

TECH[NOCULTURE

Playful Interactive Environments

Episode 19

Full transcript

Guest: Jürgen Hagler [Jürgen]

Host: Federica Bressan [Federica]

[Federica]: Welcome to a new episode of Technoculture. I'm your host, Federica Bressan, and today my guest is Jürgen Hagler, a professor in the Digital Media department at the Upper Austria University of Applied Sciences. He is the head of the research group 'Playful Interactive Environments', and since 2008, he has been actively involved with the Prix Ars Electronica, and also he's been involved with the Future Lab at the Ars Electronica Center in Linz in Austria. Welcome, Jürgen.

[Jürgen]: Hello.

[Federica]: I'm very happy to have you on the show, mostly because virtual reality is the main keyword that I associate with you. We are going to explore more how exactly you engage with virtual reality, but I've become a sort of virtual reality freak. Recently, wherever I go, if I see a public setup, I try to use it, I like to experience it, and this is also how we met. I was travelling through Austria a few months ago in 2018, and I was visiting a museum where I saw at some point a virtual reality installation, and I started queuing there. Of course, children were mostly queuing there, but I was like, 'Who am I not to want to try this?' So I queued there, and finally then it was my turn, and I learned more about it. I was even more intrigued when I found out that you were not just attending the setup, but you were actually a researcher and that was part of a scientific study. So, if you will, please, can you say what museum that was? Because I couldn't just never pronounce that correctly in German.

[Jürgen]: It is the Kunsthistorisches Museum, art museum, in Vienna, so this is a very famous museum with a lot of old paintings from the Renaissance, etc.

[Federica]: So at this museum, I not only found out that you were a researcher doing a scientific study, but that you were not an engineer, which for some reason I just took for granted. I say, 'He must be one of the people who develops virtual reality.' But I actually found out that you have a different type of background. So to begin with, would you like to tell us a little bit of what your expertise is, what your interests are?

[Jürgen]: Yes. I actually started in the '90s at the Ars Electronica research lab, Future Lab, as a 3D artist. And I actually had the great honor to work with people on artistic projects for the so-called CAVE installations. So the Ars Electronica Center was the first museum that offers a CAVE installation, virtual reality installation, in the '90s, and that was actually my start in VR. And since a couple of years, I'm head of a research group that is called Co-located Playful Interactive Environments, and we are very interested in co-located interactions, so we are doing research on user experience. And this project that you have mentioned at the Art Museum in Vienna is one of our recent examples where we tried to find out new findings in the field of user experience in VR with a focus on co-located interactions. So this installation, called the Virtual House of Medusa, is a virtual archeology installation, so this is the topic. The federal institute of restoration asked us to support them with the very... It is a very interesting archaeological finding. They reserved it over a couple of years, and they had the exhibition at the Art Museum in Vienna, and they asked us to think about new possibilities for presenting it in a museum, and then we said, 'Okay, we are interested in VR, and we are taking this content,' so these are actually Roman fragments found in a Roman villa 300 after Christ's death in a local city to lanes, closed to lanes, and we got all this data from the archaeologists and we decided to create a playful VR installation with the focus of integrating the spectators at the museum. So we face, we are facing the problem that there are a lot of VR installations at museums nowadays, mainly head-mounted display VR installations because they are cheap, they do not need a lot of additional equipment, not really a lot of space, and so you can find these head-mounted displays in a lot of different public places, actually, in the last years. But the problem is (or one problem that we are facing, especially in a museum context) is that it's still a single-user experience. The people are queuing, as you already mentioned, and they are waiting, so there is a possibility to watch the journey, the virtual journey via a second screen, and then you can see the experience, but you cannot participate. And our research was to give these second screens to the audience, so we developed an additional app where you can see or showing the VR experience of the VR user, but here you have a tablet where you can move around and can interact with the virtual objects, and that is actually our research, that the play, the gameplay is, you can slip into the role as an archaeologist, as the VR player, and you can bring these Roman fragments together, and with the support of additional spectators mounted with these mobile devices, you have the possibility to puzzle together these pieces together to bigger fragments. So that was our idea, and we developed a questionnaire, we asked a lot of people. We did a couple of slight modifications. We moved from Vienna to Stuttgart,

to other places, and we got a lot of positive feedback, and there are now a couple of findings.

[Federica]: Wait, just so that I understand correctly. In this setup, one person is wearing the headset and is actually in the virtual world, but other people can participate too by holding tablets.

