia a distorcere tutti i vari dati che rappresentano varie elementi della rete e diventi pazzo quindi serviva un po' una metafora appunto che richiedesse uno sforzo cognitivo bassissimo su cose che già riconosci e possibilmente piacevoli nel senso che possono stare nel background finché non c'è un allarme vero, che poi ci sono un sacco di allerte di anomalie ma non solo anomalie malevoli sono comportamenti anomali nella rete però non significava niente e quindi stiamo usando la pioggia e il temporale temporale quando c'è quando c'è l'attacco .E altrimenti come insomma succedono delle cose tu senti più certi animali della foresta gli altri ma comunque non ho fatto non ho potuto fare il test perché genera nell'ambiente reale perché c'è stato quello che sappiamo, quindi speriamo in autunno per vedere se poi un po' funziona. Però sempre con l'idea che poi loro però questi operatori possano praticamente monitorare perifericamente mentre fanno altro e poi nel momento in cui l'allerta diventa più concreta vanno poi a cercarsi dati sul visivo e funziona da richiamo. Chiacchierata molto molto molto utile per me per la mia ricerca molto interessante e mi piace molto il tuo lavoro davvero.

Chelidon F.:

Comunque alcune domande mi hanno fatto fare delle ricerche banalmente non avevo mai non avevo mai collegato al fatto che entrambe le installazioni fossero in qualche modo state determinate per determinate dall'ambiente in cui erano era una riflessione che avevo fatto sicuramente sulla prima, sulla seconda non avevo non non avevo mai fatto questo collegamento di impara almeno quindi è stato sicuramente l'ultimo sì sì che poi EA volerlo magari etichettare è il contesto d'uso. Mi vien da dire che comunque la considerazione di chi ascolta gli obiettivi di chi ascolta occupano meno quelli che che tu vuoi siano gli obiettivi quindi sviluppare una consapevolezza in questo caso riguardo ad un problema a quello che tu consideri un problema sociale insomma e pubblico non so come dire una cosa da che vale la pena su

cui vale la pena far riflettere e qual è il contesto in cui questa relazione poi quei dati si sviluppa, si consuma, quindi in un caso in un contesto fisico e nell'altro un contesto digitale però comunque tu lo prendi in considerazione. E quindi la scelta dei suoni la scelta è molto legata a questo, perché la scelta dei suoni la scelta di come si comportano i suoni perché appunto su internet non posso pretendere che la persona stia lì ad ascoltare tutto il tempo e quindi di conseguenza ho aggiunto un tipo di interazione visuale in quel caso e la possibilità di saltare mentre nello spazio fisico ti andava benissimo anche un passaggio così casuale proprio perché era in realtà era disturbare un'attività che comunque fisica che comunque l'ascoltatore avrebbe fatto. Tant'è che nella prima alle volte capitavano delle mezz'ore di silenzio tranquillamente senza problemi come anche delle mezz'ore di roba costante. Proprio World soundscape quindi bello. Il problema con le installazioni che poi documentarle non è così facile.

Sara:

No esatto. Bene grazie mille Alessio, davvero informativo, se poi magari mi dovessero da qui a quando consegnerò la tesi che è a fine anno, magari mi riservo di di riscriverti ecco solitamente si degli sviluppi mi portano a pensare altre cose volerti chiedere altre cose.

Chelidon F.:

Va bene, dai grazie mille grazie a te grazie.

Sara:

Buona serata lavoro buon tutto mi raccomando buona fase nuova normalità. Ciao.

Interviews to expert users - Chapter 4

The full transcript of the interviews to experts that were part of the experimental protocol for the Design Action 1, illustrated in Chapter 4, follows.

Experts are anonimous and identified by the code ‘Tx’, where ‘x’ is the progressive number used in the quantitative analysis of Chapter 4. The order of the interviews follows the order of the analysis.

The first interview, in Italian, was manually transcribed. All the other interviews were transcribed used the online service Temi (https://www.temi.com/).

Tester 1

Sara: T1, tu hai avuto modo di leggere il documento, che copriva più o meno le aree di questo colloquio?

T1: Sì, sì sì

Sara: Vai perfetto, e poi Ginevra ha preparato un file con i tuoi risultati

T1: Ok

Ginevra: Adesso te lo mando

Sara: Così vediamo, lo possiamo guardare

Ginevra: Lo mando qua nella conversazione, dimmi se lo ricevi

T1: Eh, la chat è qua, sì...

Ginevra: Sì ok. Allora tieni presente che sono i quattro scenari. Sulla sinistra trovi quello che abbiamo definito noi come gravità della sonificazione mentre sulla destra ci sono le tue risposte, poi va bhè dovremo trovare un modo per analizzarle...

T1: Ah si. Ok

Ginevra: ...era per avere un'idea di quello che è il corrispettivo, ecco

T1: Ok

Sara: Bene possiamo guardarlo mano a mano che arriviamo più nel dettaglio di questo tema. Possiamo partire con le domande direi. Noi abbiamo la nostra scaletta che è un pò più dettagliata rispetto quella che hai ricevuto tu. Se ti va bene iniziamo, che ne dici? Vuoi iniziare tu Ginevra?

T1: Sì, sì va bene va bene

Ginevra: Va bene, allora, in generale la prima parte era un pò più riguardo il contesto, quindi ci chiedevamo se sei sempre riuscito a sentire i suoni o se hai avuto particolari problemi con il fatto che ad ogni ora ci fosse questa sonificazione a cui far riferimento

T1: Sì li ho sentiti tutti, in realtà non ho avuto problemi tecnici. Sì magari mentre stavi lavorando ti dovevi ricordare, cioè appena sentivo il suono dovevo spegnere subito la musica per ascoltare e esser un attimo concentrato poi a volte finiti i suoni andavo indietro sulla pagina dove c'era la libreria dei suoni [legenda] per capire cosa avevo ascoltato. Perchè cioè magari le prime ore non era facile ricordarsi tutti i significati e bisognava un attimo memorizzarli, però magari verso fine giornata era più facile andare all'orecchio.

Ginevra: Ok quindi, infatti noi ci ricordavamo che tu avessi menzionato la musica, perché tu ascolti la musica di solito quando lavori. Quindi tu praticamente sentivi la musica e quando sentivi il primo suono la spegnevi? È così che hai fatto?

T1: Sì esatto

Ginevra: E poi la facevi ripartire ok. Pensi che questi suoni potrebbero essere realmente utili in un contesto vero? Ti ricordo che comunque lo scopo della sonificazione non è quello di coprire tutte le informazioni che poi sono compito dell'analista ma di avere queste sonificazioni ogni ora che, nel caso in cui segnali un'anomalia, appunto inviti l'analista su un'interfaccia visiva ad indagare meglio tutte le parti. Però questa introduzione di suono pensi che possa essere utile nel contesto reale oppure no?

T1: Forse fatto mantenendo tutti i suoni separati. Secondo me, visto che ci sono 5 zone, avere le 5 zone separate, non sovrapposte come suono potrebbe risultare più immediato. In generale penso che è utile che ci possa essere un feedback uditivo però io lascerei ogni suono di ogni zona separata e non sovrapposta agli altri.

Ginevra: Quindi comunque la divisione in zone reputi che sia una cosa utile da mantenere, oppure lo vedi solo come un metodo per dividere il suono perchè hai percepito come complicato il fatto che fossero 5 suoni a volte sovrapposti

T1: Avere il fatto dei suoni sovrapposti era un pò più difficile da capire, perchè dovevi andare a capire l'accordo che si andava a creare quando i suoni andavano assieme e nella libreria [legenda] si sentivano da soli e poi dovevi capire qual'era la combinazione che stava uscendo

Ginevra: Qua ti riferisci ad entrambi i tipi di scenario, giusto?

T1: Sì, soprattutto allo scenario 1 in cui vanno tutti assieme. Mentre l'altro aveva il loop, l'intensità è fatto con il suono ripetuto più frequentemente, quello è un pò più facile

Ginevra: Ok. E quindi invece dal punto di vista tecnico, hai detto che non hai avuto particolari problemi anzi tra parentesi, grazie per aver risolto quella cosa che all'inizio non capivamo cosa fosse infatti poi non ci sono stati più problemi, tu usavi delle cuffie o qualcos'altro?

T1: Sì

Ginevra: Usavi delle cuffie ok, che tenevi su tutto il tempo... perchè nel resto del tempo ascoltavi la musica?

T1: Sì

Ginevra: Giusto?

T1: Esatto. Oppure magari se non stavo ascoltando la musica le tiravo su all'ora che c'era il suono

Ginevra: Ok. Quindi comunque avevi il riferimento dell'orologio, possiamo dire

T1: Sì

Ginevra: Lo spazio intorno a te è particolarmente rumoroso?

T1: Si può dire che le cuffie che uso hanno la riduzione del rumore attiva quindi non venivo disturbato dal rumore attorno

Ginevra: Invece riguardo la...

Sara: Aspetta Ginevra volevo chiedere un paio di cose

Ginevra: Vai

Sara: Su questa prima parte. Magari parto dalle cuffie perchè mi ricordo meglio. Quindi tu normalmente nel tuo contesto di lavoro, tu hai sempre su le cuffie, non ti danno fastidio, ascolti musica sempre?

T1: No perchè...sì più o meno sì

Sara: Intorno a te ci sono altre persone? Cioè devi comunque parlare?

T1: Sì, siamo... io lavoro per i fatti miei però sì, ci sono altre 5 persono affianco a me e alcune sono dietro

Sara: E se vi dovete parlare ti togli le cuffie, ti fanno notare che ti devono parlare

T1: Esatto

Sara: Ti battono su una spalla

T1: Si cioè si fanno vedere, ti passano di fianco e si fanno vedere

Sara: Ok ok è per capire meglio il contesto. Volevamo sapere... avevamo messo il particolare se le cuffie fossero wireless o con cavo

T1: Sì, sono wireless con la riduzione del rumore

Sara: Ah ok quindi in teoria ti puoi alzare e muoverti entro un certo raggio insomma

T1: Sì esatto, sì sì

Sara: Perfetto, grazie e invece riguardo la domanda 1 mi interessava un pò approfondire questo aspetto

del fatto che trovi difficile distinguere i distretti, cosa su cui sono d'accordo, nel senso, lo sarebbe per chiunque, però nel caso in cui tu non hai riscontrato anomalie, che poi tra l'altro vedremo dai tuoi risultati che i tuoi risultati sono ottimi devo dire, insomma sembra che tu abbia capito l'informazione che il suono mandava

T1: Sì, però dovevo prestare particolarmente attenzione, cioè dovevo smettere di fare tutto, cioè non è come uno che ti parla e intanto stai facendo qualcos'altro e riesci comunque a capire cosa ti dice. Dovevo focalizzarmi attentamente su quello che stava succedendo nell'audio per capire cosa c'era

Sara: Quindi anche il caso in cui suonino tutti insieme... perché questo vedo che tu l'hai recepito, che quando suonano tutti insieme non c'è nessuna anomalia

T1: Cioè in che senso? Che se suonano tutti insieme il primo secondo e basta non c'è nessuna anomalia

Sara: Sì

T1: Beh perchè quello è abbastanza... Cioè ti aspetti, mi aspettavo che il primo secondo tutti i suoni fossero assieme, poi alcuni continuavano altri no, se non sentivo più niente ok, ero tranquillo che non c'era niente. Cioè su quello sì, è comodo sapere che il primo secondo, se ci deve essere qualcosa oltre il primo secondo si sente ancora se non c'è niente non si sente più niente

Sara: Quindi tu nel caso, scusa, non ti voglio mettere in bocca le risposte, volevo capire un attimo la dimensione psicologica passami il termine, cioè tu presti attenzione, quando ti rendi conto che nessun suono continua ti puoi rilassare

T1: Esatto e se invece continuano bisogna stare attentissimi a capire chi di quelli sta ancora suonando

Sara: Ok. Va bene grazie, volevo solo saperne un pò di più. Possiamo proseguire

Ginevra: Sì, riguardo il training invece, ci chiedevamo se secondo te sia stato sufficiente. Hai accennato prima al fatto che dopo la sonificazione hai provato a tornare sulla pagina della libreria [legenda] per sentire la differenza tra i distretti

T1: Esatto sì, cioè in generale era chiaro lo scopo, l'organizzazione, cioè sentendoli prima di fare gli esperimenti dicevo, mano a mano che sento un suono più grave sta scendendo la scala, cioè si

partiva dall'uno che era il più acuto, al 5 che era il più grave, cerco di far riferimento a questa cosa, se sento un suono molto grave, allora so che sarà la 4 o la 5, però poi sentendoli tutti assieme a volte era un attimo difficile distinguere tra, che ne so 3, 4, 2, 3, quelli vicini, quando magari suonavano assieme era difficile

Ginevra: Però hai anche accennato al fatto che magari a fine giornata questa cosa ti veniva un po più naturale. Pensi che magari andando avanti o utilizzando questa cosa per un periodo di tempo un pò più lungo questo sia un problema superabile o no?

T1: Sì può essere che dopo un pò di giorni che lo fai tutti i giorni magari anche un pò più frequentemente che per un ora al giorno diventi naturale e che lo riconosci come un input che comprendi senza bisogno di sforzo, cioè è possibile

Ginevra: Invece riguardo la presentazione di tutto il progetto, prima di iniziare il test avevi chiaro lo scopo del progetto, quale fosse lo scopo, l'idea della sonificazioni... ti era chiara questa parte?

T1: Sì, sì

Ginevra: Sara se hai qualcosa da aggiungere...

Sara: Sì, stavo pensando al training, che forse si potrebbero pensare anche ad altre modalità, tu ti sei trovato una tua strategia di fatto, cioè sentivi il suono e poi tornavi alla legenda per vedere se ti avrebbe aiutato a collegare quello che avevi sentito con quello... con il significato praticamente, giusto?

T1: Sì perchè magari c'erano due o tre suoni che andavano quando c'era un'anomalia e per essere sicuro cercavo di memorizzare quali fossero i suoni che avevo appena sentito per fare un controllo e dire ok, questo suono si chiama zona 2, quest'altro suono si chiama zona 3, per essere sicuro

Sara: Sì certo se fossero più zone o meno zone potrebbero influire... sto ragionando a voce alta

T1: Se fossero 10 zone diventa davvero complesso memorizzare tutti i suoni a meno che siano particolarmente diversi, mi viene in mente, fossero suonati da strumenti diversi che hanno tonalità diverse forse sarebbe più facile non so, perchè questi mi sembravano di una scala tonale dello stesso strumento se non erro

Sara: Sì

T1: Se magari che ne so uno è pianoforte l'altro un oboe e l'altro un

violino, si capisce più facilmente chi è cosa

Sara: ...eh si anche questo sarebbe da provare. Una cosa su cui ci siamo interrogata a lungo con Ginevra, abbiamo fatto varie prove, tu probabilmente hai una dimestichezza superiore alla media come competenza musicale però anche questo sarebbe da dimostrare... però sì interessante. Rispetto l'idea ovviamente tu ti sei basato, tu avevi accesso sulle informazioni sonore da cui l'esigenza di distinguere i distretti direttamente nel suono invece che le informazioni sonoreaccoppiate ad una mappa visiva in cui di fatto tu i distretti li vedi

T1: Sì io avevo pensato ad una cosa. Poteva essere che prima di ogni suoni si sentisse una voce che diceva 'Zona uno' e partiva il suono della sua anomalia, 'Zona due' e partiva il secondo suono, de l'anomalia relativa alla seconda zona. Così diventa il linguaggio naturale, più un suono

Sara: Sì così diventa ultra chiaro, ...come tempistiche? Perchè tu hai detto che devi prestare attenzioneanche nel caso in cui il suono duri un secondo a quel punto l'attenzione è sul dopo nel senso...

T1: Sì esatto sì, quelli di un secondo hai già la seconda ripetizione, sei sicuro che non c'è niente

Sara: Si è fuso con il tuo processo di lavoro abbastanza bene o ti ha richiesto l'interruzione?

T1: Sicuramente c'era un suono che era secondo me, vediamo vado un attimo sul sito, era scenario... uno dei quattro mi dava particolarmente fastidio

Sara: Ah bene, cioè buono a sapersi

T1: ...ah è occupato dalla chiamata mi sa che non mi fa sentire i suoni

Sara: Abbiamo poi una domanda specifica sui suoni fastidiosi o piacevoli

T1: Ah ok

Sara: Se vuoi magari mettiamo in pausa, insomma facciamo in modo che tu te li possa ascoltare

T1: Era tipo il suono del clash della batteria, qualcosa del genere

Sara: Ah sì, sì, quelli rumorosi

T1: Quello lì era fastidiosissimo soprattutto quando andavano insieme si sovrapponevano mi fischiavano le orecchie

Sara: Ah ok. Adesso stavo chiedendo soprattutto sulle tempistiche...

perché ovviamente aggiungere una voce naturale che ti dice altre cose allunga i tempi poi, no?

