RioTinto

Transcript

Things You Can’t Live Without

S2 Episode 5 – Mark Mangini on Hollywood sounds, innovation and suspending disbelief

No. of words	3,966	Time	24 minutes

Dr Anna Ploszajski: [00:00]
Hello, and welcome to Things You Can't Live Without, the podcast where I, material scientist Dr. Anna Ploszajskii, ask a special guest to tell us the one thing that they can't live without. We also interrogate a host of experts to find out how these items are made. Where their components come from and how the future of those things is being planned for. In this episode, I am delighted to be joined by Mark Mangini, two-time Oscar winning sound designer. Welcome Mark.

Mark Mangini: [00:28]
Good morning, Anna. Thank you for having me.

Anna:
And also with us is Didier Arseguel, Vice President of Technology at Rio Tinto, who will be taking us through ways of creating from a better place using repurposing and recycling. Welcome Didier.

Didier Arseguel: [00:47]
Hello, Mark. Hello, Anna. Very pleased to be with you today.

Anna:
Thank you for joining us. So, Mark, you know, the premise of the podcast, what is the one item that you can't live without?

Mark:
Unequivocally a microphone, my portal into the world of sound.

Anna:
Which makes complete sense. So, what we're going to do in this episode is we're going to learn more about how the art of sound design first of all relies on the technology of microphones, of course, but also your massive sound library. I want to get into that, how you've cultivated that over a lifetime and the commonality between you two is this idea of repurposing and recycling and the materials that make up the microphones, you know, it is, of course, a physical object as well as a portal into the sound world.

So, we will be talking about how those processes can hopefully ensure that there'll be many generations of sound artists to come and that you'll be able to have your sort of prize technology. As a sustainable object as well in the future. I just want to get into a bit of the background of your career, Mark. As a sound designer, you've worked on lots of movies that our listeners will have heard of winning two Academy Awards: Dune, Mad Max Fury Road for those. And you've also been nominated six times. You know, you are. Obviously at the top of your game. Movies that people would have heard of, Blade Runner, The Fifth Element, Gremlins, Aladdin,

Anchorman, any more favorites to name?

Didier: [02:04]
I'm a big fan of Dune, so it's a real privilege to be with you today.

Mark:
Thank you. I'm glad you mentioned Dune because, Denis Villeneuve is, is a very progressive filmmaker and Dune takes place in a universe that doesn't exist. So, everything you hear, we have to create bespoke. And his way of framing that universe was, "I want to hear my movie as if we had dropped a documentary film crew on the planet of Arrakis and everything we hear could have been captured by the boom mic."

Anna:
Right, so that's important for listeners. So, we're not talking about a soundtrack, we're talking about the sounds that would happen in that scene and more, right?

Mark: [02:50]
I'm responsible for everything that you hear, the dialogue, the sound effects, the ambiences, the foley. I'm responsible for everything except for the music, and that's an important distinction. Although I am a musician and a composer, and those skills deeply inform the way I design sound, because I bring to bear all the skills that a composer uses. The thoughtfulness of timbre, time, tempo, dynamic, but with sounds that are non-melodic.

Anna: [03:17]
I love that description, that's incredible. And if listeners want to hear more about foley artists, I interviewed the wonderful Shelley Roden in series one, so you can go back and listen to that. Didier, do you have any favorite film sound moments that spring to mind?

Anna:
Yes

Didier:
Yes, it is Star Wars.

Mark: [03:30]
It's a great sounding film. The sound designer Ben Burtt achieved so much greatness with the sounds from that film. He used a similar technique as we've on Dune, which was he built a universe of sound out of found sound. He didn't use a lot of electronica synthesizers. He went out into the real acoustic world, as we did, to capture the real world and repurpose it in ways that you wouldn't recognize. The Wookiee is a baby bear sound. The lightsaber is the sound of the arc lamp of a film projector. That's part of the fun and the magic of what sound designers do, is this repurposing or recontextualizing to make things feel unique and yet oddly recognisable, but you don't know why. Everything that we can do in cinema as artists to convince you that a sound is real is to start with something that is real in the first place.

Mark:
So, there's this interesting antagonism in my community of when do we use electronic sound, which inherently does not check that subconscious box of, that sounds real.

Didier: [04:45]
One of my favorite sounds is really, you know, the TIE Fighters. Do you know how they were produced?

Mark:

Absolutely. It is made from an elephant scream. He didn't do anything to it. This is the genius of Ben Burtt. He heard spaceship engine and it's just as so he added a little bit of doppler shift. You know, that, that change in frequency when something travels by you, the pitch shifts. That's a TIE fighter.