[Jürgen]: Right, and with these tablets, the tablets are mounted with a VR tracker as well. You can actually have your own perspective, and with this own perspective, you can move around. In these virtual archeology installations, there are a couple of smaller installations, one [installations 00:08:00] where you can jump into a virtual house, and the co-players with the mobile devices can move around, and in some installations, they even can touch objects and can start to discuss or communicate and have a shared experience.

[Federica]: So this is what you mean by co-location.

[Jürgen]: Yes. Co-location is, so to speak, interaction at the same place mediated with technology. One possibility is this [another that 00:08:35] I have now described to you, a scenario that we are really working on since a couple of years is using laser rangers, actually. So this is not necessarily connected to virtual reality, but with laser ranger technology that is used for civilians is, it is possible to track a lot of people, and with this information that you have these 2D tracking points, you can start to think about game mechanics, interaction mechanics, for a lot of people. So in this Virtual House of Medusa with VR, we have one VR player and up to four co-players. But with the laser ranger technology, you can track spaces up to 200 square meters and you can track 30 people or even more. We have a setting at the Ars Electronica Center that is called Deep Space. It is 16 to 9 meters. It's a bottom and front projection, so it's really a big space, and there is a lot of space behind for the audience, so up to 200 and more people can participate in this deep space, and we are using these laser ranges for various interaction methods to collaborate on stage on the same physical space. So this is our main research activity at the research group Playful Interactive Environments.

[Federica]: How important is playfulness in your approach to user studies? I mean, it's even in the name of your research group, Playful Interactive Environments. In the setup I have seen the museum in Vienna, it could have been just the thing to wear the headset and experience being in the room and walk through it, but you added that element of playfulness to it with the games and putting the tiles together. So how important is it that playfulness is part of the experience?

[Jürgen]: Yeah. Playfulness. Yes, it is very important for our research. It is... Of course, there are different levels of playfulness, so even an art installation without a goal and without game mechanics is playful, so it can be playful. So this is, in our research, it's very broad, and

if we think about computer games and research, yeah, it is always serious games, bringing a couple of aspects like how can we use computer technology to learn or to use that in medicine applications, for example? But this is, playfulness is very broad. Even persuasive playfulness, if you want to, yeah, come up with a special topic, there can be playful mechanisms that can support, yeah, attention, actually. So in our research for Playful Interactive Environments, we are very interested in these interaction methods, so we are not experts, for example, in virtual archaeology. Of course, we faced a lot of problems concerning the sensibility of data that is given from the scientists to the public, so there is really a big problem, but this is not the main focus. We are always thinking about, how can we foster these interactions? How can we foster the experiences? How can we, yeah, foster the experiences for special target groups, for example?

[Federica]: When I tried a VR experience in Vienna, I was alone in the virtual world. There were no other users. But at some point, you just said, 'Turn to your right,' and I did, and I saw a sort of flying puppet, and you were talking to me and that was matching the puppet, so you actually appeared in the world not as a regular user, but more like guide or a support to me being in the virtual world telling me what to do or pointing at things. Is this still co-location, or it's something different because you were like a special agent?

[Jürgen]: Yeah, yeah, yeah. Yeah. This is very interesting because co-location, the same place, and even telepresence, this term since the mid-'90s or early '90s, since that time, especially [CAVE 00:14:02] applications, as far as I know, visual representation of the body, even of kind of avatars, are very important, and what we did is bringing it in this sense of co-location as well. So we provided a visual representation in this installation, but you felt that I'm actually here because I was talking to you, so the audio that you perceived was actually my audio co-located on stage, but it was supported with a visual representation. So in an expanded sense, it is a mixed reality setting combining virtual objects as well as real objects. And we did a former installation at the Vienna Design Week a year before where we also used this virtual representation. We connected it with the laser ranging technology, and we scanned a lot of people that are, moved around, actually, in this exhibition, and they were digitalized as very abstract figures moving in the virtual space, and the VR player could also touch the real persons, as well. So this is this hybrid reality setting that we are very interested. In this case, in this installation, it was called Invisible Walls. We asked the participants about their co-presence and social presence, how they felt in this VR or hybrid setting to be together with the VR player as well as the real player, so we... There was a survey on the VR player as well as for the co-players, so to speak.