T1: Però forse ci metti meno a comprendere cosa è successo, dopo non hai bisogno di tornare ai suoni, almeno finchè non impari tutte le combinazioni sonore, ci metti un attimo a tornare indietro ad ascoltare e dare un significato e sei comunque sempre un pò insicuro, mentre se senti un suono e sai che quel suono è per quella cosa e sei sicuro forse ci metti meno tempo ad analizzare la situazione

Sara: Bene grazie sì, scusa Ginevra riprendiamo pure

Ginevra: In realtà la parte dell'identificazione dei distretti l'abbiamo fatta, nel senso che sulla percezione, sulla comprensione, sul tipo di richiesta questa parte mi sembra abbiamo risposto

Sara: Unica cosa che noi magari qui dicevamo che la richiesta di identificare i distretti era quasi un bonus, nel senso che per noi non era necessario, era più necessario capire se c'erano o non c'erano anomalie a livello globale dando poi per scontato che in una situazione reale ci deve essere una mappa visiva che poi ti da tutte le informazioni analitiche sul singolo distretto. Però mi pare che tu hai cercato di identificare i distretti in ogni caso

T1: Sì esatto, mi sembrava di fare una cosa più completa

Sara: Sì sì, era per capire che cosa il suono ti spingesse a fare

T1: È chiaro che se sai che c'è un significato e non riesci a coglierlo a me da fastidio, ero curioso di capire al meglio delle mie capacità cosa stesse dicendo il suono

Sara: Sì volevo sapere questo, l'attitudine mentre ascoltavi i suoni

T1: Sì diciamo che in generale nella vita a me piace avere il controllo sulle cose che faccio, quindi...se

so che c'è un significato e non riesco a coglierlo mi da fastidio

Sara: Bene, grazie

Ginevra: ...e invece prima accennavi un pò alle cose che fai durante le tue giornate in cui hai eseguito i test. Ok a livello sonoro che hai già detto che sei occupato con la musica, a livello visivo, quel'è il tuo tipo di occupazione? Se guardi intorno a te, se lavori solo con il computer, se leggi delle cose, se ti sposti nella stanza

T1: Principalmente programmo e scrivo sul computer poi ogni tanto mi capita di leggere sulla carta e

davvero raramente magari sono fuori a fare dei meeting a parlare con qualcuno

Ginevra: Ok quindi lavori principalmente con il pc e sei impegnato con il pc. E invece scendendo un pò di più rispetto quello che accennavi prima sulla percezione dei suoni: quali ti sono piaciuti di più, proprio a livello di suono sia come scenario sia che all'interno dello scenario, quali ti hanno dato più fastidio? Se vuoi proviamo a trovare una soluzione per vedere qual'era quello a cui ti riferivi prima

T1o: Eh si non so perchè adesso non mi fa sentire la pagina

Ginevra: Sì fai pure, se mai ti richiamiamo

T1: Un attimo, no niente devo staccare un attimo e vi richiamo tra un minuto.

T1: Ok, allora, quello fastidioso è l'1B

Ginevra: 1B, ok che è quello con la lunghezza del rumore, ed era il suono a cui ti riferivi prima?

T1: Sì quando andavano tutti insieme era fastidioso. Il mio preferito è stato il 2B

Ginevra: Quello dell'amplitude con il rumore

T1: Sì, che era molto esplicativo, che erano molto diversi quando si realizzavano, nel senso che c'era anche il loop, era facile distinguere gli uni dagli altri

Ginevra: Ok, posso fare un riferimento nel frattempo ai risultati, visto che hai citato come preferito e quello che ti ha dato più fastidio? Nel senso che tu hai dato come preferito il 2B però rispetto i risultati quello che hai percepito nell'1B mi sembra di vedere sia più preciso

T1: Sì è vero, io...

Ginevra: Era una riflessione che stavo facendo in diretta

T1: Sì, l'1B era l'ultimo giorno mi sembra

Ginevra: Aspetta te lo dico subito

T1: L'1B era il penultimo giorno, era lunedì della settimana scorsa

Ginevra: Esatto, era il primo giorno della seconda settimana. Ok e invece ci sono dei suoni che ti hanno suscitato una particolare reazione? Oltre piacere/non piacere? Altri tipi di reazione, non so tipo ti hanno preoccupato, hanno attirato di più la tua attenzione, meno la tua attenzione, li hai confusi con qualcos'altro...ti ricordano qualcosa

T1: No mi ricordo solo che mi irritavo quando partiva l'1B

Ginevra: Ok, rispetto il loro significato, il fatto che fossero legati al significato che avevano ti sono sembrati alcuni più pertinenti, efficienti? Anche considerando il contesto

T1: Secondo me la modalità 2 che era il suono con la frequenza, che il suono era ripetuto più frequentemente in base all'anomalia, è più facile

Ginevra: Ok più facile percepire le informazioni che ti da

T1: Sì, più facile comprendere almeno mi sembrava, poi i risultati dicono qualcos'altro

Ginevra: È interessante

Sara: Dobbiamo vedere anche con gli altri, ma anche questa contraddizione è interessante se non altro

T1: Magari pensando che fosse più facile stavo meno attento

Sara: Può darsi. È interessante perché tu non è che non abbia percepito le anomalie ma la tendenza è stata nel valutarle più gravi rispetto quello che in realtà fossero

T1: Il fatto di sentire il suono ripetuto più volte aumentava la percezione che quella cosa fosse più grave

Sara: Può darsi

Ginevra: Ok, e invece idee o cose che hai pensato mentre ascoltavi rispetto un uso diverso del suono?

T1: Un uso diverso in che senso?

Ginevra: Nello stesso contesto, un'organizzazione diversa del suono, come qua abbiamo usato due tipologie che sono l'amplitude e la lunghezza, magari durante l'ascolto o durante il test più in generale hai provato a pensare 'io organizzerei le cose diversamente', oppure 'sarebbe utile sentirle in maniera diversa'

T1: Forse appunto, organizzando come ho detto primAlessandro:uno strumento completamente diverso per ogni zona e poi forse se gli strumenti sono diversi farli andare insieme come nello scenario uno può essere più semplice da ascoltare oppure anche nel caso 2 e avere strumenti diversi rende chiaro quale sta suonando e con che frequenza

Sara: Sì poi hai gia citato anche l'idea di scalare i distretti, di dare un ordine, di non farli suonare tutti insieme ma uno dopo l'altro

T1: In generale secondo me così è evidente all'ascoltatore cosa sta ascoltando, però va in uno spazio di ascolto diverso nel senso che gli si

sta dicendo questo suono è questa cosa, non so se va nell'intenzione del vostro progetto poi andare a... perchè poi diventa come dire faccio uscire un'immagine e per ogni immagine faccio una colonna che poi è lunga quanto è lunga l'anomalia in quella zona

Sara: Sai che in realtà questo è un approccio che avevamo provato in un primo prototipo, dico bene Ginevra? Se ho capito bene cosa intende Alessandro, nel senso rendere i distretti più riconoscibili, va beh in quel caso non erano neanche distretti, beh l'inconveniente per cui prima ti chiedevo se si era integrato il flusso dei suoni bene nella tua routine di lavoro è che poi duravano molto queste sonificazioni, duravano al punto che si sarebbe richiesto in un contesto reale all'analista di ascoltare per tanto tempo, anche 2 minuti e non era sostenibile, almeno questo era la conclusione a cui siamo arrivati noi

T1: Perché con le immagini ci metti due secondi a capire cosa c'è, forse

Sara: Sì, o meglio sei libero di dedicarci il tempo che vuoi, però il suono se dura due min lo devi ascoltare tutto se vuoi avere tutte le info, per questo anche nelle nostre intenzioni anche l'identificazione dei distretti è comunque in coppia con la possibilità di andare sulla mappa visiva per vederli, se ti pare che ci sia un'anomalia, un pò come hai fatto tu nell'andare a ri-ascoltarti la legenda, però se tu avessi avuto la mappa visiva forse, non lo sappiamo serve un altro test, saresti andato a risolvere i dubbi sulla mappa visiva invece che andare a riascoltare il suono

T1: Sì, oppure un altra cosa, che non fosse la mappa visiva, che magari si illumina una cosa all'ora in cui si deve, che ne so se sono le 3:00 ti si apre sul desktop la mappa visiva, intanto che va il suono, per ogni suono che continua dopo il primo secondo vedi ogni zona che resta illuminata, avere come un led che ti dice questo suono è quello che sta andando

Sara: Sì, sì sì molto bene, tutti questi commenti sono molto preziosi per noi

T1: Così riesci ad ottenere la stessa durata delle suono però è anche una rappresentazione visiva

Sara: Sì, sì bene perfetto dove siamo arrivati, forse alla 8, in realtà da questo primo giro di esperimenti quello che noi vorremmo ricavare è la possibilità di scegliere tra queste 4 opzioni il prototipo che portiamo avanti che poi combiniamo con il visivo

T1: Ok

Sara: Quindi tutto questo ci è molto utile, per spiegarti i nostri obiettivi, tutte le domande su quanto il suono sia piacevole, efficace, ecc. vanno in questa direzione perchè poi di questi quattro dovremo capiremo quale emerge come più intuitivamente e comprensibile o che è piaciuto di più semplicemente ecco. Finito

Ginevra: Ok quindi riguardo un pò più nello specifico la struttura dei suoni, riguardo la lunghezza delle singole sonificazioni e il numero di volte che si ripetono, il caso di gravità più alta è stato mappato sui 10 secondi, nel primo scenario, nel caso in cui lo scenario è basato sulla lunghezza, nel caso di allarme il suono dura 10 secondi, così anche quello dell'amplitude, i suoni si ripetono 10 secondi e poi come avrai notato queste sessioni si ripetono per tre volte ogni ora. Credi che 10 secondi sia adeguato come tempo? Richieda troppo tempo? Perché poi se ne sommano tre, quindi magari poi devi aspettare attenzione per un totale di 30 secondi

T1: In generale se non c'è niente, essendo che hai solo un secondo, a volte era troppo lungo aspettare 9 secondi di silenzio per risentire un secondo di informazione che è già molto esplicativo. Se per un secondo senti il suono e poi per un altro secondo non senti niente sei già sicuro che non c'è un'anomalia. Nel caso in cui non ci sono anomalie si può ripetere per tre volte però magari farei in 6 secondi piuttosto che 30 cioè un secondo col suono e un secondo senza e poi un secondo col suono e uno senza. Però non so poi se verrebbe confuso con una situazione in cui c'è l'anomalia questo bisognerebbe provarlo. Mentre quando c'è l'anomalia ci vuole tutto il tempo. A meno che si possa pensare che uno capisce che c'è l'anomalia poi nel momento in cui c'è l'anomala va a vedersi la mappa e si toglie il dubbio. È utile per capire se c'è l'anomalia a quanto ho capito però poi è chiaro che l'operatore deve andare a operare su l'anomalia è richiesta un'azione. Certo sentirlo tre volte aumenta le probabilità che tu lo senta, se sei da un'altra parte e lo senti torni indietro per ascoltare bene se non hai le cuffie... in generale basta una volta per capire che c'è 'anomalia se lo senti

Ginevra: Non so sara se hai dei commenti se no ti chiedo, riguardo il fatto che i suoni arrivino ogni ora, noi ci siamo basate su questa cosa per cui usiamo i dati che si riferiscono ad ogni ora quindi abbiamo la sonifiacazione ogni ora, anche ho visto che in generale tu hai dato una risposta abbastanza alta rispetto la conoscenza di water plants oltre che di cyber security, pensi che il fatto che questi dati arrivano una volta ogni ora si sufficiente? Potrebbe essere più spesso meno spesso?

T1: In generale visto che il sistema ci mette un pò a reagire, un'ora va bene, nel senso che non si possono creare danni particolarmente gravi se senti l'anomalia ogni ora, però forse se riesci a generare un suono più semplice, che riguarda solo la cosa che ha generato l'anomalia, perchè sto pensando se non c'è l'anomalia uno può non far sentire niente tutto il giorno. Appena si accorge che c'è un'anomalia manda il suono per quel l'anomalia che è stata rilevata e magari in un'ora al posto che sentire, due suoni assieme ne senti uno nella prima mezz'ora perchè c'era la zona 2 che ha avuto un anomalia e la seconda mezz'ora nella stessa ora senti la zona 5 che ha avuto un'anomalia e non hai bisogno di avere l'informazione compressa in quel momento dell'ora così diminuisci il tempo di reazione

Sara: E se non c'è nessuna anomalia potrebbe semplicemente esserci silenzio dici tu

T1: Esatto se non c'è nessun suono, è come dire che dura un secondo con tutte le zone che vanno insieme

Ginevra: Ok

Sara: Bene, ok

Ginevra: L'ultima parte riguardava un pò la versione e lo scenario che hai trovato più intuitivo e più efficiente, non so se queste due cose tu le possa intendere insieme, nel senso riferite ad uno stesso scenario o magari anche rispetto due scenari?

T1: Intuitivo e?

Ginevra: Efficente

T1: ...allora, la mia percezione era che fosse il 2B il più facile però il risultato mi contraddice quindi... non saprei

Ginevra: Quindi il 2B, quella che ti è piaciuta di più si puo dire che è quella di cui hai avuto la percezione migliore, nel senso che ti è sembrata più intuitiva e che ti desse più...

T1: Sì mi sembrava più facile capire cosa stava succedendo, magari non avevo capito... però sembra che non abbia capito cosa stesse succedendo

Ginevra: Non è che tu non abbia capito, rispetto agli altri

T1: Sì mi sembrava più facile

Ginevra: Ok quindi corrisponde. Sara non so se...

Sara: Scusa, su quest'ultima a parte lo scenario, l'abbiamo come dire,

ce l'hai detto implicitamente, tra il suono intonato, le note diciamo e invece le opzioni con il rumore...

Ginevra: Ah sì è vero

Sara: Il 2B ha il rumore quindi insomma

T1: Secondo me idealmente sarebbe più bello avere suoni intonati però di strumenti diversi e ripetuti con frequenza come si faceva con gli scenari B

Ginevra: Con i secondi scenari

T1: Eh sì, con i numeri 2. Avere più strumenti con diverse tonalità ripetute con frequenza

Sara :Il tuo prototipo ideale, diciamo

T1: Sì esatto, mi sembra che possa essere la via più chiara, senza andare a creare degli accordi che poi è difficile andare a capire chi ha fatto quel rumore, perchè nell'1 poi si andavano a creare degli accordi che poi dovevi fare post processing per capire quali delle due note che c'era magari andando insieme creava quell'accordo

Sara: Sì li devi decostruire praticamente, risalire al singolo...

T1: Esatto

Sara: Al singolo suono

T1: Mentre se sono due strumenti diversi fanno tutti gli accordi che vogliamo però più o meno si capiscono

Ginevra: Ok

Sara: Tu che ti occupi di cyber security, non so se forse hai un'idea più precisa di altri su come poi funzioni un control center anche, non solo di un sistema fisico che magari è un sistema particolare, anche di un centro dati

T1: Non lo so, penso che ci siano sistemi tipo questo che in qualche modo ti debbano segnalare abbastanza in fretta a secondo anche del sistema in cui si opera che c'è qualcosa che non va

Sara: Sì perché la domanda appunto era se ti puoi immaginare questo tipo di allerta in un contesto reale o se ti è sembrata una cosa che può funzionare come un esperimento scientifico però che nel mondo reale sarebbe una totale assurdità

T1: Penso che potrebbe andare bene però allo stesso tempo penso che se c'è un operatore che fa quello tutto il giorno mi immagino uno che deve stare attento a vedere che non ci sia anomalia,

sommare rispetto un ciclo di 24 ore magari ci sono tre turni, con 3 persone diverse se uno è attento più o meno se ne accorge, cioè fa quello e non fa altre cose mentre aspetta di vedere se c'è un'anomalia, in un sistema critico penso che ci sia una persona che fa quello come lavoro. Andrebbe verificato non lo so. Questo modo potrebbe aprire la possibilità a non avere una persona che fa solo quello, ma ad ogni ora fa il suo mestiere e poi il resto del tempo si occupa di altre cose... non so

Sara: Sì tu dici nel caso in cui uno faccia solo quello può anche stare tutto il giorno guardare lo schermo, cioè il suo lavoro è quello li per quanto stancante o potenzialmente stancante

T1: Sì magari ha delle luci, che si illuminano, qua ho in mente che ci sono 3 led per ogni impianto, e rosso giallo verde e se è tutto verde sta funzionando tutto bene nell'impianto

Sara: Ok bene mi sembra che poi sull'ultima domanda che era libera ci hai già dato tantissimi suggerimenti in realtà, che dici Ginevra

Ginevra: Sì sì, anche secondo me nel senso che abbiamo risposto un pò strada facendo, dovremmo esserci credo

Sara: Va bene, T1 noi siamo a posto se non ti senti di aggiungere altro, abbiamo un bel pò di informazioni

T1: Ho detto tutto

Tester 2

Sara: Okay, thanks. Shall we start? Maybe we go through our questions slightly more detailed to them the form I sent you and basically you replied to to everything but maybe we keep it as a truck so we have consistency with the other interviews and then we can go through your results. We have a file with a summary of your performance.

T2: Sure is about my performance because I also tried to tell you in my writing that, so I was, I never felt that I was confident with what I'm writing now taking in terms of my recourse after hearing the sounds right? Yeah.

Sara: 02:27 Well certainly we, we were not confident either. We will, we would have understood. I mean we designed, the system but then there were moments we were listening to it and thinking well what do we understand? That's an interesting feedback. Okay. So I switched the camera off. Maybe...

Ginevra: 03:00 Yeah, when, when you are ready we can start

T2: 03:03 Sure. Okay.

Ginevra: 03:08 And maybe like the form we shared with you, we can start talking about the real work context. I mean do you think the information covered by a sound were easy to understand?

T2: 03:29 You mean the explanations in the right side for entire project and the test

Ginevra: 03:36 That, that information later. I mean they kind of information we tried to sonified. Do you think that they are... it is possible to understand them from the sound? Could be a good idea to communicate them with the sound?

T2: 03:52 Okay. I just got a, what I believe is that you sometimes it's really hard, but it is, it's easy to tell where there is an anomaly than it is severity, because um, the duration is different, right? So the longer the duration we can understand, I mean the longer, the more severe the anomaly, right? So, uh, I would say that, okay. It is sometimes easy to say whether there is not, there are some problems with the system, but it is hard to say which districts are and the level, I mean to distinguish the level for each, uh, each district. So it is sometimes hard. But I believe this also depends on the sounds for example... Some songs are quite, I mean, relatively better than the others. For example, let me check. So yeah, 1A 2A and 2B, I believe these are relatively easy to hear and to judge compared to 2A Yeah.

Sara: 05:03 Okay. Yeah. Actually the goal of this, at least one of the main goals. So this experiment was to choose the prototype to, to bring forward in terms of the design of sounds also. Yeah, yeah, yeah. We tried to give different options, so we could gage which sound why might work with better with these particular data and these particular strategy that we used to map data to information to sound. So Yep.