Anna: [05:16]
That is so amazing. And that really actually touches on the point that I wanted to put to you, Mark, which is that you must have to have trained your mind to have made those connections between sound and totally random things like an elephant screaming.

Mark: [05:30]
Yes, that's kind of the training we go through, which is to extrapolate or find metaphor in the world.

Anna:
Yeah, I love that. My example of my favorite film sound is in Jurassic Park, and particularly, you know, the bassy thump of the T Rex's feet before we see it for the first time. It just transports you right there into the car.

Mark:
You know, what's interesting about that to me is the sort of psychological nature of that it's the audience's and our anticipation that that's what a big heavy thing should sound like. It should shake the firmament and it should frighten us and in that idea of being frightened comes a deeply evolutionary thing going on in sound which is low frequency sounds are terrifying because a hundred thousand years ago, the things that rumbled were things to truly be frightened of - volcanoes and earthquakes.

Now, we leverage that as a cliche to induce fear that may not have an actual origin. Especially in things like horror films. You're always introducing some kind of rumble to get the audience on edge.

Anna:
That's amazing. So, you're, you're kind of an emotional manipulator through sound as well.

Mark: [06:45]
Oh, very much so because we are constantly navigating our world with sound.

Anna:
What sort of microphones do you use? Let's get nerdy about the tech and then we can talk about what they're made of.

Mark: [06:58]
Well, I have somewhere on the order of 50 microphones. A microphone for me is much like a lens to a photographer. And all of these microphones have a very specific purpose. So, most of my microphones are traditional diaphragm-based capture devices. Diaphragm meaning there's a very sensitive piece of material that receives sound waves. Sound moves in waves, and it vibrates the diaphragm, and the diaphragm converts those movements into electrical impulses that you can record. But I have a lot of other specialty microphones. I have hydrophones, microphones designed to work underwater.

Mark: [07:42]
I have EMF microphones that capture electromagnetic frequencies. I have contact microphones. What other kind of crazy microphones do I have? I have subsonic microphones designed to capture only those at a frequency well below human hearing. So that's a broad description of the types of microphones that I have.

Anna:
That is quite a box of tricks. I've heard about your rig for rain sounds, and I really want to hear more about it.

Mark: [08:13]
Well, that rig came about as an outgrowth of my philosophy, which is how do I place my microphones, hence the audience, as an extension of the audience's ears? Rain is particularly antagonistic to sound recording because you don't want to put expensive equipment out in moisture. So, I had to figure out a way to protect the equipment while capturing rain the way we hear it when we're stuck out in the rain. So, I built a canopy for my microphone rig, but it had to be an inert material because I didn't want to hear the rain dropping on my canopy. I wanted it to only capture the sound of the rain around the microphone.

Mark: [08:57]
Yeah. So, I found a particular kind of foam that would absorb water, that would not reflect sound. You wouldn't hear tick, tick, tick, tick, tick. The microphones are right there. And I could run for about ten minutes before the sponge material absorbed enough water that it would start to leak. Now mind you, I'm out in the middle of the rain. So, I could only be out in the rain for ten minutes till I had to take off my cotton jacket and wring it out. And then go back out into the rain. Now, what that achieved was recordings that I used for Blade Runner 2049. We had a lot of rain sound.

Anna:
That is incredible.

Didier:
You know, listening to you, Mark, I think what you describe is really fantastic in terms of innovation and, you know, breaking the rules. And thinking out of anything, really impressive.

Anna: [09:47]
So, getting back to materials, you mentioned your microphones have got diaphragms in, they've obviously got a structure. Any guesses about what materials go into making your microphones?

Mark:
The good microphones almost always have an alloy like aluminum as a casing as the body that contains the parts, and the shape of that body is critical in terms of how the microphone captures the sound in the way you want it to capture sound. And the diaphragms, I would love to know more about the science of those materials because the diaphragm of a microphone mimics what your eardrum does.

Anna: [10:28]
Yeah, I did some research into this. And in a way, I was surprised to read that sometimes those diaphragms are made of very thin plastic material, which surprised me because we think of plastic as being quite cheap and quite weak as a material. But thinking about it, it's probably one of the most similar synthetic materials we have to the human body materials, so yeah, I was sort of surprised to think, like, oh, it's just a plastic membrane that's so important in the working of it. Didier, you have any further guesses on microphone materials.

Didier:
I think you say metals. Yeah.

Anna: [10:58]
Yeah. If I think about the materials that maybe Rio Tinto would be involved in, in some microphones, there are magnets involved and probably, sort of alloys of iron, boron, neodymium maybe would be ones that Rio would be involved in.