[Federica]: I never felt alone in the virtual world, but I have to say that when I realized that you were there in the form of this agent, I had a very strong positive emotional reaction. So maybe it's just me (I can only speak for myself), but not being alone in there and

actually being with someone who was supposed to know more than I, and therefore guide me through the world and point at things and help me, had a very strong positive emotion response.

[Jürgen]: Yeah. Yeah.

[Federica]: Is this also something you were trying to observe in this study?

[Jürgen]: Yes, we did, actually. So we had three conditions, and we started without a visual representation of the co-players just to use a virtual finger where you can touch objects without any representation, and we changed to a very, very simple representation of just a square that is representing the VR device, and this third condition was a very stylized avatar with a couple of features like, yeah, very simple facial animation. So in research, you find that, a lot of [survey 00:17:35], that is not really important that the virtual avatar is very, very realistic, so even a stylized character supports the feeling of being together in this hybrid setting, actually.

[Federica]: You said that there are some findings already from this study. I don't know if the study is completely over or if you have partial results because the study is ongoing, but can you talk a little bit about what you've found so far?

[Jürgen]: It's still ongoing, and we are still doing questionnaires, but this is the final round. So we have in October two exhibitions, the last exhibitions, and then it's over. So we started in January this year. We had a lot of different settings. One finding already was the survey on the virtual guidance in museums, so we had the possibility that the Virtual House of Medusa was executed in the VR Lab at the Ars Electronica Center without the additional mobile devices. So it was a very classical setting. The VR Lab is a selection of different VR devices with different installations, and it is the VR setup, and there is a second screen for the audience. And there are these very special, at the Ars Electronica Center, there are so-called info trainers, and these are the museum guides that help visitors in, yeah, in different installations. So they introduce the VR setting, and they are starting to talk to the VR player. And in other settings, we have done it in a different way with our additional devices, and one finding was that this kind of virtual guidance is, of course, has a positive effect, even for a bigger group. So if you come to a museum, you're always facing that there are a couple of people, and sometimes it's a big group that has to be introduced to a installation in a very short time, and therefore it is quite a good tool to introduce a VR setting to a lot of people.

[Federica]: Do you differentiate among different target groups, for example children? Because children were queuing in front of me there. Did they take the same questionnaire I did, and do you expect them, actually, to have the same experience than I - I mean, comparable, I should say - or do you distinguish between maybe not just children and adults, but also elderly people, experienced people with this kind of technology, etc.?

[Jürgen]: Yeah... Actually, kids, the questionnaires for kids, in this case for the Virtual House of Medusa, out of the survey because it was too difficult. So we started with, I think, 19 or 20 years and older. So this was... In the first test, we included the younger generation as well, but then it was too complicated, because the kids were so fascinated by using the VR devices, and it was not... And even it was difficult for kids under 10 years because the navigation and, yeah, the triggers were too complicated for them, so... In this study, we actually kicked the younger generation out of the survey.

[Federica]: All right, but I believe kids were normally enthusiastic. Right?

[Jürgen]: Yes, yes. Yeah. Yeah. Definitely.

[Federica]: Like the kid in front me didn't want to leave, and I think his mom was pulling him, and I was thinking, 'Kid, it's my turn. Let me try this.' So still, 'intergenerational' is a keyword that recurs in your work. Can you talk a little bit about that? Can you explain what you mean by that? In what context is it used, intergenerational game studies?

[Jürgen]: This is a project that is actually finished, so end of this month it's over. It was two... Yeah. We worked two and a half years, or even three years on a topic. We got kind of nice funding. We worked together with a science museum called Welios. It's a local science museum in Upper Austria, and with psychologists from the Johannes Kepler University on intergenerational play called InterPlayces where we looked for a game setting in a public space, also for a museum, where we can foster the communication between old generations, 60-plus, and young generation between six and ten years. And, you know, we did a couple of surveys, so this is really a big problem to work with 60-plus and also young generations. Even... We started, actually, with a very small workshop, and we thought it's very easy to bring grandparents with their children to a workshop, and then we faced the problem that it is really hard to find grandparents that are willing to go with their grandchildren to scientific workshops, so to speak. But we managed it, and with this workshop, we find out a lot of different game mechanics that old people like and young people, the young generation likes. And with these findings in the workshop, we did a couple of user experience tests. We find out, we found out that older people are good in using mobile devices, also touch devices. This was not a surprise, but in the workshop, the older generation preferred working with physical objects, like puzzle games and tokens, etc. And with another survey, we found out that they were really good in using sort of touch interfaces, for example using their smartphones, or they can use Google Maps as well. And we found out that they like to support the younger generation, but they don't want to be active in the gameplay. So the asymmetric play mechanism in that intergenerational scenario is very important so that you don't have the same player roles to give the younger generation [another goal 00:25:22], and the older generation the more supportive game. So what we finally