Ginevra: 05:40 From your previously answered, um, I just want to specify that, like you suggested this unification doesn't want to work instead of the visual interface. I mean, the goal of sonification is to give a first level of information to the analyst. In this way he can understand if this system has anomalies or is in normal state status. And then if he see that, if he heard that there are some anomalies or any problems, he can focus on these problems using the visual interface. So the, the idea include also the visual part. Maybe was not clear.

T2: 06:39 Awesome. This part, right?

Ginevra: 06:41 Yeah, yeah. This experiment was like, works like a first step. Just to understand which kind of sound works better. But then the sound, we would like to, um, add these sonification to the maps of the, of the system to make the analysts, um, to make possible for the analysts go deep with the analysis if he recognize some anomalies.

T2: 07:12 Yeah I understood that, but, do I miss a questions or do you have a question related with?

Ginevra: 07:19 No, no, we just want ask you if you would think there are some problems that could emerge in the real context using this kind of sonifications

Sara: 07:43 Did you always, um, eh hear the sound or did you miss any because it was too...

T2: 07:50 Yes

Sara: 07:50 Ah okay, good.

T2: 07:51 No, it's a, it's at beginning. You know, that I had some problems with chrome settings, right. So once it is solved... Alessandro helped me for this for this and then I didn't have any problems so I could hear all the sounds. So I think no problem with that.

Sara: 08:13 Okay. Okay. So you, you think that... we will ask you more about your, the context in which you took the experiments, but do you, would you be able to image in this unification in, in a real contexts, like in a operating in a control room over a water plant, for example. So from the technical point of view or they intrusion or the sound in your routine,

was it fine or you can foresee major problems there?

T2: 08:46 Uh, actually I don't see any problems because I also believe that in any area they use, that's... I mean sounds to alarm people for emergency cases, right, I believe sound... I mean it's useful to have it, but sometimes I make, I would repeat this example, so in here people keep testing fire alarm. Okay. So we keep listening it be annoying to... it is a test right, after while you were... I mean, after a while you just don't interpret if it is a test or an emergency or whatever it is you just ignore it. So that's kind of situations might happen. This is one concern I'm seeing. These kind of things can get..you know. Um, maybe I'm, for example, you can put some rules saying that the sound can appear, once the emergency case is, I mean it in a high situation, let's say anomaly, is severe, right? So but, I don't know maybe such cases. So maybe not all the time hearing sounds but only emergency cases. But of course I have another concern with that because when you do this and then the controller doesn't hear anything, then he might think that everything is regular, but he may not understand whether the system is working properly or not. So I don't know. I mean these are the challenges that I can think of, but I don't have solutions of course for now, but I still, that sounds really hard to get. Um, I mean to let people know that there is itregular situation into system safe. Yeah, it's helpful.

Sara: 10:47 Thanks. Great. Yes, all these considerations, I think that will be the answer to these points that you're raising will make the difference between a successful sonification and one that is not successful. So it's all these details that have to be refined through, through iterating the prototype. Basically. I believe we thought of values options. What we were trying to do here is precisely not to work with an alarm on off like the, the, the fire alarm triggers when the fire is already there. Right. And then it does the on off alarm. Either you hear it or your day's full alarm or no one arm. So the, the idea of differentiating levels of alert is to see whether we time the operator can understand where the is really something that he has to follow up or it is something that he or she can just ignore for now.

/: 12:15 [alarm]

Sara: 12:17 Yeah. Awesome. So we have it recorded in the interview what you meant.

T2: 12:23 You should find a way to get it --

T2: 12:40 Okay. So now back to your question. So I understand that it is a continuous monitoring of the system states, right? Yeah. And

it's still, I believe I just don't get one point. So you said that it is not an on or off situation. So I can, I think that for example, in the morning, right, we set alarms to just make up. So it is sometimes very annoying and before it even starts to ring, so we just turn it off. Right. So I think I understand that in yours situations. Sound, I mean do operator, will not have control on whether the sound is there or not this is, what I understand. Yeah. Okay. So it means that, uh, for some certain periods of time the operator will hear sounds indicates the system status in that case what, I believe is that choosing right sound is very important, which you already consider actually. Right. So because some noises makes might make someone very nervous. For example, in your 2A (1B?) Scenario, right. It was really hard to listen that noise. So this annoying it makes me nervous. I just want it to end, and yeah, I didn't know. I mean, I just tried to say that I mean, choosing right noise might help you to make users to be a willing to use it. Yeah, yeah, yeah. Yes, yes, yes. It also depends on the user. So it's not a... it's personal sometimes I am. Maybe you might have some options or choices for difference. I mean, I don't know. Yeah.

Sara: 14:38 Yes. Okay. Thank you. One of these is very, very, relevant for us. So thanks. Yeah.

Ginevra: 14:45 Yeah, we can go the technical part. And, did you have, uh, uh, some particular problem with the interface? Uh, yes. The one you mentioned before that...

Sara: 15:11 Yeah. Yeah. Those with Alessandro.

Ginevra: 15:17 Did you, you done the test? I mean, which kind of tools you used... The headphone with a wireless or maybe speakers or anything else?

T2: 15:27 Okay. Um, so sometimes I'm really... I can be very unlucky, so I while I was doing I mean, my test, I only end up being that happened.... In the building I got some construction noises, so I just wanted to get rid of them, not just to hear, I, I use my hear phone all the time, not just to get rid off. I mean, sorry, not just to listen the sound, but also get it off outside, I mean the noises outside. So during this I kept my headphones on so it also helped me to get that a clear sounds right. So, yeah, I can, I just use my headphone.

Ginevra: 16:16 Okay. And, you mentioned the training before and do you think the information on the website, were... Explaining the project appropriately?

T2: 16:32 Yes, I believe so. I really like to read it, because before that, I

mean I didn't have much detailed information about data sonification. I just know that people use sounds to just get alarm for something. Right. I just, I mean it's nice to know about it. I mean it's, I mean the information are very good and relevant and explanations about the test and also the key sound. Right? These are all have, I mean help me quite much I didn't need to the ask you further questions for example. Yeah

Ginevra: 17:15 Got It. Okay. So, so the key, the sound-keys were useful to understand the sounds right?

T2: 17:22 Yes, yes it did actually.

Sara: 17:27 Did you go, did you listen to the sound keys during the experiment as well? I mean, did you go back to...

T2: 17:36 Yeah, sometimes I just, since I forgot easily, I am, I mean consult these keys. I mean, it sounds key. So sometimes, okay, before, this sounds came and sometimes for example, after hearing sound, I made some decisions about the anomaly, but later after recording my, I mean judgments than I at listen to key sound again, to be sure about what I'm using right or not.

Ginevra: 18:19 Okay. And um, how much do you think... About the district identification? How much do you think you can understand the district, the distinction between districts or were the request too much ambitious or maybe you think more training, uh, could enough to, to make it possible in the near future.

Gulten: 18:44 Yeah, I believe that. I mean, first training is required but um, this training is actually, but I mean with this training is just using the system more so in a real application. Right. Um, the users need, for example, I believe the users need to hear the sound forlonger time, not just one day, but maybe more. And after hearing this sound right, I just go back to a key. Sorry, I sounds key, right. It would be nice to know whether I mean right after hearing it and making your judgment or decision, whatever. So knowing what the decision is right or wrong might help us to learn faster. I just keep hearing but without any feedback.

Sara: 19:45 Yes, yes. Of course, true. That's a very good point because, in our final product, but this is an assumption that we knew before, but you didn't because we are imagining imagining it coupled with the visual feedback. Yeah. Then you know it, if you are really in a real situation after you, you would know if you skipped a, a real emergency in this case for a negative, I mean

that there might be some more, some more serious development, uh, in time or you might validate that it was not so serious because you get alerted. You ever look at the, at the visual map, at the Scada, whatever it is, you realize that nothing serious is really going on. So this back and forth with a visual, for example, that of course you didn't have it.

T2: 20:45 So for a real user there will be a feedback of this system real situation. Right? So in that case they might learn faster. And since they using it, they will be using it repetitively. So they will, get... Specialize on it. I mean, yeah.

Sara: 21:08 Yeah. Okay. Thanks.

Ginevra: 21:11 Thank you. Can you briefly describe your main] occupation during the experiment days? I do not know, maybe you were reading documents, paper or coding or... there are other people around you just talked with them, how your visual and the sound channel were occupied by other, other stuff to do.

T2: 21:41 Okay. So I planned my test days according to considering that I don't have meetings or something. So during the test, during testing I was always in front of the computer and reading, coding and this stuff. Nothing more. But one time I wanted to meet a friend and in that case I just hear the sound leave the room and come back in an hour. So listen to sound again. So did that. So I knew every hour there will be a sound. So I kept scheduling my routines as well sometimes, but not always. Other than these I, I kept being in front of computer and reading and yeah, and stuff. Does it explained enough?

Ginevra: 22:34 Yeah, of course. Do you have the sonification that you like more than others and this sound you like more than others independently from any other consideration? I mean, you can say also that your favorite sound is the one that you understood less than others.

T2: 23:00 Okay. I guess it is 2A, okay, so let me repeat this one. 1A, 2A and 2B. These are relatively easy because the sound sounds are bit more distinct from each other. So I believe these are relative easy to judge, but my favourite is 2A, because I think it's nice to hear that as well. Not just, I mean, not just to distinguish it, but it didn't make me uncomfortable or I, yeah.

Ginevra: 23:27 Okay.

Sara: 23:28 And the worts 1B. No doubt.

T2: 23:32 Yeah. I really did not like it, that happened one time that I

wasn't really focused on my work than it was time to train, so I start shaking. I mean I'm, it was a severe one and so it doesn't stop for a severing. I couldn't listen and carefully and analyze what is going on there. So I just wanted to stop.

Sara: 24:04 Good. Good. That is quite a clear reaction. Yeah.

Ginevra: 24:15 Yeah. Maybe we can share the results with you. I send you a link in the skype conversation

T2: 24:38 You sent, right?

Ginevra: 24:40 Could you repeat please? Did you receive the...

T2: 24:48 No I haven't seen it

Sara: 24:59 I see there is something, uh, okay. Okay. No, I can access

Ginevra: 25:05 Any problem?

Sara: 25:07 I think you sent it, only to me Ginevra, in our previous call because I see it there...

Ginevra: 25:23 Sorry. It's my fault. The conversation was open on the other one, so, okay. Now I think I've done it correctly.

T2: 25:37 Okay. It's okay.

Ginevra: 25:43 Okay, so you have on the column on the left to the right, the results, the number we used to make these sonifications and on your right you have your, the answer we calculate based on, on your, on your excel table.

T2: 26:11 Okay. Yeah, it's incorrect, sometimes. Maybe...

Sara: 26:14 It seems that the second week you did, you started to get more acquainted with, familiar with this system. Right. It seems to me because you distinguished the... Even the 1B that you said you are so annoying for you, but actually your answers are very good there. I'm so, so interesting. We are actually trying to do this matching even if we have very few testers. It needs first a serious. Hmm. Because there's been a few occasions where some of you said this is my favorite, but he's actually the one where the recognition was lower. Yeah. In your case, the other one you said, I really hated this, but the recognition was better so will be interesting to...

T2: 27:05 I guess it was because my feelings was more strong for this... maybe, I do not know

Sara: 27:16 Interesting. I was saying this about the first and the second week, it looks at the first week, which is if I'm not wrong, 1A and 2B...

you tended to interpret all the alerts as very serious.

T2: 27:37 Yeah, because for example if it is more than six or seven seconds and if I keep repeating it right after, I mean, sometimes the sound is... it is suppose to repeat at least three times. Right. So I observed that sometimes it did more than three. This is one thing and some cases in some cases there was no break between the repetitions. In that case it's, it's like for, for the first one it's going quite long than the second one is following it, right? So I mean, it means to me that it is severe one. So I just give it to five and one... I said 1, by the way I had to say zero? The reason is that, so I assume that, if I heard any sound, it means that the system is with anomaly?

Sara: 28:33 Yeah, it was in your notes.

T2: 28:36 Yeah. The sound is enough for me to hear that. It's not, I mean it is and then moving, but of course it's not severe. But, uh, so I, my numbers and I give number five. It means that I did hear the sound long, so that's why.

Sara: 28:53 Okay. Because we have, in the scenario 2, we have two kind of two kinds of repetitions. I mean, Eh, the, the all process, let's say the all sonifications for the status of the system was repeated three times just for you in case, you know, in case you missed the first one, you missed the beginning, you miss the end for, for whatever reason, we played it three times identical. But then the scenario 2 the strategy was based on faster, repetition of the sound. I mean, on a let's say, if no sounds repeated in meant there was no anomaly, if one sound more than repeated looped looped. Like it had a cycle, a second cycle, then the speed of the cycle and the frequency of the sound would give you the, level of the anomaly.

T2n: 30:02 So yeah

Sara: 30:04 So... You heard only... Like "tss" nothing else and then after 10 seconds, "tss" that meant no anomaly. If you heard "tss-tss-tss-tss-tss" the repeated the looped, the sound meant that that particular district was anomalous and the speed of these loops indicate the level of anomaly, maybe we can listen to it because I may be confused when you say repetitions... If you mean the all repetitions that we did just to make sure you and you heard it or, or the or the inside repetitions there was meant to be the level indicator.

T2: 31:12 Okay. Let me try to tell you again.

Sara: 31:16 Because from your notes is not clear. Sorry, just to give

you a hint, why I'm I entered on this digression is because from, from your notes is not clear what you mean. Sometimes you say that sound should repeat three times but instead it repeats five times. So I, I, be confused here because...

T2: 31:47 So at the beginning I was keeping, how many times did I listened to the sound my comments, but then I removed them I just thought either I'm wrong or the system didn't mean to work that way. I can say now is that for some cases I get the sound more than sometimes without any breaks. So I interpret this, maybe it is there the mistake or I commented for non-break sounds that it is long. So other sound was repeating right after the other one.

Sara: 32:37 Oh, okay. Yeah. Okay. Okay. So when you say long you, you mean this, you just explained, okay

Gulten: 32:45 This is what... I think this is itOkay. So in the explanations it says that that you will hear the sound three times, but each time, I mean it should be, have to say, so if it's a severe, one it should be around 10 seconds. Right? Then the second, I mean second interpretation will happen, right?

Sara: 33:05 Yes. These were the scenario 1.

T2: 33:09 Okay. Oh, but I assumed that this is for all cases, but

Sara: 33:15 eh, the scenario B... sorry sorry the scenario 2 had a different strategy which was based on looping. I mean cycling or the sounds.

T2: 33:30 Um, just let me ask you one question. So, okay, I got, I got that the strategy's different in some test, but is it intention, I mean is it written into explanations or is it, it is not mentione

intentionally to test their response of the tester

Sara: 33:53 It is written, so we believe I'm finding the instructions. Maybe Ginevra you can help me...

Ginevra: 34:06 In the project page on the website that I can share directly with you now here I hope is the right conversation. Let me know. We described the after the maps, after the only keys, we have scenario 1 and then the sounds, the keys to understand and distinguish the districts before the sound keys we have the title scenario 1 in red and then we tried here to describe the differences between scenario 1 and then scenario 2. The idea was not... just to describe them and not to go deeper in, in, in, in the details. Also to understand if you took the differences and

understood how you understood the differences between two scenarios. But the main idea it was to describe them...

T2: 35:16 I was checking and yeah, the difference is mentioned here, but Ijust, I didn't get it. I just assumed that it is the same. Sorry.

Sara: 35:30 Oh, no, no. I mean we thought of it while reading your comments. We had the doubt, but then again, we didn't include any demo and this is something that emerged the with other testers for example, having not only the single sound, the single sounds are listed in the page as a key, but also 10 seconds demo or what you would expect

Ginevra: 35:57 Yes, with all these districts played together.

Sara: 35:59 Yes. With all the districts have some anomaly like the demo of, let's say, uh, hour one on day one this, we didn't include it on purpose. I mean, it emerge it would have been useful instead. So...

T2: 36:17 Yeah. Yeah. Maybe some, maybe you should maybe, I mean to me emphasize the difference between two scenario is not just the sound but also the loops. I mean, I just, you know, this fact you say maybe I just read it without carrying... I mean carefully. Right. So I just, maybe I just assumed that the same thing but different because I, when I listened to key sounds they are different and, but I didn't think that, okay. Yeah.

Sara: 36:52 Yeah. Well that's interesting. But despite that, you detected all the anomalies correctly, so on. That's interesting too.

T2: 37:03 No, because I mean when it's repeating, right. So it means that it is no for scenario 2 I see that I'm not doing that well, right?

Sara: 37:15 Yeah. Yeah. But probably that's why you use the highest level of anomaly always. We assume that all the uh, that because... Okay. Good to know for us because then the training would have to include a demo, which you will probably doing in a real context. Right. We would give time to try a few, a few cases like this is what you will hear if they are anomaly serious or this is what you will hear if the anomaly is not serious and in between. So we would do that in a real case, here we just described it in words. So...

T2: 38:17 It is just a kind of related with getting a feedback from what you hear. Right. So I mean we already talked about this at the beginning so I said sometimes I didn't know what I am doings.I'm just saying things base on what just heard, but it's going in a second right. So yeah, maybe demo as you said would be reallyhelpful.

Ginevra: 38:45 About the Sounds. Maybe was any of the sounds you heard particularly meaningful for you based on your personal experience or maybe they simulate some, some physical reactions or emotions for example peace, anxiety, happiness or some sounds remind you...

T2: 39:14 The strongest feelings that I had during this testing. Right? It is that 1B that makes me annoyed, 2A I think it's more like song. I guess 2A, I said that it is nice to hear that one, but of course maybe, I don't know. I mean having a nice thing to hear may not be also good solution because then you can just keep it, keep listening it without caring what it say. So that I... I don't know maybe some, it should be something between 2B, and... Sorry, 1B and 2A, which is one of my favourite. And the other one is my one that, I mean maybe something between the two. Yeah.

Ginevra: 40:12 Okay. Maybe during the test you had an a different idea to use sound to cover the same information in a different way. Maybe just thought about a different kind of sound or a different way to use the sound to say the same information.