Didier: [11:15]
Yes, I would say that the first one that Mark was highlighting, aluminium.

Anna:
Yep.

Didier:
Rio Tinto is really super well involved. Iron as well, you know, obviously. Overall rare earths is quite challenging for different reasons. You know, it's a type of material that economical environmental viability, it's a big technical challenge.

Anna: [11:37]
Yeah. And actually that brings me on to what I wanted to talk to you about in terms of sustainability and recycling, because we think of metals. We're familiar with the fact that they are recycled when you put them in our recycling bins, but I want to dig much deeper into those processes and how recycling is only going to become a much more important part in both the Rio business but also in the products that are ultimately made out of their materials and how that fits into a circular economy.

Didier, how does repurposing and recycling come into your very different line of work?

Didier: [12:14]
Yeah, very different. I think there is no ideal recipe. I really believe it's all about having an open mindset by looking to what is already available externally in the open world, but as well internally. It's about having no hesitation to take, to adjust and to adapt to your current situation and purpose. I believe it's really about having an open mind.

Mark:
An open mind is so vital in cinema, certainly in cinema sound, because to create, to design sound, is to be open to anything. To sort of approach a problem with no preconceived notions.

Didier: [12:57]
Exactly. You know, these things may be 20 years ago, from an economical technology standpoint where possible, but that now became possible. The world is dynamic. Technology is evolving. One best example is what we call heap leaching. Heap leaching is about recycling copper tails via bacteria which will process this tail.

Anna:
So that's an example of how you're sort of repurposing what would otherwise be classified as waste and getting useful stuff from it.

Didier:
Exactly. It's a way to maximise what the nature, what the earth gives us.

Mark: [13:35]
You just made me think of a nice little wooded area behind my home, and there's a lovely barn owl that I wanted to record. But of course, you can't ask a barn owl to speak on command. So, we put out what we call a drop rig. We put a recorder out there and we turn it on, and we leave it for 24 hours in the tree branch right near where the owl existed. And I recorded for 24 hours, and I came back, and I put that recording of 24 hours into my timeline. My sound processing tool, and in that 24 hours was about 15 seconds of great owl vocalisations.

Anna:
Amazing. Didier, can you tell us about biocarbon maybe as an example?

Didier:
Yes, for sure. Biocarbon is a project that we are developing within the context of our decarbonisation strategy.

Didier: [14:35]
The purpose of that is really to replace fossil anthracite for cycle and biocarbon is a high-quality metallurgical carbon, which could be used in our processes based on wood recycling. And with no incremental CO2 emissions. That's biocarbon.

Anna: [14:59]
So is it a material that would be used when you process iron ore, you need a lot of carbon involved. Would it be, instead of using coke and coal, you could use this carbon that came from wood?

Didier: [15:13]
Exactly. Assuming it works. It could be a key element, you know, to decarbonise the steel industry, which is one of the largest industries in the world. But as well, you know, it could be a titanium feedstock production, because you need to remove oxygen from the ore, and a way to remove the oxygen is using carbon. But the value, the beauty of biocarbon is, you know, you develop high quality, carbon with no incremental CO2 emissions. And you don't need to mine for fossil anthracite. Knowing that would be based on wood and especially on wood residues.

Anna:
Brilliant. One thing that really surprised me is it's not just about sort of repurposing and recycling in an outward looking way where you're kind of taking feedstocks and you're recycling and making existing products greener. It's also about looking internally and finding ways that you can repurpose and recycle in terms of your own, processes, your own ways of doing things that aren't actually about making products. It's just about making the business more efficient.

Didier:
Exactly.

Anna: [16:28]
Mark, I want to touch on your relationship with recycling because we talked a bit earlier about you reusing sounds and I'd love to know to what extent is recycling or do you think of recycling as part of your portfolio.

Mark:
I've never made that direct association, but in that context, it's certainly a way to look at the way I work, which is to say there's this universe that all of us in sound aspire to, which is to have everything that you hear in a film be an original recording. For that project, but time and budget have never allowed for that and may never allow for that. Thus, we record sounds constantly and master them to be part of a sound library, a collection of sounds that is browsable and recallable. So, I am constantly recycling, if you will, sounds from my sound library when I'm not able to go out and record the new sounds that I desire to use.

Anna:
Do you have any questions for Didier about what elements might be recycled or recycled in the future?

Mark: [17:32]
Well, I have sort of a personal concern because it's harder and harder to find a recycling centre here in Los Angeles. And I generate a fair amount of electronic waste. And I know there's a lot of rare elements in my electronic waste that could or aren't extracted or repurposed, and I'm just curious what the future is for electronic equipment. Are there advances being made on how to

recycle electronic waste?