did (and this is a prototype that is now in the museum as well) is a kind of space travel where you have a navigator who is in charge of touch interface and can see a little bit more, then the younger generation who is controlling the spaceship. And what we also found out that we need different play phases, so to speak. The two, the younger generation, the older generation, starts building together a spaceship, designing a spaceship, and in the next phase they can evaluate their design and can have a journey, start a journey, through outer space, and then if they are facing problems with their spaceship, they can go back and find a new design, and the older generation is always in this kind of supporting element, so helping the younger generation to find a better spaceship design, find effective ways to planets or to stations, and this is quite a popular installation now at the museum, actually. Yeah.

[Federica]: Besides virtual reality, you have engaged also with augmented reality. These two things somehow belong to the same category, if we want, but they are also two different things. I would like to ask you if you distinguish them in your work, if there's something unique about virtual reality, and especially from the standpoint of the user study, of observing the user experience, if there is something that distinguishes virtual reality from augmented reality.

[Jürgen]: Hmm. I try to answer it in a slightly different way. So for me as a creator at Ars Electronica, there's... The difference between a computer animation, 360-degree VR installation or interactive installation, what is actually the difference? For example, this year, we featured a VR piece actually in exhibition just as a screening, so the piece was conducted as an immersive installation, 360-degree head-mounted display, but also as a movie, so as a curator, you can decide, 'Okay, how will we present this piece in an installation?' And there, of course, is a difference if you have a screen or you have a 360-degree immersiveness, and it's depending on the project, I would say. So in this case, it was not really a difference. A piece that is screened can be immersive as well. If there is not really an interactive mode, you can provide 360-degree videos in different ways, so one example is a head-mounted display, but you can use a big-screen 360 projection as well. There is maybe not really a big difference. It is more specific on the installation. Some installations really need the VR tools. For example, Norman is a VR animation tool where you can use the VR space to animate your object, so this is not possible to do it in another way. It was specific, developed for VR, and this is a totally new experience compared to an animation process that you are doing in a software where you are just moving pixels and vertices in a 3D [unclear 00:30:02] space. If you are using virtual reality as an animation space, you can capture your movement. It's more a combination between motion capture and the virtual representation of your body, and this is specific, a very immersive experience that is just possible with a head-mounted display.

[Federica]: Why is it important to study these things? Something tells me that there is more to it than just improving the design of future installations.

[Jürgen]: Good question. I think this technology has a lot of different fields where they can be used, and in the field of art, I think it's always very important to find other ways to find, for example, self-reflective ways where you just see the limits of this technology, where you can bring auto-poetic aspects of the technology itself on top of discussion, and if you use it just as a further development of the moving image, there is also a lot of new aspects that you can develop. So, how can you tell a story in an interactive way? So this is not a new topic, but if you are using mobile devices, for example Google Spotlight, where you have the possibility to move around very simple interaction, then it brings up this discussion that already started 20 years ago on interactive storytelling, and I think with this new technology, new forms of telling stories evolve and some of them are really succeed and will go further. So this, that's my opinion on this VR hype that we are actually facing, and I'm still not sure if the hype is kind of over in next year or the next years, but such hypes are bringing up new aspects or old aspects with, yeah, new approaches, new perspectives and there will be effects, new effects, of course. Even if you think about a lot of film festivals are now featuring virtual reality applications, so think about that. So if you are going to the Biennale or to other film festivals or Sundance, VR is very, very present, and a lot of people, filmmakers, are thinking about how can we use this, very cheap, not new, but in this kind of new technology, better technology, it is new, how can we use this technology for our stories or for the ways how we use the medium? And that's very interesting for the future.

[Federica]: Do you use VR today for creative purposes? If you still make new things, is it a fair thing to say that you were more active as an artist in the past than you are today? So were you using VR, do you use it today for creative purposes?

[Jürgen]: Yeah. Yeah. Yeah. Yeah. This is a little bit complicated. So as the head of the research group, I'm always interested on research topics, so before we are starting a prototype, there should be a funding and a research question, and so this is a whole package. In some cases, it is connected to art, but not always connected. So as a curator and as the director of the Ars Electronica Animation Festival, I'm actively involved in creating exhibitions and screening programs, but not as an artist who is producing VR installations, but what I can say is that for the university, for the students, it is very, very interesting. So a lot of people are doing VR installations and interactive stories in VR now at our university, so this is really evident, yeah.