T2: 40:48 I didn't know the technical terms for the sounds, but they are actually the same thing. But how to say, some of them. Um, no, I mean same sound, but the properties are changed. Right. But I would say, I mean I, I would suggest to test I don't know if ti can work or not, but maybe it can be tested that using the totally different sounds for districts. I guess one of the cases and scenarios like this, let me check which one it is.

Ginevra: 41:27 Okay

T2: 41:28 This one I think it's 2B, yeah, it is quite different.

Ginevra: 41:40 Okay. So are you suggesting to use different sounds to cover the different districts? Right?

T2: 41:52 Yeah. I'm just suggesting to test them.

Ginevra: 41:53 Okay. Okay. Okay. And about the sound structure. Do you think... we talked before about the duration of the sonifications, but also the number of repetitions was appropriated to, uh, give the information you think or do you need more repetition or maybe less were enough to understand the meaning?

T2: 42:24 For repetition I would say it also depends on the system I guess. I don't know. I mean, for example, it might be severe anomaly right, but since you keep repetitions less... if the sound choosen

is good enough. I think few repetitions should be enough; otherwise if it is an annoying sound I don't want to hear it long time because I only got that the system is severe. I mean the system is not regular and I just need to be, to react. You need to do something to make system, get back to regular condition. But if the voice keeps, uh, I mean if the sound is there and makes me annoyed, then I might not react. Right. That's one thing that I can say

Ginevra: 43:34 For these sonifications we used the data that's coming from the the sensors every hour. So do you think the rate of the sonification were too high or maybe too low, do you think based on the, on the system recive data every hour is enough or maybe you need more data more frequently or maybe less

T2: 44:07 Ok, my comment for this is that: completely depends on the system and so for different systems, different rate should work. That's what I, I believe, it depends when the anomaly is critical and what level for a given system. So the system has changed, I mean system is actually defining the rate. in our case, mmm, I really don't know.

Sara: 44:44 Yeah, this is actually the rate that comes currently from the anomaly detection algorithm. You mean it works with how hourly evaluations of the system. So we simply took that from, from the, from the algorithm that plugs into the, into the, the network of these water plant. So should be fine. I mean we are trusting that it should be fine for the current system. But of course it depends how fast the anomaly the accidents evolve and...

Ginevra: 45:19 Do you think there is a range, I mean, you said that depends on the system but could be like 20 minutes, two hours or maybe something completely different and far away from these number.

T2: 45:39 By now it's fine by me to having one in an hour, right. Again, it's really depend on the system having to, I mean depends how it works and really many other things that I cannot consider now, right?

Ginevra: 45:55 Ok.

T2: 45:57 And when I get the alarm so..the time that I need to make it regular or something. So this is important I guess

Sara: 46:15 Yes, true. Okay.

Ginevra: 46:19 And Sara, I think the number nine we have already answered to the scenario she preferred. So, would you personally be willing to use the sonification you tested during the experiment, in the

real world activity?

T2: 46:43 Yeah, I mean, I would consider it, Once we agree on the sound side.

Sara: 46:51 Yeah, of course. Of course. Because it's very invasive. As you said in your, in your written comments, you cannot, you know, you can move your eyes away or something you don't want to see or you can close them. But this doesn't work with sound unless you do some voluntary, so it makes sense.

Ginevra: 47:18 Okay. I think you gave us a lot of information. I don't know if you want to add some free comments or general comments...

T2: 47:26 I did like your study, so I did my best to...

Ginevra: 47:36 Yes! Thank you very much we are very grateful for your help because after projecting it is very useful and also, I mean, curious know how people that will work with... real, with the project, think about the idea and the prototype...

Sara: 47:56 Yeah. Yes, yes. Thanks a lot. We will keep you updated when we all go.

T2: 48:05 Thank you and good luck for everything you're doing.

Tester 3

Sara: 00:01 It's okay. I stopped it too. I couldn't just it. Okay. Okay. Let's go.

Ginevra: 00:08 We started, we start talking about the real context. So the first question is if the sound was always audible when you did the test ...

T3: 00:26 Yes, yes

Ginevra: 00:26 Ok, and was the information covered through the sound, easy to understand in your opinion?

T3: 00:33 Um, so I like the, I was able to understand the sound, but I prefer the one with a pitch with a high end low with a musical notes rather than the one with a noise and the frequency. So you have, four configurations right, uh, whether the anomalies is shown with a frequency or with the length. Um, I think the one with that length is easier to understand then with a frequency and when they use either diff... And you distinguish the districts by either the pitch of the sounds, so it's high and low or the different types of sound. Uh, so I prefer using the pitch than the type (frequency), so, so I remember you have a four different types, right? One is... let me open one is... Okay. So I labeled the five types roughly as foot stamping, mouse squeaking typewriter, dart and house hoof, in order to distinguish the five districts. But it's not easy using the pitch is easier.

Sara: 01:54 This labelling was very interesting.

T3: 01:58 I think some, some people may be tone deaf so they might be fun with noise rather than a pitch.

Sara: 02:11 Okay. I Just wanted to comment that because we are nearly at the end of our interviews. So each of you used a slightly different strategy and, uh, when it comes to what worked best in our analyses of your results and what is the one that you preferred, it's not always consistent. So it's quite, um, quite interesting to see the difference. So it looks that something, one thing is something that you like and makes you feel good when you hear it during the real working day. And another thing is how you actually understand it.

T3: 02:56 Do you also see that myself or of my friends get better through time, as in they do in the fourth tasks and the first task

Sara: 03:06 Eh, yes, yes, yes. We commented this of... the ideal of getting familiar with the system as well. Yeah.

T3: 03:16 Yeah

Sara: 03:17 Definitely. Yeah. And we have our question in fact on the length of training and how you feel, you, you would need more time if you feel you would need more time. Okay.

Ginevra: 03:28 Okay. Maybe we... remembering that the sonification in our project doesn't want to stand for the visual interface. So the project wants to communicate the first level of information, while the analyst is working and then if some problems is occurring, he can focus on the visual interface to go deeper with the, with the anomalies on the problem... Considering that, do you think the idea of sound could be useful in the real context?

T3: 04:08 Uh, so in general I think, guess, yeah. So using sound, it was quite obvious to detect anomalies versus regular, but to go to the second level, what kind of anomaly in, in this particularquestion, which district? It becomes tricky. Um, because, uh, it's not always clear to distinguish between the sound, for example, the type writer versus the other foot stamping for example. Um, and the judgment of the severity of the anomaly is also quite subjective. Uh, so if, if you use the length for example, then it can be a little bit more straightforward. I can say: "Okay. 10 seconds means a 9 to 10 seconds means a severity five and a six and a six to seven seconds is severity.. A seven to eight is four. One, two, two is one to two threes, two" for example. Uh, but, but to do that I had to do the counting, uh, which is not always correct, accurate and it's a lot harder with the frequency. Uh, so, so for the frequency it's, it's, it's a lot harder though to say, okay, this is a hundred beat per minute. This is 90 beet per minute. So it's so it's, so it's very hard to, it's harder to say which kind of severity it is in a, in a particular sound.

Sara: 06:07 Yes. Actually from the design perspective and the planning of the, of the mapping, let's say between data and sound, we did not use any predetermined level of severity. So this question was also to see whether they use their fears. There is a different level and how these different level is labeled.

T3: 06:35 Yeah. So it's very subjective.

Sara: 06:37 Yes, it has this definitely this... We would expect that it has this component because there is no real severity level embedded in the design of the experience. We just take the data as they arrive. So it's a sort of post event judgment if you, if you will. Uh, what, what was interesting for us is to understand whether with time the, the operator that uses the system every day can develop their knowledge of the

sound that tell them, oh, now I have to go and look at the visual map or no, that's fine because you know, previous time I heard this type of sound, nothing was really going on. So as you say, a subjective strategy, as long as it's clear if there is an anomaly or not. So how important it is to distinguish the districts and to distinguish the anomaly level for us, it's still a question mark too. So this... first round of experiments was really to gage some, some knowledge on whether it is relevant or not. In my, it might not be after all because you always will have the visual support for that. That probably has more value, right? Then the sound.

Ginevra: 08:07 Yeah. The next question is about the problem in your opinion could emerge, but I don't know, maybe you already mentioned it with the, with this answer. I don't know if you have other problems that could emerge that you want to add to this...

T3: 08:28 So for the first three tests, I did the tests at home, so I put on the speaker and I didn't have to worry about remembering the time. So when it comes to the hour, the sound would just play. But on the last test I did it in the office and I was using headphones, so there was one time slot when I forgot to put on the headphone. So this could be relevant to the actual users case, right. When they have to remember when to listen to the sound.

Sara: 09:11 You don't use to wear headphones at work, you don't listen to your music or keep headphones on? Normally?

T3: 09:20 No, I don't normally keep headphones on and even if I do it just for one or two hours, not the whole day.

T3: 09:28 [noise]

Ginevra: 09:30 Any particular issue you encountered with the interface? or website didn't load or...?

T3: 10:06 No, I use Firefox and everything was ok.

Ginevra: 10:14 Other different problem, or technical problem?

T3: 10:16 No, I didn't have any technical problems at all.

Ginevra: 10:20 Okay. About the space around you when you did the test there was, it was noisy or, oh, how can you describe the space around you?

T3: 10:34 Relatively quiet.

Ginevra: 10:42 There are people around you usually when you work?

T3: 10:47 So the first three, I did at home, so I was alone and then the

last test it was in the office, so there are people around, but I used the headphones, for the test, so I didn't have any problem listening to the sound except the one time that I forgot to put it on. When, when I was supposed to

Ginevra: 11:12 And about the training, do you think the training was sufficient? Do you think the Information on the website explained the project appropriately?

T3: 11:23 Um, well actually it would be better if, uh, I go through some supervised learning first, right? If I, if I was given a training set and say, okay, this is the sound and, and this is districts two and three that's abnormal. Because what, what, what I went through this, uh, that's completely untrained. Okay. I know this is the five sounds, but I've never heard the five of them together in the whole ten seconds. And I, I never, there was never any, there was, there wasn't a feedback in the training period period that's have made, okay, this is district two and this is this a three for example. So all I had was the five separate sounds, right? Yeah. So if this was to be deployed in an actual water system, the operators, we need much more thorough training. They need to listen to all the five sounds together. They need to receive feedback when their classification fits (?). Right. And then this could take a few days, I don't know, maybe a week, maybe two weeks. And then after that, can you trust them with the real life situation.

Ginevra: 13:00 So you mean like a demo of the real sound? Not just this sound keys that you could hear from the website but the soundtrack that plays altogether the district sounds.

T3: 13:17 The five south keys are definitely not sufficient

Ginevra: 13:24 About these sound keys. Uh, how did you use them? I mean you heard them for the first time from the website and then you came back to the sound keys during the test or you just heard them one time?

T3: 13:40 Every hour after listening to the test sound, I went back to the sound keys and played the sound keys to verify that. Okay. This is really district two, for example.

Ginevra: 13:59 Remembering what Sara said before about the district identification that is not the first purpose of the project. Do you think the district identification is too much... is a request too much ambitious, or do you think that maybe with more training and focusing on the sounds you suggest us, would be easier?

T3: 14:28 Okay. Um, if the, if the purpose of the test is just to identify abnormally versus regular and then you have a visual verification after that, then this is sufficient. As an operator, I would just every hour listen to the sound. If I detect something irregular, I would come to the visual and, and can check.. for this purpose I think this is sufficient. Um, if, if we need to identify the district and the severity, then I definitely think that more training is needed and um, not just that I think, uh, you need to do certain experiments, this kind of experiments to show which kind of mapping is better. But I think you're already planning that. Yeah.

Sara: 15:32 If I can comment, yes. We are planning also... where you have done Ginevra...

Ginevra: 15:40 Are you talking about the district identification? We can say... I don't know if what you want to say, but this is out first... You can continue Sara...

Sara: 16:08 I would just want it to, to say that yes we are planning also more... statistical relevant. Okay. That I mean with much more many more users. But these first round was really focused on identifying critical aspects of design prototypes. So we can also choose, I mean from this four alternatives should emerge one that we move forward. [inaudible] all your feedback through the final prototype, let's say.

T3: 16:47 Yes, yes, yes.

Sara: 16:52 Just if you give me a second, I will go back to the main um, network of the house because I managed to move from to the main room. So I'm not using my hotspot. If you don't mind, I will disconnect just for a second.

T3: 17:21 Okay.

Ginevra: 17:22 Okay. If for you is ok, we can talk about your main occupation during the experiments days. We are interested in your visual and the sound occupation. I mean how the visual and the sound channel were occupied and which kind of work you were doing or...

T3: 17:52 So I was mostly doing programming.

Ginevra: 17:55 Okay. So using computer, right?

T3: 17:57 Yes. Most of the time during the test I was doing programming. And for the first three day I let the computer speaker play the sound. So I opened a Firefox as a separate window and just made it stay there and it would play through uh, the uh, computer sound. The computer speaker on the fourth day I use a laptop. So I used the headphones. I was mostly programming

all the time.

Ginevra: 18:35 About the sounds you like more... you already said the one you prefer and then maybe we can share with you the results. I mean...

T3: 18:52 Yes I'm curios...

Ginevra: 18:54 I think this is the right conversation. Let me know if you, if you receive the link on the chat

T3: 19:08 Okay, got it. Okay. Taking the time to open it now. Yeah. Okay.

Ginevra: 19:19 Okay. So on the column... there are four column for each of the districts and on the left there are... I say "true" column, that one with the number we used to make these sonifications. And on the right you have your own answer and just for make it clear, we, I have some problem with the number because I saw... Let me know if it's correct, but you didn't put the number of the anomaly level, right? You put the dimension for districts and other information but... I didn't know if you miss... or maybe you didn't.. just write the number

T3: 20:11 2A, is it the second day?

Ginevra: 20:14 2A is the second one of the second week... It's the last one. Probably the one you did at work...

T3: 20:24 Yes. Uh, yeah, I kind of give it the, yeah, I uh, I give it like a beat, but I didn't, that was for the sec. Let's see. Uh, for the 12 o'clock scenario. I didn't give it, uh, uh, anomaly level and, but the rest I did. Right?

Sara: 21:00 We see only one in the, that would be the column g in my file of your results and it says, uh, 10:00 AM, zero, 11:00 AM four and then there's nothing else... Maybe I send you the file I'm talking about.

T3: 21:26 Okay.

Sara: 21:36 Can I Ginevra? I mean the fire that we received, right?

Ginevra: 21:39 Yeah, just because I want to help you. No problem.

T3: 21:57 I just put the file that I have on my computer into the Skype as well.

Ginevra: 22:16 Okay. I'm opening your fire.

T3: 22:24 Ah, okay. Okay. So week 2, day 2, the last, the last scenario. Column G. Yeah. I didn't put, I was, I put it on column J. So I put this anomalies four separate districts. Yeah. But I didn't put a

common one for all the districts.

Sara: 22:49 Okay.

T3: 22:50 Correct. Yeah. So on column J I put the, the anomaly level for individual districts

Ginevra: 23:01 You mean with that... You mean the total... the Anomaly level of the whole system, right?

T3: 23:10 Yes, yes. So on column j should be the whole system and column g should be the whole system. And J should be the individual district yet, but, but it didn't put for g... But this last one. Yeah, sorry.

Sara: 23:27 No, it was more to understand your, your reasoning.

T3: 23:32 Uh, I think I just missed it.

Sara: 23:37 Yeah. Yeah. That's fine. Because otherwise you performed pretty well. Yeah. We feel even comparing the results it seems as scenario 1 that in fact you said it was easier to understand for you. Right. You said it at the, at the beginning, the 2B, um, and this has happened before actually, um, to other people seems could be interpreted in general as a higher level of anomaly. Like, like maybe the, the repeating noise, I don't know, generate some kind of reaction by which you, you think is more anomalous than what it actually is. Yeah.

T3: 24:26 Yeah.

Sara: 24:29 I would not say anything else because we have a question actually on that, but other than that, your, your yes, performance was quite... pretty well

Ginevra: 24:43 Okay. We can speak about what's... Any of the sounds you heard are particularly meaningful for you based maybe on your personal experience or... They stimulate some physical reactions? Emotions?

T3: 25:07 Yeah. So I, I, I labeled them, so 1A, is a musical note and, uh, 1B is kind of noise, but it's also by the pitch and 2A is definitely, definitely musical note. And 2B, is just noise, uh, with a deaf mute of five different labels, foot stamping and so on. Yeah.

Sara: 25:51 And, and any of, did any of these sound annoyed you particularly or you thought, oh my God, now this is coming and I don't want to hear it or the other way round, like this is pleasant. I could use it as a background or any comment on this type of considerations? Oh, no, but no.

T3: 26:15 So I quite like 2A

Sara: 26:20 Okay.

T3: 26:21 Like 2A right. And uh, yeah, I think 1B is a little bit annoying. Yeah, I think one B is a bit annoying. I'm replayed that now. 1B is a bit annoying. 1A is okay. I quite like, yeah, I quite like 2A because it is definitively musical notes 2B, it's kind of funny, but it's definitely not my most favorite. So I guess, uh, my favourite will be in, so the other will be first 2A and then... okay. So the, the most favorite will be 2A. The least favorite would be 1B and the other two are kind of similar in the middle.

Ginevra: 27:22 Okay. And do you think sounds accurately represent the information they means to convey? Or maybe during the test you thought about different sounds that are maybe more appropriately to, to express this kind of related to the context?

T3: 27:48 Well, not really. I just, I was just trying to associate the key to that district and, uh, I didn't really have any, uh, perception for the keys whether they are appropriate or no, not really. I would just try to associate the key to the district. That's all. Um, and when I say I like them or not, like it's just whether they are pleasant to the ear, not, not because they are appropriate to represent a water district.

Sara: 28:21 Yeah. Yeah.

Ginevra: 28:27 About this sound structure, do you think the duration of the single notification was fine, each scenario is about 10 seconds, that are repeated three times.