Didier: [18:00]
Well, it's a super challenging question, but the fundamental element is how can we develop technologies which will allow to recycle these things in an economic way. You need to target multi metals, multi elements, you know, in order to be able to build the business case, the business value, and address the cost issue. Another way to recycle sometimes is about using an existing asset, an existing process, which is already in place and recover material like rare earths. In Rio Tinto, an example is we are recovering scandium, which is a type of, you know, critical material type of rare earths. And the challenge is, how can you make, you know, economically viable? One of the potential avenues is exactly that, is developing synergies with an existing already, you know, processes in place, which will address the cost dimension.

Anna: [19:01]
Electronics, they're so complicated. There are so many elements that go into making those sorts of components. And if you think about all of the energy that it takes and effort to extract all of those different elements and process the parts and then construct them all together into an amplifier or a phone or a laptop or whatever, to then try and reverse that process. And if you had 50 elements that went into it. To try and get 50 piles of all of those different elements out of it again is virtually impossible. These components that we make are so finely engineered that the materials are mixed at such a small level that we can never really hope to extract them all and recycle them as if they were fresh.

I guess that's the importance of the repurposing part, is that we wouldn't necessarily want to turn an amplifier into piles of material again, we might want to turn it into a different type of amplifier or into a microphone, even changing what it is, but not exactly deconstructing it down to its individual parts. And this is what we mean by circular economy, right? Is that, that the repair culture just has to become much more embedded in these products that we use.

Didier: [20:17]
Maybe the innovation, you know, technology improvement can bring part of the solution. That's where we need to keep going in terms of innovation, and maybe it would partly, look, address this concern.

Anna:
I want to end on an optimistic note. And Didier, I'll come to you first. When it comes to this repurposing and recycling work, what outcomes are you hoping for? You know, what impact do you want to have?

Didier: [20:42]
Well, I would expect the least impact from an environmental standpoint and the best outcome in, to our, in terms of communities.

Anna:
What do you mean by that?

Didier:
In fact, you know, bringing the best to the society and our community. Practically, what does it mean? Can we avoid waste? Can we maximise, you know, what the earth gave us?

Anna:
What about the sort of the size and the scale of this?

Didier: [21:12]
What does it mean at scale for Rio Tinto? It's all about improving performance. Improving energy

efficiency. We have an active development in renewable energy. Wind, solar, we are testing electric car, trucks, bioiron, biocarbon, new way of producing titanium metal, fantastic metal, you know, which has a fantastic ratio, weight and strength, which will open as well, new field for the world. We have still work, but we're focusing on that.

Anna:
And Mark, how about for you? What will future technology allow us to do when it comes to sound design in your work?

Mark: [22:00]
I would say the first is the development of microphones that can capture in a true binaural, meaning the way we hear, receiving with two points of access, immersive content.

Mark: [00:22:15]
The other area is artificial intelligence, the ability of artificial intelligence to inform sound in a film through the creation of sounds that we've never heard before.

Anna:
Going back to our conversation at the start, the way that you've trained your mind to make those connections between physical object and a sound that would represent something entirely different. That skill is something that you've honed over decades of work. You could maybe put a description into an AI, make a thing that sounds like this. But you still need your skill set to be able to make those connections.

Mark: [22:56]
Thank you for saying that. You led me right into what I wanted to say, which is that it can only generate through iteration from something that has already existed. So that, in and of itself, speaks to this idea that AI, to me, is never very original. It can originate ad infinitum, but it will always be reflective of something that has already existed. The corpus is built out of my work. And so, while, to me, creativity is about the fusion of two disparate ideas into something that is greater than the sum of its parts 100%.

Anna:
Maybe in a few years' time, you'll have a completely sustainable titanium microphone made with bioiron and all sorts.

Mark:
I'm looking forward to that.

Anna:
Whoever's on the end of the boom mic will thank you for that, I'm sure.

Mark: [23:44]
Oh, what it takes to hold a boom pole. Oh my god, the arm shake.

Anna:
Well, we've come to the end of our conversation. A huge thank you to my guests. This episode's sound designer, Mark Mangini and Rio Tinto's Vice President of Technology, Didier Arseguel. Thank you both so much.

Mark: [24:00]
Thank you, Anna.

Didier: Thank you.

Anna:
You can listen to more episodes of Things You Can't Live Without wherever you get your podcasts. And don't forget to follow, rate and review us to make sure that you don't miss an [00:24:15] episode.

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