[Federica]: VR is a technology in constant development. It takes quite advanced skills, actually, to engage with it. It's a complex field of computer science and engineering, so I would like to ask how you balance the group. I'm sure that it's an interdisciplinary research group that you have, so yourself, with your background, how do you communicate? How do you... You know, what's your relation with the tech people who actually develop the systems that also you will use for your studies?

[Jürgen]: As you mentioned, it is a very interdisciplinary approach. A lot of people are working together. You need someone from the outside and also from the decoding part who is in charge of doing a lot of programming, if you are developing something totally new. So for our students, it's very, very simple. So there are tools available where you can animate and create your VR environment and where you can go to a VR setting, so the tools are available compared to the '90s, where I actually was an artist and worked as a developer. It was very, very limited to people because no VR settings and hardware was available. I was very lucky to work at Ars Electronica for the CAVE installation, and we also worked there very interdisciplinary, so there was just one machine where we could test our VR experience, and with these experiences, we further developed the new artistic applications. I worked together with artists doing art pieces in the CAVE setting, so I was actually very impressed by [Waltz King 00:37:05] that was a, this is a very pioneering work in the '90s, and this was an installation, actually, with a lot of new approaches in VR, even compared it to the things that we are doing now. And this was very impressive for me to think about new ways in the '90s, but it was always, for me, as a 3D artist, a limit, so we needed people in in this field of VR technology as well, and in our research group, we are lucky to have both people, from the outside, also from the tech side.

[Federica]: You started engaging with VR in the '90s. There are some who say that it was a thing in the '90s but then disappeared - VR - and now it's back and it's the next big thing and it's everywhere, increasingly everywhere. I would like to ask you if you can tell us a little bit about how you have seen this technology evolve and if you can confirm that it kind of went away for a while, but now it's booming again.

[Jürgen]: It is booming, but, as I already mentioned, I'm not sure if it will still be a hype next year or in two or three years. The cool thing is that the devices are very cheap, and a lot of devices are available, and they are still in production, so started with Oculus, but now we have a lot of different devices, and in addition, with our mobile device, we have the technology in our pocket, so we can use Google Cardboard and watch a VR experience. It's [really 00:39:05] available, the technology. It's cheap, so with 300 euros you can buy a VR device, or 600 euros, and you have a very good device, and the tools are available for that. I've seen kids at the age of 16 doing VR stuff, so it is very, very simple to access, to create content, and to share it as well. There is, a lot of things are going on on using the internet, VR on the internet, to share it and therefore I would say there is of course a big future, but I'm not sure about the content. I'm sure that the people will still go to cinema and they will see, would love to see movies on screen, and if there is not really a good application or a good reason to see it in VR, then there will be no future. So the first step is, of course, for the people to see, 'Okay, it's cool. I'll do it the first time. It's a great experience,' but the next step is, you need a good reason for VR to use it as a tool, as something where you just screen a content, or where you can use it as a tool for collaboration or whatever. And the hype is, of course, not only concerning movies,

animations, art installations, but there is a big research going on in the industry as well, and this is an effect that will be good for artistic projects as well, but as I have mentioned, said before, for art it is always a very big challenge to think about the technology as well and to bring new effects of the technology itself, yeah, bring this as a topic.

[Federica]: I don't know if you have a vision for VR in the future. In case you do, can you tell us a little bit about it? Like will the sense of smell be the next thing to be integrated? Is that the direction we go, and what kind of applications we might expect outside of museums education, gaming?

[Jürgen]: Hmm. Good question. I am not sure about additional sensory elements. If you look back in the history of VR, smell was, of course, a topic. The future, what I think is quite interesting is this hybridity between real and virtual, so what we are seeing now is a lot of additional devices in augmented reality, and I think this will be really a game-changer, can be a game-changer, to have these possibilities to blend the virtual world in your real environment. This can be supportive in a lot of different situations, but this is also an expansion of your being, actually, and this, I think, will be the hot stuff in VR in the next years.

[Federica]: You have been involved since 2008 in the Prix Ars Electronica. There are different panels in it. Which one is yours?