T3: 28:47 I think 10 seconds. It's just fine. It's just nice. Uh, it's enough for me to realize that, Okay, there's something going on. So usually because I didn't time the, the timing of the alarm, I usually the first one you just to tell me, okay, I need to listen now. I was doing my code and writing code, and something happened. Okay, I need to listen now. And so then I started listening on a second and then I verified with the third. So I guess, yeah, three times, three repetitions is good. The first one is just telling me that, okay, I need to listen. Second one, I listen and the third one I verify

Ginevra: 29:38 And about the rate of the sonifications? Because we used data that comes from the system every hour. So each notification is, the frequency of the repetition is one hour, but do you think, related with the system, that one hour is okay? Or maybe you need data, more frequently or maybe could enough less

T3: 30:01 So it depends on the system. So I was actually, I actually worked in a wastewater treatment plant before and for the plant that we had a different kind of system for some systems we just look, we just look every twice a day for example, why must

every shift and the more critical system where we look almost constantly and yeah, that, that and that our system where we look every two hours for example. Uh, so it depends on the system. Some system requires more monitoring and some requires less. So I, I, I don't know about distribution system, uh, that, that, that I think that would be a judgment call for people who are more familiar with this kind of system. Um, but if this is a wastewater treatment plant for example, uh, then, um, you, let's say you have a membrane, a filtration system and, and the membrane needs to go through a backwash cycle every half hour, every half an hour. So, um, every half an hour, you need to check that. Okay. The backwash did happen. If it doesn't, if it doesn't happen, then when something wrong, it's wrong with the control. Um, then, but then they are, oh, other system, uh, where it is monitored constantly by the computer. And if there is something out of range, the computer will pop out and an alarm. So, so, so we know that we don't have to look at the system all the time and we just go in every shift to record the value at the beginning of the shift. So this will, this will be a check twice a day.

Sara: 32:15 Oh, okay.

T3: 32:16 Yeah. So these are examples. So, so in an actual wastewater treatment plant, uh, operate those, we look at different subsystems at different frequencies,

Sara: 32:32 but still their main task will be to monitor operations, right? I mean to come to make sure everything is working fine, but of course a different, uh, um, with different frequencies or of the control and different, let's say, I guess levels of possible of, of emergency or what can happen. But that would be one person dedicated to this.

T3: 32:57 Okay. Uh, yeah, so actually in, in the plant that I worked, uh, we have three different, uh, so the whole plant is separate into three different main systems and we have one one operator for each system. So we have three operators each of them looking at one big part of the plan. And then in each part they look at different components at different frequencies.

Sara: 33:28 Okay.

T3: 33:29 Yeah. So, so, so this will depends on the actual system that, that you launch.

Sara: 33:35 Yes. Yeah, yeah, sure. And because this is, is, is shown of as a, as, um, as an alert system specifically for cybersecurity and cyber attacks. And of course that will be also a matter of how fast can an attack evolve and become dangerous. Yeah, I'd ask them if there

will be a dedicated operator. Of course, the assumption here is that a cyber security, uh, detection algorithm, I mean an anomaly detection dedicated to cyber security will be installed on top of the routine operations of, of control over the system. So I guess that would be also I metro of seeing how fast this can then they generate or escalate.

T3: 34:32 Yeah.

Ginevra: 34:41 Okay. And you mentioned the scenario you preferred, what, which would be the relation between the scenario you prefer with the one you considered more intuitive? I mean the... How do you think... the one you preferred could be the one that you consider more intuitive also looking at the results.

T3: 35:14 Hmm. Well... intuitively something normal would be nice to hear something abnormal will be difficult to hear, but, uh, but I think it would be difficult to have a mapping, a mathematical mapping from the plant to this kind of subjective friendliness. So I think that all all four sound keys, um, uh, again, I didn't associate the keys to any meaning, whether they make sense. I know I just tried to associate the keys on the districts.

Sara: 36:10 Hmm. So, so you're saying that maybe a solution could be then a sound is, is actually unpleasant when there is a danger and very pleasant when you don't have to worry about it. So it sounds worrying in a way.

T3: 36:30 Yeah. Yeah. I mean, I do. Ideally, maybe that would be good, but I don't know whether it's doable, but I think the current... the currently order for different mappings, was fine, I think, as long as you can distinguish within the four within the five districts and you can have a greater distinguished the anomalies I think with, um, with training people would be able to do better.

Ginevra: 37:10 I do not know if you have other thing to add... the other thing or maybe you add other considerations...

T3: 37:19 Yeah. Uh, so I noticed that in all four best, the first one and the last one is always regular. Uh, it's kind of, I mean maybe it is better if you randomize this

Sara: 37:42 Yes.

T3: 37:44 Oh, I mean, after, after the first test, I already know that. Okay. The first one, the regular, the last one here regularly and, and yeah, so I think, yeah, I think it's better to randomize, put the, put the regular one everywhere.

Ginevra: 38:11 Okay. Just because when we selected data to make the sonification, we tried to, uh, represent, uh, a situation that could be real. I mean, on that we have a normal system, then it happened, some, some anomalies and the level became higher. And then came back to the normal situation. So we tried to do present them. But, uh, yes. Um, probably what you are saying about the first and the last one is real and correct.

Sara: 38:50 Yeah. Basically we didn't want to mess around too much with data because we use real data or at least data from the work of Stefano and Riccardo and their algorithm and we said, because many of you have a competence in this field. If the data are really random, you will, you will find it inconsistent and these might distract from the main task, which was the sound because you you can think, oh, what, but the system cannot actually be behaving this way, right. Because we don't have the competence to judge what is, what is realistic or not. We basically stuck to the existing data.

T3: 39:37 I understand. I see.

Sara: 39:41 Yes. In terms of experimental design, yeah. This is certainly an interesting point for future tests. Okay. And one more quick question, maybe the 10.

Ginevra: 40:04 Yes, if you are willing to use the sonification you tested in the real world activity

T3: 40:15 Uh, so if, if it is only based to detect anomaly, then yes. If it is to, uh, detect district and the level, then yes with more training. Yeah.

Sara: 40:32 Okay. Do you see it, um, realistic in a, in a real plan since you have this experience and expertise that not everybody has Of course.

T3: 40:46 Well, in the real, in a real plant, we never trust just the computer. We will always go to the actual location and see what's happening.

Sara: 40:57 Okay. Oh, okay.

T3: 40:59 So even if we have the Scada system and, and we see something abnormal on Scada, we would, we would, we never just trust just Scada. We've always asked somebody on the site to go there and verify. So that's what we did. That's what we did in, in my plans previously. We always radio, hey, I see an abnormal level in this tank. Can you go and see?

Sara: 41:29 Yeah. Okay. Okay. Um, well I guess it's an evolving

situation, these on cybersecurity, because what we were discussing with, Stefano e Riccardo in the past weeks has also been that sometimes... where the computer can help is that may be the, the concrete result is the concrete, the visible problem is that there is something with a tank. But if the attack is not there, it's somewhere else and it is affecting the tank. Yes. So this cross check of information could be, could give additional information in this in the sense but of course...

T3: 42:20 Yeah. And also my experience is with a wastewater treatment plants is a contained environment we have operators on the field all the time. But if you're talking about what the distribution district, uh, you may not have guys, you may not have people on the field on the time and it might take one hour or two for you to call your technician to go from one place to another. So, so, so in that kind of system, maybe you can't do what I did in my plant previously. So you may have to rely more on computers. So in this case the alarm, the accuracy of the alarm become more important.

Sara: 43:08 Yes.

T3: 43:09 But as operators, we are trained to always as far as possible, always see the physical location, before... doing anything critical. Yeah. We, we, we don't trust computers.

Sara: 43:28 Yeah. Good, good. I think that's wise

T3: 43:35 So sometimes, for critical locations we install cameras and so on, so we can send a guy there, we can, we can look at the CCTV and see what's happening. But again, cameras can be hacked.

Sara: 43:54 Yes.

T3: 43:55 So our preference is, or as operators, our preference is always to be physical.

Sara: 44:03 Right. Interesting. Okay. Thanks.

T3: 44:10 Oh, my pleasure.

Sara: 44:13 Okay. Ginevra you...

Ginevra: 44:17 We have finished our questions...

Sara: 44:17 Thank you for your help.

T3: 44:34 Oh, my pleasure. It's just fun. Thank you for sharing the results. I know how I did it. Okay. It's kind of Nice too. Then this is a kind

of feedback there that I asked for. So when, when for the real life operators, they should do this. They, they, they, they, they, they do that

detection listening and detection for one week and at the end of the week they, they get their feedback and then they repeat the next week and they get another feedback. You do that a few times and then I think they will be more confident.

Sara: 45:08 Yes, yes, definitely. Definitely. Because these scenarios where all different, um, we didn't do that on purpose, not to give an advantage on the understanding of the next scenario. That new with this idea. So of course the first one is going to be the more difficult and then once you have the feedbacks, then the last one, even if the strategy is different, will be easier to understand. So we would have had the problems in comparing the results.

T3: 45:40 Yeah, yeah, yeah. ...doing a lot of experiments in the real life, right. In Real, you want, you want the act that, that a person would be better. But in lab experience you want them to be equally not as good throughout the, throughout the all experiment. Yeah.

Sara: 46:04 Okay. Thanks. Thanks a lot.

T3: 46:07 You're welcome. Very welcome.

Sara: 46:10 We'll keep you updated... updated on what happens with this project then.

T3: 46:15 Yes, sure. If, if you have a paper, I would love to read.

Sara: 46:19 Yeah. We aim at that. Great. So, Yep. We talk in the future. Thank you.

Ginevra: 46:28 Bye, thank you

T3: 46:31 Bye bye

Tester 4

Sara: 00:00 Take the time for taking the time during your office hours. So, also. You were the only one working in this moment, so thanks.

Ginevra: 00:13 Yeah. Thank you.

Sara: 00:15 Yes, here we are... last step!

T4: 00:19 Indeed. Yeah.

Sara: 00:22 Yeah, we made it. So I was started a recording from, from here, from Skype

T4: 00:29 Sure.

Ginevra: 00:39 Okay. So, we can start talking about the real context and we want to ask you if the sound was always audible during the test

T4: 00:52 Right. Um, I think, I'm trying to remember what it was almost. [noise] - Any better?

Ginevra: 01:31 Yeah. Thank you.

T4: 01:32 Yeah. Okay. We'll just keep that then. Um, so it was a week two day two which... I think were sound profile 2A. Let me double check that. Uh, the, the sounds for D-5 was quite quiet. I can

still hear it, but I don't know. It was the only one.

Sara: 01:56 Yeah. Because the pitch is quiet, is slightly too low to be heard with, with computer speakers or headphones

T4: 02:09 That wasn't easy I think.

Ginevra: 02:15 And was the information covered through the sound easy to understand in your opinion?

T4: 02:23 Was the information... Easy to understand?

Ginevra: 02:26 Yeah, I mean in general, maybe after we go deeper with a more specific meaning covered by the sound. My I mean in general. Yeah.

T4: 02:39 In general, it was very easy to tell whether the behavior was anomalous or regular. Uh, like that was very clear when there was this, um, comparing any kind of anomaly to um, uh, to the regular performance of the system. Um, and then determining how severe the anomaly was and which a district it was present in was more or less difficult depending on which sound scape was used

Ginevra: 03:19 Considering that in this project. This edification doesn't stand for the visual interface and the idea is to use the sound to

communicate the first level of, uh, of information, why the analyst is working, and then if he detected some anomalies or problem, he can go deeper with the visual interface. So, considering that you think the sound would be useful in the real context?

T4: 03:47 I think in that context it could very very useful. So yes. Um, if you were accustomed to one sound and then you're presented with a different one, uh, I think that's very noticeable.

Ginevra: 04:03 Okay. And which kind of problem do you think could emerge, um, from, from this kind of project applied to the real scenarios,

T4 04:22 Problems using this approach in the real world, um, I guess if it's a noisy environment interference, I guess over reliance on, on this one method might be, might cause a problem there. If this was the primary way that people use to check, uh, the normal status of the system. And then if there's any kind of interference or quietness or, uh, something like that, then maybe problems could go undetected. Um, so I, I think it's probably, um, what would fit best as, as part of, uh, as a complement to other methods of identity like visual and um, uh, yeah, data reads out some things. Um, other problems... I guess if the system is compromised. Um, then is under an attack (?) then they could present the um, the normal operation sound even though the system's performing anomalously. Um, so they might allow people in to a false sense of security, but I don't think that's any less problematic than a visual alert because you could have the same problem there.

Sara: 05:53 Yeah, yeah. We consider the the replay attack for example, but to our knowledge, which is, which is from a design perspective, but uh, as long as we, uh, as much as we understood for what we understood from Stefano actually, there's no real solution to that as well as our, we had I mean, if the system tells you everything is okay, than detection algorithm tells you everything is okay and it's a replay attack, you will basically discover it once, once it is done.

T4: 06:27 Yes, that's very true. I think maybe if there is two different ways of measuring the state of the system, um, which are independent of one another. Um, and if one was, say for example, you were measuring the level in a tank, you could have, um, like a pressure meter in the tank. But you could also have a webcam, uh, showing live footage of the tank so you can see if the, uh, it was overflowing or something like that. That would be harder to, for an attacker to compromise I guess. But, um, yeah, having for the sound application,

uh, sonification, um, you're still operating with the same data. So, uh, this day yet it presents the same issues. I guess

Sara: 07:22 Unless, the visual interface works with that type of data and, and sound from another source that could have a cross check... Sorto of - effect

T4: 07:32 Exactly. Yeah. That could be one great way to use this application. This as a cross check as she's saying,

Sara: 07:39 Yeah thanks!

Ginevra: 07:46 And about a technical point of view. Did you have any specific technical issues that you encountered in the interface? Maybe the, with the website or other, other system you used during the test.

T4: 08:07 No, technically I think it all worked fine. Okay. Um, my, uh, the only times I missed the alert where when I was away from my computer.

Ginevra: 08:20 Okay. And uh, which kind of devices you used? Like the speakers or headphones...

T4: 08:28 Headphones.

Ginevra: 08:30 Okay. Always the headphones. Right?

T4: 08:33 Yeah. Always headphones.

Ginevra: 08:35 Okay. And was this place noisy or quiet? They were other people. You usually talk about... talk with them?

T4: 08:47 Yes, it was at times noisy. It's an open office. I sit close to other people who are working or having meeting on the phone, and it's nearby a printer. Uh, so there's the noise of the printers. So it's a relatively noisy environment. It depending, um, it differs on at the time, I would say moderately noisy.

Ginevra: 09:18 Okay. And about the training, do you think was sufficient and do you think the information on the website explain the project appropriately?

T4: 09:28 It does, yes. It works. I, all the information was there and um, it, it set me up well to distinguish it. Just normal operations from an anomaly. I think it took a little bit of practice for me to, uh, get better at distinguishing the different districts and um, how serious each one was. Um, but understanding what the tests would involve quite clear. Um, I did make a, an incorrect assumption about, um, the ones where the sound is repeated and state of, um, uh, played for a different length of time. Um,

the assumption I made was that, uh, the, the number of repetitions would be different for each district. So, um, instead of the frequency changing over the same sequence. Um, so I think that was that I realized my mistake after a while, it took me, I think two or three goes to work out the difference.

Sara: 10:39 We didn't include any demo track, so to speak, but just they individual sound case. On propose, because the scenarios where, I mean every day you tested something different. So, um, giving, giving a demo, we felt we were getting ourselves into troubles because then to give a demo of each scenario, but then you get much of an advantage, right? from the first to the last.

T4: 11:14 Yes. Yeah.

Sara: 11:17 Cababilities would increase exponentially, I mean, with only four cases over two weeks. So we were afraid of getting a little bit lost in then analyzing the results.

T4: 11:29 That makes sense to me. Yeah.

Sara: 11:31 But these emerged, also in everybody's comments that in a real case, of course an operator would be presented with, uh, examples of different possibilities and...to familiarize, so... Definitely.

T4: 11:50 Um, but I don't think it changed, my understanding of how the test could work.

Sara: 12:00 So from this single sounds and listening to real events, then you are able to develop your own strategy to, to understand what's going on, right?

T4: 12:19 Yes. Yeah. I found I would take little notes on a notepad as I heard the sounds. So the first, yeah, I found, should I describe my, my tick named. (?)

Sara: 12:36 Good. And did you go back to the website for, to hear the single sounds?

T4: 12:42 Yes, I did.

Ginevra: 12:46 Okay. So about today, the district identification, do you think the request were maybe too much ambitious? Also with more training or maybe with more training could be easier to detect the number and... which districts have anomalies...

T4: 13:09 Yeah, I think more practice would be helpful. And also I found the musical tones were easier to distinguish than the, the noisy tones. At least that's how I felt. But you can be the judge of that based on my

results.

Sara: 13:35 We will share them with you, we have them. We have a file for you too, to check your performance. We... we assume in a, in a,in a second prototype, let's say to have a visual interface as well. I mean so, so we, we are not trying to replace the, the visual maps. So of course that's for the districts having a visual feedback that will be um, almost necessary. I will say if you want to go deeper into, into check in what's going on so it makes sense. We asked to the questions about, we included questions about districts identification and anomaly level gravity level. Um, but we actually, we're not sure. We still are. I'm sure where that information is really relevant or not to, not to use the sound for, because we could because we don't know. That's why we asked about, we have no, um, no pretty judgement on this point. Sometimes for example, I personally think that identifying the district is something that could come with time. So the operator that do it because with sound, we develop a quite high level. It is very sophisticated how we can understand sound. Because imagine in a forest, right, we are able to identify so many details in the sound or in a city, depending on the environment we are familiar with, a whole, we get so much information from the sound, but then how we use it and whether it's relevant or not to take action, that's, that's a matter of time mainly and circumstances and difficult to understand. So we tried I suppose for the level of anomaly, for example, we didn't use any anomaly level to design the sound. We simply to take the data as they are.

T4: 15:51 Oh, I see. Okay.

Sara: 15:53 We don't have an idea on how these five lever are... We thought we'd ask you so we could gather information...