[Jürgen]: I am the curator for the Ars Electronica Animation Festival since 2008, and therefore I'm actively involved in the Prix category Computer Animation, so my part is actually now curating the program, but also thinking about the Ars Electronica Animation Festival, and this category has a big history, and this is quite interesting in the context of Ars Electronica. So the category Computer Animation started together with the two other categories, namely computer music and computer graphics, in 1987, so very long time ago. So these three categories roots to classical art forms. So painting, Computer Graphics; film, Computer Animation; music, Digital Music. And over the years, the categories in the Prix Ars Electronica for new media evolved, so there was always a debate. Jeffrey Shaw, a lot of pioneers, discussed what is media art, and in the '90s, a new category evolved called interactive art. So in the '90s, I would say there was, the borders between the categories, they were quite clear, but then World Wide Web as a category started, digital communities was the next category after World Wide Web. Hybrid art was founded as a new category in 2005 or like this. So a lot of different categories in the field of digital art or media art evolved. And now in the last ten years, since I'm involved in the category 'computer animation', we face the problem that the borders are blurring and a lot of... For example, VR installations, the artists do not know where they should submit. Is it more interactive? Then I would say it's interactive art. But if it's just a 3D 360 degree video, it is still interactive, but then maybe it fits more in the category Computer Animation. What we thought about is a new title of the category Computer Animation with [these termed 00:45:40]

Expanded Digital Animation, [what 00:45:44] means that we are very interested in these fringe areas, in these intersections between interactivity or going out of the black box of the cinema, so with new devices, with new possibilities, to screen moving images, etc., and this is a topic that we are now focusing in the last six years with a symposium, also with an exhibition, and connected to the category Computer Animation, where it is, when you just look at the category Computer Animation, compared to the '80s, where it was quite clear computer animation is a movie that was produced with the computer, but now everything is done digitally, the borders between analog and digital, digital images, are totally blurred, so you have really a problem to define this category. And this is not a problem for me, but it's just more to think about the very special fringes of computer animation. And this is for Ars Electronica very interesting, to say, 'Okay, we are a media festival, and we are not a film festival. We are not an animation festival. What artists we want to feature? Which direction do we want to go?' And therefore, I think the term 'expanded animation', 'expanded digital animation', is a very interesting thing because this expanded cinema topic that came up in '70s with Austrian artists like Valie Export, Peter Weibel, or Gene Youngblood, etc., this was connected to Ars Electronica in the '80s when they started with computer animation, and we brought this idea of thinking out of the box, expanded forms in computer animation. We are thinking about bringing this idea with the focus of [unart 00:47:56] back to the category Computer Animation. Yeah. And therefore, VR experiences are very, very interesting for us, and we are very lucky that we have a lot of VR installations in the final selection in the last years.

[Federica]: It's interesting, because I think you just said something that resonates with something that I've often heard, and that is that artists are always ahead, which sounds like just this grandiose statement, but there's some truth in it, I believe, especially with artists that experiment with the new technologies. I use this concept in my own research. It's just an assumption. You say, 'Why is it interesting to observe artists engage with technologies?' Because they do push the boundaries. They explore the wide range of what is possible. Sometimes that works, sometimes it doesn't, but we all learn from it, and it's not all about making pretty things. Sometimes it's about raising a critical aspect of these technologies and their impact on society at large and all of us, and some - some - of the uses that they find with these technologies will become our own tomorrow. So this is a bit of a more complex concept than I have laid out just now, but I think that what you just said resonates with this idea, which I share. Listen, if someone wants to read some of your scientific work or just watch some videos of the installations that we mentioned during this conversation, is there some material online that we can refer our listeners to and that we can link in the description of this episode?

[Jürgen]: Of course. To point out, of course, the Ars Electronica website. It is great that there is a big archive as well, so you have the possibility to see the huge history of Prix Ars Electronica. You can see the prize winners in the category Computer Animation since 1987. You have access to a big database connected to women in media arts where you can search the

big archive of Prix Ars Electronica with the focus of female contributors, artists, researchers, also a big archive with all these publications. And if you're interested in the research we are doing, there is a website with all our current projects and papers as well.

[Federica]: Well, thank you very much for your time. It was a pleasure meeting you in Vienna, and I thank you so much for being on Technoculture.

[Jürgen]: Thank you.

[Federica]: Thank you for listening to Technoculture. Check out more episodes at technoculture-podcast.com, or visit our Facebook page @technoculturepodcast and our Twitter account, hashtag Technoculturepodcast.