T4: 16:06 Yeah, no, that's, that's, that's a good way to do it. It's like a double blind. Well, so with, um, with sound, um, and so much of the understanding is, um, subconscious as well. In my experience. Like I've had an example pointed out to me before that you can hear the difference between hot water and cold water. And it sounds kind of crazy, but if you listen to the sound of cold water being poured into a cup and then again you listen to the sound of hot water be important, it sounds different and you know which one is which, even if you might not have been able to describe how they are different.

Sara: 16:51 Yeah, yeah, definitely true. So where we, we are heading to hopefully with the next prototype and next round of tests will be exactly leveraging this competence that you can acquire withsound. It's just

that this requires, I mean it requires time, but anyway, um, uh, reach this level of competence to demonstrate that it makes than searching for the correct information in the visual interface is more efficient. So using the sound as a sort of facilitator, that stays at their background of your, of your routine, then you develop these unconscious subconscious capability to perceive that something is quite not right. And you know where to go and look for information?

T4: 17:51 That's really interesting. Yeah. I like it.

Sara: 17:55 That will be it. So we don't want to give the same information that you can have on your software with all the visualization and flow charts and maps and details and historical data... through sound... because we don't think that will be even necessary right. Then you just look at the screen.

T4: 18:19 Yeah. Unless you are designing assistant for somebody who's, you know, cannot see someone who's blind. Yeah. That's a different design question altogether.

Sara: 18:35 Okay, thanks.

Ginevra: 18:37 And then about your main occupation during the experiment days uh, what you used to do? Like reading documents, paper using computer. We are interested in your visual and sound channel. How they are occupied also if you use to listen to music at the work?

T4: 19:01 Yeah.

Ginevra: 19:01 How did you manage the sound of the test and the music?

T4 19:09 Right. So, um, in my role, um, I work as a consulting engineer and involves reading documents, um, browsing reports, uh, doing some data analysis, uh, email communications and phone calls with clients. Um, I also have some site visits, but I made sure that I was only doing the experiments on days where I didn't need to leave my desk. Um, occasionally I'll have meetings that I need to leave, uh, for. Um, so I tried to schedule those around, um, experiments. Um, a couple of times that I had phone calls at the time the, uh, the test was going. So, uh, I wasn't able to concentrate on the test. Um, I often listen to music while I'm working at my desk and I just usually have something quiet on in the background. Um, something instrumental. So No, uh, no lyrics, no words. Um, but even so when the test started, I always pause the music because I found it difficult to concentrate on just the

test if there was also music playing. Um, so that may, that usually of the three repetitions the first one, um, mostly just alerted me that the test was happening and maybe I could distinguish if it was normal or anomalous. And then it was the last two repetitions where, uh, I was able to pay close attention to, um, to try to distinguish the level of anomaly and the districts.

Ginevra: 20:59 Ok, I do not know Sara if you have some specific point to...

Sara: 20:59 Just a question that is not in our list. How would you, how would you see the option about continuing sonification? I mean just we use, we have a question on that where we use data did arrive once an hour. So at the moment we have this, hourly frequency of receiving data from the algorithm, but there are other systems like internet networks in terms of cybersecurity that they manage a much bigger volume of data and it's real time basically. Right. So how would you see a real time sonification? I mean, that goes on in an office basically. Yeah. All the time. Like a music background of course, given the right sounds and let's see, all the design problems solved.

T4: 21:59 Yeah. I think there's a lot of potential there. On the website there's the example of Wikipedia edits. And I found that actually quite soothing I had on in the background for maybe an hour on the first day. I was, um, uh, when you first presented the website information. Um, so I think, yeah, if, if the sound profile was right, I would quite enjoy that. Um, I don't know if it would work in my current office were receiving and making phone calls all the time, but in the right setting that could be, it could be interesting. Yeah. I would be open to that, working insuch an environment.

Sara: 22:45 Okay, good. Thanks. Definitely the Wikipedia one is quite is a very good example. I sometimes open it and leave it there as background music. Okay. Thanks.

Ginevra: 23:02 What about the scenario or the sound that you like more than, than others? Independently of the other consideration that could are... the one you performed better. But just to say the sounds you prefer and the the kind of structure you, you found more comfortable.

T4: 23:30 I think I definitely preferred the musical notes. Um, and I um, preferred the, uh, the single turns repeated, um, as opposed to one tone stretched out. Um, so let me find the exact one. I'm just going back to the website. So I think... yeah, 2A is my favorite and the most

pleasant to listen to.

Sara: 24:13 Ginevra, maybe we can share the results...

Ginevra: 24:15 Yeah, I'm copying the link in the conversation... let me know when you see the results

T4 24:28 Good. Excellent.

Ginevra: 24:36 You have the right... I mean the number we used to to make this notification on the left and on the right you have your answers...

Sara: 24:52 Not bad

Sara: 24:56 Actually some... which was 1A is almost perfect even with the levels. So we reverse engineered the anomaly level. I mean as I told you, we didn't put an anomaly level into the design of the sounds. They just go with the, with the individual numerical data. Of course they are normalized and blah blah blah. But it's just a translation of the sound. But then we created a scale one to five of course to cross check your results. Otherwise we wouldn't have been able.

T4: 25:34 Sure. Yeah, that makes sense. Um, and I think this reflects my preference for the musical of the noisy sounds. I was also better at identifying it looks like...

Sara: 25:49 Which was not always the case though. I mean I'm the you you testers. Yeah. It seems that this thing, so this is something as to investigate on larger numbers of users. Because it happens that people that said I definitely prefer this. And then it was the one where they performed worse... so something to do investigate more.

Ginevra: 26:24 About the sound, there was some particular sound that have special meaning or maybe remember some personal experience or physical reaction, emotion in you?

T4: 26:38 Um, not especially no. Some, uh, first time I listened to, um, 2B, uh, the volume was up too high on my computer and it was so, it was quite an unpleasant sound and also quite loud. Uh, so that I like jumped in my seat. Um, so yeah, essentially 2B, it took me by surprise every time. Um, but yeah, I didn't find it really stirred any memories or a head of particularly emotion or reaction

Sara: 27:19 In the spreadsheet you sent over for 1B, which is noise with length, you noted very jarring, scary sound, that actually means that everything is fine. So...

T4: 27:40 Yeah, that was an emotional response

Ginevra: 27:54 Maybe during the test you thought about some different sounds to use a, or maybe just, do you think that the sound represent the information in the, the way that could be useful? And, and real related with the sounds?

T4: 28:19 Yes, I think the meaning was quite clear based on the different sound, the lienght, it's a very comprehensible way to understand it. Um, the, the frequency of repetition I found little bit more difficult because, um, for the length I knew that if it was 10 seconds it was the worst and once they can was fine, but for the frequency this effectively no limit to how fast it could go. Like how, how high that frequency could go. Um, so that I've found it a little harder to, to distinguish how serious the anomaly was. Um, cause there was not so much of a relative scale to compare to. Um, so one thing I thought could be interesting would be, um, if the sound's repeated like once for a regular performance and then more times for some anomaly, but the number of total number of repetitions change, not the frequency. So like one sound every second, for five seconds would represent, um, you know, like a, a medium anomaly. That was one idea that I don't know this would be Um, and, it's distinguishable as the others.

Sara: 29:59 So that you have... I mean, you can build a relativity scale. Sort of? Because you already know what will be the maximum possible case.

T4: 30:10 Yeah.

Sara: 30:11 So, so your trouble was that yeah. You hear that maybe their repetitions are closer in time, but you actually don't know whichis the the closest possible.

T4: 30:23 Yes, exactly that.

Ginevra: 30:28 Okay. Yeah. You also mentioned the duration. So, uh, you said, uh, that the first uh, um, sound was to keep your attention because we, you, we repeated repeat the... the sound for three times and each of that during, uh, 10 seconds for a total of 30 seconds. Um, do you think the idea of the repetition was fine? I mean useful too to cover the information?

T4: 31:10 Yes, I found it very useful. I think my performance would have been worse than one third as good if I only heard it once, if that makes any sense. Um, yeah, most of the, because I would be concentrating on something else and this first sound would mostly served to bring my attention to the test. Um, so having it repeated allowed me to better characterize the information.

Ginevra: 31:43 Okay. And also about the, the duration of a single sonification, do you think that that 10, so in total 30 seconds is too much or it could be a, a good solution?

T4: 31:58 Um, it seemed like a reasonable amount. It's enough to, uh, make clear distinctions between different levels without dragging on for too long. Um, and three repetitions was enough to, um, get quite close to, um, knowing the system as well as she could based solely on the sounds I think.

Ginevra: 32:31 Okay. Okay. Like Sara said before, we used data that comes from the system every hour. So then the repetition about the data... They are played for, for one hour by hour. Uh, do you think that this kind of a rate could be enough recite data or maybe you need the more frequency sonifications?

T4: 33:04 Um, it depends a bit on the application. If, if, if the data, they come in once an hour, then I think it's fine to have that represented once an hour in the sonification. Um, if it was yeah, designed to be a rapid response to identifying an issue, then um, maybe, um, maybe more frequent would be useful. Um, if, say the 10 o'clock sound gets repeated at 10, 15 and 10 30 and 10 45 and then it'll live in a, can you get a new sound... Um, um, in my particular context, that would probably actually be a useful thing because, uh, they may be the chance that I'm on a phone call or an meeting, uh, at, at the top of the hour and three hours. So I think that would, uh, in my particular work context, I would have found that perhaps that more convenient

Ginevra: 34:27 in this case we have once per hour you think would be useful also to repeat like a, I don't know, 20, every 20 minutes, the same data or maybe you mean that, uh, considering an algorithm that gather the data every 20 minutes, in this case

T4 34:52 In this case, I think it would be fine the repetition of the same data then it could serve as confirmation, um, previous alert or it could replace the previous alert if you missed it somehow

Ginevra: 35:22 Okay. And so Sara if you do not have... any particular consideration in the sound structure...with the instructor, ok, you already mentioned the scenario you prefer and also the structure of the scenario you think, ah, is more easy to understand. My question is, how do you think that the one you prefer is related to the structure you consider more intuitively? I mean, do you think that how these, the one you prefer and the other are related?

T4 36:11 Um, I guess, uh, while I found the musical notes repeated, the

most pleasant to listened to, it was probably the length that was easier to tell. Um, uh, uh, well the relative seriousness of the anomalies, um, clearer for length, whereas the repetition of the notes was probably more interesting and pleasant to listen to. For the, the noisy sounds Um, on the other hand, uh, I think that, um, if they were definitely less pleasant to listen to for me, but, um, I also appeared to have performed worse and I think I felt that at the time of testing as well. So I don't know if that's because, um, having had some training in music, I find it more comprehensible then the noises or whether it's because it's less pleasant. I don't want to listen to it as closely. Um, so yeah, I'm not sure what the direction there is.

Sara: 37:37 Yeah. We are not sure even. That's not really relevant literature on the topic because every time. I mean, there are some studies where are music is an advantage or whether, what do you like most? Do you also understand better? But because all these are very interconnected with a specific design problems, right? I mean, at least seen from our field is very difficult to give, just, to do, to take a cognitive test and be assured that this is what it is. Because then in, in a real context and with the real sounds the new ones are so many, like with a product to you, do you like to use it because you like the color? I mean you develop on an emotional connection or just because he works fine is very debated in, in design. What is one of the biggest programs because topics, right. So, yeah, not easy.

T4: 38:46 It sounds like you've got some conflicting results.

Sara: 38:50 Yeah. But then again, the numbers are very low. So our primary goal with this first round, because it's six people, but at the

same time you dedicated a bit of time. We have the interview. So say the quantitative part that we collect is certainly not the most relevant is like a first iteration. We have four different prototypes. So ideally from all your feedbacks, we would redesign a final prototype to test with larger numbers. So let's see what comes out. Okay.

Ginevra: 39:34 The last question is if you would personally be willing to use the sonification you just tested in the real world activity.

T4: 39:47 Yeah. I think if, if part of my job entails monitoring real time data, then yes, I would like to have sonification be part of that.

Ginevra: 40:00 Okay. Okay. Sara I don't know if you have... or maybe also you T4, if you have some any personal opinion or something to, to add or suggest.

T4: 40:17 No, I think I, um, most of the comments and made it on previous questions or, or in the spreadsheet. Probably cover it. Um, yeah, thank you for letting me be a part of the experiment. It was, it was really interesting, it was cool to be a part of that.

Ginevra: 40:40 Thank you for helped us

Sara: 40:44 Yeah, thanks very much. We will keep you updated.

T4: 40:53 Okay. Yeah, of course. Um, but thank you for accommodating me and giving me extra time to complete the experiment. So, um, uh, did make it easier for me, so that was great.

Sara: 41:03 Yeah. No, thanks. Thanks. No problem. Thanks for managing to get to the end of it. We had cut a buffer time, so we asked them in our schedule.

T4: 41:21 Ginevra, Sara, nice to meet you both and if does anything else that can help you, let me know.

Sara: 41:29 Good night. Good evening. Thanks.

Tester 5

Sara: 00:00 If you are ok with that, we switch off the video we go to audio only we record so we can transcribe it later. I will have to leave at quarter to 10. Your quarter to six? Twenty to. Six. Better. If we didn't finish Ginevra will do the wrap up. Thank you.

T5: 00:31 Okay, sure. Okay

Ginevra: 00:37 We can start asking you about the context where you took the test and we ask you if the sound was always audible and if you hear each of the sonifications. You didn't hear the first one, right?

T5: 01:01 I didn't hear the first one for the week 2 date 2. Yeah. Although i am quite sure my headphone are plugged in so I'm not sure why because sometimes so the ten o'clock, the 10 am one, I only heard it only once without the repetitions. Yeah. So it's just with the ten o'clock and so I'm not sure why.

Ginevra: 01:26 Okay. Okay. Don't worry but other sonifications you heard, you think the information that was covered were easy to understand?

T5: 01:42 Uh, yes. So the other time I heard all the sonifications. So I think the, I will say that the repetitions were very useful because most, most of the time, when I'm doing something, the first time the sonification sounded, I really don't notice which district it is or how long it sounded. So then I pause what I'm doing and go and listen closely the second time. So I thought the repetition was very useful and for the audible fact, there's only one time which I find that it was too loud because there was once when I had a meeting with my advisor. So, so the sonification sounded during the meeting...so the meeting ended at 11 PM, Eleven AM. Sorry. So the sonification sounded at 11 and because of the meeting I had with my professor over a Google hangouts, I've had to turn up the volume so that the sound that it was extremely loud.

Sara: 02:48 Yes. You put it it in your notes, right? Yeah, yeah, yes. Yeah.

T5: 02:56 So there was one time when I found that the sonification was very hard for me to listen to it and luckily during that time it was near the end of call, so I ended the call and turned up the volume to listen to it for the second of the time, it's quite funny you know. I guess its the purpose of the sonification that when you are engage in other tasks, you can still hear it.

Sara: 03:28 Yeah. So it definitely should attract your attention because

our goal here is to finalize a prototype. For example, your feedback will be used for, for example, to think that the sonification should be able to merge with your other activities. I don't know if you receive a, a skype or a google hangout call in the same was... so it was the same computer you were using for the call, right?

T5: 04:02 Yes, correct. Yes.

Sara: 04:03 So probably it could lower the volume or increase the volume if there's no other sound. So that's very interesting. Also, I think from your comments if I remember correctly from your file, this was the sonification with noise or with music. Do you remember that?

T5: 04:25 You mean for which day was it?

Sara: 04:32 I should open up your...

T5: 04:32 Is this the one?

Ginevra: 04:35 It was the first day of the first week?

T5 04:40 The first day. Let me check on. This was for the two day one. So that's 1B.

Ginevra: 04:51 Yeah, we do day one. Yes. Was the 1B. It was the length with noise.

Sara: 04:59 Noise. So particularly. Maybe also startling if you didn't expect it. But good to attract attention as you mentioned somehow. Okay. Thank you.

Ginevra: 05:19 Do you think the sonifications could be useful in the real context? Considering that, like we explained, the sonifications doesn't stand for the visual interface. Our idea is to use the sonifications to describe the system and then if this system, has some problem, the analysts can go to the visual interface to go deeper with the problem. So considering this background, do you think the sonification could be useful in the real context?

T5: 05:58 Yeah, I think. I think it could be useful because most of the time when I'm engaged in a task. I will, I will try to describe my experience. So I tried to to take note of when it is going to be near, let's say, when the sonification is going to sound so our plug in my earphones during that time, but most of other time, I don't know, maybe I would try to plug in my earphones about a 10 minutes to the hour so, but then I will get engaged in my task so I don't, I won't purposely wait for the sonification to sound and then when I'm engaged my task, I will still be able to suddenly hear the sonifications, so it is really useful

for giving information even when you are engaged in some other task although the downside would be you have to be somewhere near where the sonification sounded. You must be able to have your phoned plugged in. I think it's useful for me to know whether there's an anomaly and to check the visual interface. I mean in a real world scenario. It is easy to distinguish between where is regular or where there is an anomaly, but I find a bit difficult to differentiate the anomaly level and also to differentiate the different districts. For some of the scenarios is easier for some it isi tougher for me, I would say that my favorite is scenario 2B. Yeah.

Ginevra: 07:31 We have a spreadsheet with your personal results.

Sara: 07:39 Maybe while Ginevra sends it to you. I just wanted to recap your, your technical experience so... if I got it correctly usually you don't use headphones and nor you listen to music or let's say your, your sound channel is free usually, right? But you put your headphones on just before the sonification because you knew you had to this task.

T5: 08:09 Yes. Yes.

Sara: 08:11 Okay. But still then you put it on and then sort of forgot about it until it sounds, is it correct?

T5: 08:18 Yes. Great. And I'm also sometimes are maybe listening to music. So there was a few instances that I post my music to go back to the sonification to hear for the second time of the time day. Yeah.

Sara: 08:35 Okay, good. So the first time to, to alert to that it was time for the sonification and then second or third to pay more attention.

Ginevra: 08:48 And what about the context where you took the test so, I mean the space was noisy or there was other people doing different stuff. I don't know...

T5: 09:04 Oh, so most of the time I'm alone. If you go see from the picture. One time I was at home. The other time was in the office. So most of the time not I'm not ? distracted? but then again I purposely chose those days that I know that I can stay put in a single location, so to do the experiment. So most of the time nobody, nobody, distract me. So...

Ginevra: 09:33 And about the training, do you think the information on the website explains the project appropriately? You understood from the website...

T5: 09:46 I think the website was very helpful for gift the difference sounds for the different scenarios so that I can always check

back also, but I said that I, I think I'm missing the one...one for "sssssh". So that are two issue that I had actually the one is because the sample sound, it's only when it's regular. So I actually had no idea how, how the different anomaly levels shoud sounds like. So, if there is something that I can suggest, i'd rather like different anomaly level or the different scenarios. So I can go through one so I can gage how long, and what are the different anomaly levels. Yeah. So because the first time I did it, it is actually I think it is a big one, day one the first sound it's a regular sound but I thought it was anomalouse because it just seems different from the one I heard, because I did not know how long this anomalous sound is suppose to be. Then I may have adjusted the, adjusted that some of like what I feel as I go through. So maybe I thought Sunday at 1:00 PM which seems a bit longer than one I heard at 12 PM and then adjust that. So there wasn't like a benchmark of like how long its anomaly level should sound so I could really compare againstnthat. But other than that I think the information on the website are very helpful. Oh yeah. An other thing that I'm pretty sure I did it a bit wrongly because when I first did scenario 2B, although I know that there are two different scenarios but actually I thought that I was still thinking that's scenario 2 was based on duration. I know that there will be changes in the number of the loops So I didn't know that it is, say it would be like three loops over the same 10 seconds, I was still thinking of it in a more duration form so I thought like, mmm, so this sounded like..mmm...so I think I confused the districts because I thought the sound has a same duration, but actually they have a different frequency. It was only for the scenario 2A and I realised that is the frequency rather than the duration that this may cause some problem for the 2B.

Sara: 12:16 Yeah. I think this happened because from your comments in the excel file, we could see that you were probably... in fact we noted down whether you were, you were confusing the strategy of this scenario. One with the one of the scenario 2.

T5: 12:37 Yes. Yes.

Sara: 12:38 Nonetheless, it's very interesting that then you found your own strategy. I mean it was sort of... you were able to go back to the rule.

T5: 12:48 Yeah. So it was quite interesting because for 2B I didn't really realize that it was the frequency because I think the sound of 2B is more of of, there are like different noises rather than... Ithought 2A is more like a melody or a music. So different pitch. So it seems more obvious that I can count it as different on some sort of score but for 2B

because the sounds are more like different noises are more like... you won't find them in a music. So I didn't realize that it was the frequency but for 2A I realised the frequency was different.

Sara: 13:38 Okay. So as for the, for the training part, then probably you're saying that it would've been useful to have a demo, right? A demo of what you were going to expect. Not only the key to read the sound map so to speak, but like a ten seconds demo or with anomalies and no anomalies. Ok. Go. Thank you.

Ginevra: 14:09 About the districts identification. You mentioned before, um, how much do you think that was... you understood the distinction between districts and then how much do you think was possible to distinguish the districts? I wanted to remember you that it was not the first purpose of the sonification. I mean the first idea of the sonification was to communicate if the system has anomalies or not and we tried to add also these information to help the analysts to go faster to the visual interface and to go deep in the analysis. So districts identification was not the first purpose but how do you think it was possible to do that and maybe you think the request was too much ambitious or maybe just more training was enough to, to, in next days, to understood better this information

T5: 15:21 Distinguish the districts I think the sound in scenario 1 they are harder to differentiate. Especially because they are using duration So I find that when that's an anomaly for districts it goes longer but it's this for me that only the sound at a very initial second sound different and it just goes longer and It seems very similar or different districts. It's more obvious for scenario 2 because they keep repeating. So I guess you have more opportunity to identify the districts. Uh, as I said, i prefer 2B actually because I thought they sounded very different. Uh, the different noise. Uh, but, but actually I think that 2A could be very useful for someone who is pitch perfect or who are more musically trained because I think 2A it's seems more something like a melody, or something musically trained I think that might be. For me I find quite difficult to differentiate as well. So I always had to go back.

Sara: 16:28 Do you want to have a look at your results?

T5: 16:33 Yeah, I'm looking at it. Let's see. So I suppose the correct answer is the one bold, isn't it?

Sara: 16:44 To the left? Yes. Yes. I think there is a typo problem

Ginevra: 16:49 I can, I'm sorry. I don't know what happened but 1B is this one, I can copy the results. Okay? Do you see now we have the

numbers

T5: 17:13 Okay. So

Sara: 17:19 It's interesting and you are not, you are not alone in this... I was very surprise is interesting to note that, despite being to be your favourite and as I said, well the first time that it happens and you actually performed better in others

T5: 17:43 Actually for 2B thought I heard the district 2 quite distinctly and not district one

Sara: 17:51 We also have to go back, but anyway, your identification of the district is pretty good. It seems as district three. You always got. We, we still have to go back and cross check ourselves because honestly, I will not remember which one is three. Which one is, is one. So I mean from the design of the sound point of view with our considerations, but you understood it pretty well in general. Is interesting that the result of the 2B uh, is um, you caught all the anomalous states but attributed a more serious level of anomaly. Correct. But the anomalies are correct are all marked five. So it seemed to you that the anomaly was strong.

T5: 18:56 Yeah, because there was when I said I interpreted wrongly because they lasted for 10 seconds although the frequency was low, so I was still thinkinf of durations for high, high anomaly level. So that was the reason

Sara: 19:13 Ah ok, it was in this particular case because then the 2A is better in this sense

T5: 19:23 Yeah the 2A is better because but I started counting, rather than depending on. Yeah, because 2B I missed ti and I took the

uration.

Sara: 19:33 Because you took 2B first. Yeah. Okay. Okay.

Ginevra: 19:39 Yes. Because 2B was in their first week,

Sara: 19:42 You see... I still.... Yeah. Okay.

Ginevra: 19:54 If you is okay, we can try, start talking about your main occupation during the test. If you can describe what you were doing during the test or if you were using computer or reading paper or, and also how your visual and the sound level were occupied by different kind of things to do.

T5: 20:25 Okay. So when I was doing this experiment most of the time I'm on the computer, so let me check, so I'm writing code and writing papers and doing some simulation. So yeah, most of the time

I'm looking at the computer. So visually I'm going on a computer, but as for listening, let's see sometimes, but sometimes I listen music, sometimes I do not. I don't think there's any other interferences with sound, other than the meetings meeting that I mentioned earlier. So that's the only point that Oh, I'm listening for something else, but for the other times I'm not listening to other things.

Ginevra: 21:12 Great. And from your personal point of view, you were saying before the 2B is your, we can say your favourite scenario, but it's the one you prefer than others, but there were maybe some sounds that have a personal meaning for you or that reminds some particular experiences or maybe physic reactions or emotions for you.

T5: 21:49 So for the one I like... 2B. Because that one sounds like it sounds like a game to me, because the district 2 sounds for 2B sounds like some kind of bird flying past the district three sounds like

it's the monster something like foot... Yeah. So it sounds like a game

Sara: 22:17 Ah ok, so you attributed meanings to the sound.

T5: 22:26 Sort of. The scenario 2B has the most distinguished sounds for the district. Yeah. So 2A, 1B, 1A, I found that it's harder to associate something with a sound. So it's seem to be hard for me differentiate them.

Ginevra: 22:46 Okay. So the one that is your favourite, you like more than others, it corresponds with the one you think is more efficient and more intuitive to understand. Right?

T5: 23:00 Okay.

Ginevra: 23:02 Okay. And during the test maybe you tried or thought about different uses of sounds in this context maybe? I don't know. We proposed two different scenarios that are first and the second based on length and amplitude of a sound but I don't know, maybe you tried to or you had a different idea of use of sound to cover the same kind of information.

T5: 23:38 Uh, I thought that the current way it's not bad to tell whether that's anomaly and not. If I want to suggest, actually I would rather have 2B but using duration that the sound of 2B for different districts that using duration rather than the frequency because for frequency is not really obvious for me it was like something can sound 10 times in 10 seconds and something can sound 15 times in 10 seconds, but it's been hard for me to count concurrently how many time a different sound sounds. But it is,for duration, it seems like, oh, this and that.

This did not end. But then the problem that was for the scenario one, I couldn't differentiate between the districts. So something else, I can suggest it's um, they had different loops but it ends earlier or it ends later. So the sound repeats, but the duration changes. So let's say something. So is there, or having a one district sounding for 10, 10 beats in 10 seconds. Again, the other one for 20 beats in 10 seconds again. I rather have one district with lower anomaly, be 10 beats in 5 second and the other one has a 20, 20 beats in 10 seconds. So the frequency is the same, but the duration changes. Yeah.

Sara: 25:10 Wow. Okay. That will be a sort of combination of the two.

T5: 25:16 Yeah. Yeah. So I like the duration of a scenario one, but I liked the repetition part of the looping part of scenario 2.

Sara: 25:29 Interesting.

Ginevra: 25:34 Uh, I don't know Sara if you have more specific questions about sounds or we can go to the sound structure

Sara: 25:43 Yes, I think so because... Yes. Thank you. You've given us a lot of information

Ginevra: 25:51 About about the structure. Do you think the duration of single sonifications was appropriate? I mean, the duration. We based the sounds on 10 seconds each and then we repeated each part for three times in each sonification. So do you think the idea to base sound on ten second and then repeat the sound for three times was good? You got the information that was enough? Or maybe too much repetitions?

T5: 26:33 Uh, I liked the repetition, so they were just right to have them for three times. The duration, I think ten seconds It's also fine. Just the one difficult part is I don't know how long ten seconds is So there were some times during the experiment, I'm like, this sounds will be longer than previously, but actually they ended up being about the same length or like if there's a hint? On that, how long that ten seconds is these, it will be easier for me to tell this just sounded for 5 seconds, but sometimes I'm like is it again 10 seconds? it sounded the same to me So yeah, it's just something that I can't really gage the anomaly level by duration for scenario 1 is just one continuous, but the duration is a, it's a nice amount of time. It doesn't I don't have to spend a lot and listening to this sonification since it is quite short and I can, I guess it conveys enough information during this time also. So yeah,

Ginevra: 27:37 From your first questionnaire, you, we saw that you

are a water infrastructure engineer. So you are specialised on water structure, water infrastructure and what do you think about the rate of each sonificartion because we use data that coming from the system every hour. So we use this timestamp that is one hour to communicate the information about the system. Do you think that one hour is a good timestamp to, to make the sonification or do you think you need more data more frequently or maybe less?

T5: 28:28 Personally, every one hour for someone listening. I think that is that it's just right not too demanding and also a seems frequent enough for someone listening because, like the only problem is so when you need to go for lunch and it'll be more than one hour. So you may miss something. So I think that that's still reasonable. Wether from the perspective of say someone operating on the system, whether one hour is frequently enough. I think that depends on how fast that system could possibly fail within one hour. if the system fails very quickly then one hour maybe too long before the someone listening to it realised that it is anomaly. So I guess it depends on the system, it can either fail very quickly. Even it doesn't then I think one hour is reasonable.

Sara: 29:24 Yes. At the moment is based from the data that they do come from the system. So in theory we should be assured that the one hour is fine for this particular system. In general, so yeah, I wanted to go quickly back to the district, but, identification even to me, it sounds like you, you had quite a smooth experience. I mean it seems to me that you were quite confident in the districts identification as well and that didn't concern you too much or I don't want to give you the answer. I wanted to understand a little bit more because for us the identification of the district was a demanding task for, for ourselves. I mean if we had to do it we would have found it difficult. So I don't know. I just wanted, as I said to you are, you are giving us a lot of feedback so thank you very much. But just just to understand more if, if you were, if you thought you had enough information or if you let you concerned with the fact that in a real situation you wouldn't really know what's going on or you couldn't identify the districts. Thinking that in a real situation you would have also a visual feedback. So.

T5: 30:49 So for the identification of the districts I think is smooth. Sometimes I'm just guessing because I hear few sounds sound very similar. So I would just guess. So I wouldn't say I'm very confident which district it is. Actually that was, I think district five, district five of 2A. I couldn't really hear that sound compared to other ones because it's a very low base sound. So that seems softer to with me than the

other sounds likes. What's anomalous district, I'd be caught that, but I guess that was a, it is easier to count and the number of districts, but it might be a bit harder to differentiate the districts.

Sara: 31:37 Yes. Yes. In a context where you have the visual map, that might be enough. But anyway we will do this consideration. Thank you. Good. Thank you.

Ginevra: 31:52 Yeah. And about your profession we talked before. And do you think you would personally be willing to use the sonification in the real world activity? I mean you tried this for an experiment, but do you think could be possible and really useful to use this kind of sonification in the real context?

T5: 32:21 It's possible, but I guess there will be some... it depend on how it is really implemented. Because when I was doing it I selected days that I can be near my computer for all the day, so, at my meetings ware through using skype or hangouts. I made sure that I'm not meeting people physically cose that might distract me. So yeah. So the limitations are to be near my computer. I may not be willing to do it like every day because my job, sometimes I need to move around. So yeah. So then that might not be. It might be difficult part of implementation because not everyone will be near the computer all the time unless it is implemented in a way such as Maybe it's in the operation planr there is a sound system that can allow everybody walkign to hear it. So you can hear it no matter where you are and youdon't have to be near your computer. So yeah, it depends on how it's implemented. Yeah, I think it's, I'd be willing to use it because it doesn't really think much cognitive power to listen to it to read every one hour you know, yes.

Sara: 33:41 So if you were, are you familiar with the setup of operating plants or not? Because we try to gather all the information we could on who does the operations control and how the daily routine is even if not, that is not information that you can access so easily, but we started from the assumption that they will be a group of people, maybe two or three people that their daily routine is to sit in the control rule and monitor the state or the status of the system basically

T5: 34:23 Yeah, for those people who had to sit there to monitor the room. I think this is useful. It's a useful way to inform them of a anomaly. Yeah.

Sara: 34:33 It was as to know if you ever saw a control room of thistype,

but you have you ever or no?

T5: 34:40 No, no, not in this situation.

Sara: 34:48 Just curious because your field is quite special.

T5: 34:52 Storm water management, actually I do, I run some simulation, things like that. So I haven't had the opportunity to really work in the control plan.

Sara: 35:09 I don't think it's so common. Okay. So any other thing you can add to the options? You talked a lot about your favorite option, but in general between noise and musical sounds. I got the feeling that you felt better with the noise.

T5: 35:38 Yeah.

Ginevra: 35:41 I don't remember if we asked her about the technical issue if she were using headphones or speakers if wireless or not. I don't remember. Maybe we already asked you which kind of device you uses to hear the sound

T5: 36:01 Oh, so. All the time I used headphones. So my headphone is commonly plug in track in to the computer. If I see the headphone is not always I put the headphone on my self. To finished listening to the sound I were put the headphone and put them, for outside,

Sara: 36:18 It was only for the sound and the technical problems. Yes. You couldn't hear the sound a 10:00 AM and we have no idea why. Right. Or sometimes you had only one of the three repetitions.

T5: 36:32 Yep. Yep, correct.

Sara: 36:33 Something with a playback was... maybe there was a delay or.

Ginevra: 36:42 Okay. But I think other parts are fine.

Sara: 36:50 Okay. So then. Yeah. Thank you very much for everything.

T5: 36:56 All the best for this research.

Tester 6

Ginevra: 00:02 Okay. Um, when, when you are ready we can, we can start and then we start talking about today the context and then we want to ask you if the sound was always the available during the test

T6: 00:23 Always audible for me. Okay. no problems.

Ginevra: 00:29 Okay. And do you think the information gathered by the sound was that were easy to understand.

T6: 00:37 Yeah. Yeah, It was easy to understand.

Ginevra: 00:42 And could in your opinion, this kind of sonification be useful in a real context and I wanted to remind you that in our project project the sonification doesn't stand for the visual interface, Imean the project wants to communicate to the, we, the sound different level of communication about today's state of the system and then if some anomalies are occurring, they analyst can go to the visual interface to go deeper with the, with the problem. So considering this background, do you think that the sound would be useful in the real context?

T6: 01:24 Yes, I think it will be useful.

Sara: 01:29 Good. Your background is, if I got it correctly, it is mixed right, um, physical digital systems and a bit of cybersecurity and water management.

T6: 01:45 Yes.

Sara: 01:47 So how would would it be your, your job contexts, let's say outside university, like in a water plant. Is it a realistic setting for your, for what you are studying or...?

T6: 02:01 I actually didn't work in a real water distribution plant, but is more about test bed which is in SUTD in either case I feel that using the sounds are useful because it engages another sensory. Oh, organ Yeah. Because um, for visuals there's a lot of things to take you off on the Scada.

Sara: 02:36 Yeah. So you're working with the SCADA Oh, okay, good. Good.

T6: 02:41 So when I look at the SCADA there is a lo of movement, a lot of values changing, sometimes the values are changing a lot, a lot of colour changing, so it might be difficult to, to see the alerts that quickly yeah. I think that the sounds is useful. Thank you.

Ginevra: 03:06 We can talk about the technical part. You said before that you didn't have a technical problems, right?

T6: 03:15 Yeah.

Ginevra: 03:17 And uh, which kind of, do you use the to to hear the sonification headphones, speaker,

T6: 03:28 I used earphones.

Ginevra: 03:29 Yeah. Okay. We a wireless or. not?

T6: 03:36 Wired

Ginevra: 03:36 Okay. And then the space around you was noisy or just quiet. You work with other people or alone in the room?

T6: 03:47 It's mostly quiet because I work in an office environment everybody is doing their own work.

Sara: 04:01 Do you use to have headphones on or did you put them on Only for the experiment.

T6: 04:06 Oh, it's, um, I always use my earphones. Oh, okay. To Keep out additional noise if someone is talking. It helps me feel like in my zone, so it makes me feel like I can focus on my work. Yeah. Yeah.

Sara: 04:26 Many times I have the HP on with no music. People think I'm listening to music. I'm actually not it's just for sheltering myself. So you were not listening to music

T6: 04:39 On some occasions I'm listening to music. Usually I listen to to pop songs or instrumentals. But um, for all of the sound [of the sonification] it was very distinct and loud enough.

Ginevra: 05:05 OK. Sara if for you is ok we can start talking about the training and we want to ask you if information on the website, uh, explain the project appropriately.

T6: 05:21 Yes, I think so.

Ginevra: 05:21 Before this, before starting the test, you were, you, you know a little bit about the project and you understood why and how we wanted to use the sound, this kind of information?

T6: 05:37 Yeah. It was too.

Ginevra: 05:39 Okay. And uh, the, are the sound keys useful to understand better the unification meanings.

T6: 05:48 Oh yeah. Okay.

Sara: 05:51 The, yeah. The single sounds on the, on the web page

T6: 05:55 The sound check, yes

T6: 05:58 No, not the sound check, the Sounds keys that in the project

page, the sound we provide you to, uh, distinguish district.

T6: 06:16 Oh yes, yes. Yeah. Okay. On the website, right? Yeah. Yeah.

Sara: 06:23 Did you, if I may add, did you, uh, do you do go back to these sounds, individual sounds during the testing? I don't know to check the district or to remember details or you just listened to them at the beginning and then that was it as a personal strategy, I will say

T6: 06:47 I have to go back to them.

Sara: 06:49 Oh, you did go back to them

T6: 06:54 I think, every morning is always a bit difficult. Uh, when I first hear the sound checks at 10am, then I have to go back to the sounds and play again. Yeah, yeah, yeah. to check which district it is.

Sara: 07:10 It's like starting from fresh. I mean fresh every morning then. Yeah, assuming that you would, uh, of course the purpose of this experiment is also for us to choose the best option and we'll move on with that and do, you know, adjust, adjust the prototype and run other tests and so on and so forth. So at the end did, if the final product, so to speak, should be always with the same sound. So probably day after day you, you'll get acquainted with the sounds and, and finally you learn them. But uh, but we will have to test this too, but with different sounds, of course everyday is like starting starting a completely new thing.

T6n: 08:07 Between 10 and 11 I always had to go back and check.

Sara: 08:10 Yeah. Okay.

Ginevra: 08:15 Okay. And so, um, how about the district identification? Uh, you, uh, you already explain how you used them, the key sound, but uh, how much do you think the, uh, the districts were, um, were clear to define and understand the difference between these districts .

T6: 08:43 Actually for some of the scenarios is quite difficult

Ginevra: 08:46 you, you can, you remember the number of the order of the scenario you're talking about.

T6: 08:55 I only know that one is very clear to me, I think is 2A.

Sara: 09:01 We actually have a file with your results. Yes. That we can send over to you with a, with a recap of your results. So you can, we can have a look together now. I will say that you did pretty well.

Ginevra: 09:18 I send it here in the conversation.

Sara: 09:23 Um, maybe from looking at it you can by looking at it, you

can, you can remember which was the scenario

Ginevra: 09:34 They are not ordered by the order you followed in the test, but I divided A and B. okay. Yeah. But the sequence on the website where we're different to this one in the, in the file for the results because here we gathered together by scenario, so we have 1A, 1B that were the one with the length and the 2 A and 2B that were the, the, the amplitude scenarios.

T6: 10:14 Oh let me check, So for Week 1 Day 1 is sound key 1A right?

Ginevra: 10:35 Yeah, the first day was 1A,. And then the first week was also 2B.

T6: 10:43 Yeah, that's correct.

Ginevra: 10:48 Okay. Have you opened the results from the link share with you?

T6: 10:57 Yes I opened

Ginevra: 10:58 So on the left you can see the, the number, uh, that refer to the system, the number we used it to build the sonification So the true part and on the right you can see your answer. Yeah. And uh, we think that you detected most of the anomaly in, in the right way. I mean you can see from the results that you understood well both the scenarios, but you, um, which kind of scenario you were talking about before.

T6: 11:49 Oh that was hard to distinguish that is?

Ginevra: 11:55 Maybe use the website. The last page I created during the last week, where you can hear again the scenario to remember which sound go with which name

T6: 12:13 Okay.

Sara: 12:19 But yes. The one with the most difficult distinction between distrcits

T6: 12:35 i think that 1B is very hard to distinguish .

Ginevra: 12:38 1B yeah. Okay. Oh,

Ginevra: 12:53 okay. And do you think the request to distinguish these districts were too much ambitious? Maybe you need more training or you think it's not possible to do in the real context? I don't know.

T6: 13:11 I think with more training I will improving it, but it's definitely a bit difficult. And I wonder whether people who are told deaf, they might find it difficult

Sara: 13:26 Yeah, yeah, yeah, yeah. That depends also on the design of the sounds. That's why, for example, already choosing between tuned sounds like the piano sounds you have in the option A and noise is gonna be very important to us because there are, there are different theories here and different. Uh, the literature says is various things. Sometimes distinguishing instruments is easier even if you are tone deaf and some other times noise is better. It really depends on the context and how they sound. Um, behaves. So. But of course it was a doubt we had too. That's why basically we propose to both, uh, options. Um, and another thing that is very important to us that maybe you can elaborate on it, is that in principle the the ability to distinguish the districts is not totally necessary for us because the idea is that once you hear the alert, you go on a visual interface where there is a map. So a geographical representation of their districts and you will have some other cues to, to...That highlight the district with anomalies. Um, but what, what, what we are trying to see here, if that's useful to be pre alerted on the district.

T6: 15:04 I see. Okay. Yeah, that makes sense.

Sara: 15:11 So, so that was the spirit a little bit. So we wondered whether asking you to distinguish the district was too ambitious because we thought it would have been challenging for us to0, uh, but I must say that, uh, that you guys did pretty well much beyond the expectations, right? Yeah. So it looks at it's not so difficult after all. I mean even in that scenario 1B that you said, you say you had more difficulties, you actually did it really well. So

Ginevra: 15:45 just one question about the results in a scenario 1A because it, you start interpreting 1 like 0 probably, I mean you the one that the system was a without Anomalies or am I wrong? Because after that I saw that you used zero, but in the first one you, uh, either in the answers in the excel table you, um, say that a number of districts with anomalies with zero for the last sonification that you say that the system report anomaly level 1 But, uh, let me say you used 1 instead of 0?

T6: 16:52 I think there might be some inconsistency...because for day2 I put not applicable and not 0.

Ginevra: 17:05 Yeah. Okay. Okay.

Sara: 17:10 Yeah, yeah, I saw it. We just wondered whether you thought that every time there is a sound that is an anomaly.

T6: 17:19 Oh No, no.

Sara: 17:24 Okay. Because that happened before. So that's why we are asking.

Ginevra: 17:31 Okay. And then you can describe a little bit deeper, your main occupation during the experiments days uh, you talked already about your sound occupation. I mean sometimes you hear music or use headphones, but about the visual occupation, did you use use computer or maybe you read the paper or do some experiment? I don't know which kind of occupation did you.

T6 18:02 Yeah, sure. So I was coding, mainly coding so I had to troubleshoot also read articles online for my troubleshooting. I did read a paper as well. I think that's about it. So either I was reading a paper or I was coding

Sara: 18:27 and then you left for a couple of meetings right now? No, no lunch break. Okay.

Ginevra: 18:38 And um, you talked about to this scenario that was more difficult to understand in our opinion. And what about, uh, any particular scenarios that you prefer or you liked more than others?

T6: 18:59 So I liked 2A the best.

Ginevra: 18:59 Also because it was the easier to understand for you or is something different?

T6: 19:10 I think it is easy to distinguish

Ginevra: 19:24 and was any of the sounds you heard particularly meaningful based on your personal experience? If some of them stimulated some physical reaction or emotion in you? Like peace, anxiety, happiness. I don't know, other kinds of emotion.

T6: 19:47 Oh, only scenario for scenario 2A I like the sounds, it made me me feel happy. Yeah. But for the one on, wait for week 2 day 1. Yeah, the sounds..let me check

Ginevra: 20:07 the first day of the week2 was 1B.

T6: 20:14 I didn't like the sounds, it made me feel how do I describe, very alerted, almost frightened. lot That was the only scenario I was not comfortable with.

Ginevra: 20:35 Okay.

T6: 20:37 Yeah.

Ginevra: 20:38 Okay. And, and would you use different sound, I mean during the tests maybe you thought about some particular sounds you

like or you prefer or would you like to hear instead of the others?

T6: 21:03 Sorry, I don't quite understand your question.

Ginevra: 21:06 If you, during the test maybe you thought about some sounds that based on your personal life or personal music you like, I don't know that you would like to hear instead of the sound we used or maybe you can suggest different kind of sound to use

T6: 21:37 Nothing much came to my mind during the experiment.

Ginevra: 21:41 Okay. Yeah.

T6: 21:50 but maybe Instruments like guitar chords or something would be nice

T6: 21:53 Yeah, it was about to say, because you said you, you listen to pop instrumental, right? So you, you, uh, you are skilled in that sense with different instruments. So I was wondering, but you already said it, good.

Ginevra: 22:15 And we can talk about the sound structure Sara if you don't have...

Sara: 22:23 Yep.

Ginevra: 22:23 About to the duration of single sonification If they were appropriate for you or not, I mean each sonification, were based on 10 seconds repeated for three times for a total of 30 seconds. Do you think the duration was enough? Also, the number of repetition was enough or maybe you need some more or less time to understand better the sonification

T6: 22:59 I think is enough for me to detect whether there's anomaly and go check on the Scada. Oh, but if I want to, one to distinguish about what districts Maybe more repetitions would be good, maybe four or five. Depending on the goal.

Ginevra: 23:25 You are in your expert on water management.I read, So what do you think about the rate of this sonification? Because we use the data that comes from a sensor and a, uh, every hour. So we based a certification on these data. And because of that you have a sonification, uh, every hour. Do you think this kind of timestamp was appropriate or do you think that are required more frequently or maybe could be enough for one every two hour? I don't know.

T6: 24:12 ACtually I'm not really an expert in water management, but I did have experience working with the test bed, so I would, the frequency should be tied to how, how important is to be alerted to the

attack fast enough. So for example, um, what amount of time is needed for the tank to overflowand inflict damage on the plan? If it takes about 30 minutes then maybe the frequency should be 30 minutes so that you can find out before there is real damage to the plant.

Ginevra: 25:02 Okay. So you already said the scenario you found more intuitively understandable and the one you prefer. Um, I don't know if you have any kind of comments or feedback that you want to share with us.

Sara: 25:39 On the scenarios you mean or in general?

T6: 25:47 Let me listen to the sounds again. If I were to combine the scenarios, I would say that 2B is to easier for me to distinguish than 1A, yeah. And a 2A is the best for me to distinguish and 1B is the least. Yeah. Other than that, I don't have anything to comment.

Ginevra: 26:31 Okay. And would you personally be willing to use the sonification you tested it your the real world activity?

T6: 26:43 Yeah. If the sounds are not like scenario 1B I would be.

Sara: 26:53 So if I can, just a little thing. Uh, so you, you think that the, this sounds that appealed more to your taste to you were also the easiest signal to understand. Did I get it right? Yes. So the two things go together somehow. Efficiency and, and a personal, positive positive feeling towards the sounds. Okay, good. That will, just to clarify, good. Awesome, I don't know. Ginevra, do you have any other.

Ginevra: 27:32 No, I think we have all the answers we planned so we can finish. Thank you for your answer and those for taking the test.

Sara: 27:52 Keep you posted on what happens with this idea. Okay, thanks and good luck for everything.

T6: 28:04 Thank you!

Interviews to expert users - Chapter 5

Due to several considerations - the professional role and responsibility of the experts involved, the limited number of participants, the language spoken by the participants (Spanish) - the interviews were not recorded. The original text of the fields notes that I collected during the interviews as part of the experimental protocol for the Design Action Two, follows.

Expert 1

General Feedback-

Sound is very pleasant you can play it during working hours without any problem.

There is a sound that is quite 'spooky' (the breathing) that made me feel uneasy every time.

It was difficult to realize when anomaly grows / chaos grows, in insects is easier but in birds for examples is even too pleasant...

Test results-

Very good, not significative difference from checking the interface or not

Problems in assessing due to issue of taking note of the time (While time is running!)

User Experience-

Audibility and compatibility with work environment:

- Very good

Technical problems :

- Interface: sounds keep playing even if data stopped so this is a problem if you want to start from before
- Taking notes is not easy, you have to check and write down and you waste time, it's not accurate
- It would be good to have only one window in the interface, for the testing at least (this would not apply to the real-world situation)

Describe the place: silent, with headphones

Occupation/tasks: programming, execution time was slow so it was not problematic to follow the sound

Pre-test training: OK

Sound Design-

Type of sounds: a part of the spooky the other all good

Emotional response

Recognition of sound types: breathing = unpleasant, birds even too pleasant

Groups: very good differentiation, easy to do, the noise of the forest is the less easy to recognize

Rain is very pleasant and very effective

Structure of the sonification-

The thunder works very very well, it always attracts the attention whatever tasks you are doing.

During not real anomalies, it could be that your main tasks absorb you too much as the sound is too pleasant?!?

Perhaps include a volume increase for the group that is anomalous

Intermediate levels of anomaly: they sounded all a bit the same, not sure on how to give an anomaly level and even if it is relevant. With practice

Relationship with visual interface-

Did you use it? Yes, very much, I am that visual type

Real world potential-

I would definitely use it, to unload the visual channel.

The design of soundsis very relevant, sounds of the forest are relaxing

The ability to distinguish intermediate levels of anomaly could be very useful to retrieve visual informatio faster.

One advantage would be that the alert system is synchronous with the anomaly, unlike current alert systems (SMS, emails).

Suggestions-

I am more visual, so, if I hear something, I want to go and check so the visual was quite useful to me.

Expert 2

General Feedback-

Group 3: noise not easy to recognize/distinguish.

Birds: OK

Insects: after a while it got better.

Differentiate severity level is not easy, even if in the case of recognizing the anomaly is not easy to give a level. Real anomaly is easy to distinguish -> because of the thunder.

Test results-

Much better than the impression the tester had while performing the task.

The feeling was that distinguishing intermediate levels of anomaly was very difficult. He had to stop working to focus on the sound.

User Experience-

Audibility and compatibility with work environment:

- Work phone calls so you have to stop the app/test. What do you do in real cases?
- Issue: latency in fade out of the sound, they keep playing even when data stops.
- Volume and listening was adequate.

Technical problems: No.

Describe the place: quiet, and with noise cancellation HP

Occupation/tasks:

- Tasks: network configuration and product debug, mainly visual. When focus is high, it is difficult to pay even peripheral attention to sound. Main occupation: programming, anomaly detection with data monitoring but not that day.

Pre-test training: Yes, but the expert did not have much time to train

Sound Design-

- Type of sounds: issues with the noise, not easy to distinguish it from the background noise of rain.
- Emotional response: I liked it, I was surprise by how much I enjoyed it. I liked it keeping it as a relaxing background ‘cause it was too relaxing and it helped me focus on my other tasks. But

not with the thunder, it is not possible to miss it.

Structure of the sonification-

In the case of a SOC, maybe only one group with anomaly/serious anomaly of the whole network would be enough. Then the operator would go to the visual to check other info. In the field of security, granularity of the information is really basic. Maybe for industrial production it would be needed more detail because the system can collapse more easily.

Real-time: it is adequate

Thunder + sound: what is easier to distinguish.

Relationship with visual interface-

It could be a complement of the visual indicators that SOC already have.

If you know how serious the anomaly is would be already very useful, it would alert you on how fast you have to look at the screen.

Did you use it to read the incoming data?

- Not really, I use my own dashboards.

Checked the audio display?

- Not really useful, if not for training phases and feedback but not in a real situation.

Real world potential-

It would be very useful to unload the visual channel instead of looking at a dashboard where nothing happens.

From there to technical visualization, not through another viz.

Algorithm is not something that tells anything to the SOC operator, they have their own system, they don't want to know what our algorithm does but that there is an anomaly and then they would go to their dashboard that they are used to and it is designed for me.

Actually, if the two things don't match then it would be useful to double check.

Much better than SMS than is not agile and requires additional checks and are asynchronous, sound is synchronous, the anomaly calls your attention in the time it happens.

Suggestions-

Click con keyboard that prints the exact time and records input without looking the time, collecting the anomalies -> ‘cause time keeps going while you try to note down (this is only valid for the test).

Max three or four parameters.

Rewrite it in Python?

Cover design: Eva Sádaba Lenzi, 22 months.

This research was designed using Archivo font family by
Hector Gatti and Omnibus - Type (Latinotype).

I want to thank Angeles Briones, Michele Mauri, Tommaso Elli, Beatrice Gobbo and Andrea Benedetti for their open-minded participation to the sonification workshops, their honest feedback and useful advice, and for welcoming me at the Density Design Lab.

To my tutor Paolo Ciuccarelli for the conversations, the opportunitites and the challenging ideas on sound and sonification.

To Angeles Briones and Valentina Pallacci for their help on the design of this research.

To Ginevra Terenghi, Riccardo Taormina and Stefano Galelli for the conversations, the laboratorial work, the gerenous effort in doing good research on a new topic.

To Aitor Moreno Fernandez-de-Leceta and all the people at i3B-Ibermatica for their open-mindedness in accepting me in their group, for their help and feedback, and for companionship.

To Davide Tiso for the startup help with the sonification prototype.

To Damiano Meacci for his infatigable help and work on the development of the sonification prototype, and for friendship.

To Myonghoo Yeon and Dietmar Offenhuber for examining the thesis manuscript and giving me precious advice.

To my family in Italy for pushing me to make the dream of a PhD come true.

To Juan for being there.

To Nora and Maia for their continuous motivation.

To Eva for deciding to come to this world during this research.

June 2021, Milan - Italy.