Dave: Welcome to The Elegant Workflow Podcast, A member of the Tech Podcast Network. Today, we are speaking with Stuart Bowling, Senior Worldwide technical Marketing Manager at Dolby Laboratories. Stuart, welcome to the Podcast.

Stuart: Hey Dave, welcome, thanks for giving us the opportunity to talk to you.

Dave: It's great to have you on here today. Please tell us a little bit about your career and how you ended up at your position at Dolby Labs.

Stuart: Okay so I actually had somewhat of a varied past as it were. I actually started on the exhibition side. So I grew up in Manchester England and I started in this industry working for Warner Brothers. Warner Brothers couldn't operate cinemas in the US because of the Anti-Trust Laws yet internationally the studio was able to build a branded theater chain under the Warner Brothers banner and used that at the end of the 80's, beginning of the 90's to really kind of improve the quality of the movie going experience to audiences in Europe and Asia but also give more outlet for the content that the studio was creating. So, I actually started there as a projectionist in 1989 and then I worked my way through. I became a booth manager then I was a trainer and then I worked on installations and then basically, also new multiplex cinemas and we also built a theme park in Germany that I was involved with. I got involved with production because of the Warner Brothers Movie world has also 6 stages in a production and a dailies theatre and I got involved with that. During my time in Germany, I met some people from Lucas Film and that then basically brought me into the US in 1998 for THX division. Basically, I worked for them, did a lot of work with post production and then obviously George was very interested in digital cinema at the time with Episode 1. We did a lot of work with studios and the introduction with text instruments in the DLP technology and then that basically began as a transition to me that I worked with Chicken Little for the big roll out of their research in 3D. I did a lot of work in Dolby and Dolby brought me in and I've been with me for almost 7 years now.

Dave: And I imagined just having the background of starting off as a projectionist and kind of working your way up and everything, I imagined that probably helps you a lot in understanding the technology and understanding some of the challenges that people have using technology.

Stuart: Exactly yeah. So it was a great foundation for really kind of understanding the ecosystem of exhibition and how exhibition kind of works but then also you know, working with THX and then kind of being more grounded in technologies but also understanding better post production because I did a lot of work with post productions studio around the world and understanding that workflow kind of then gave me a bigger overall arching vision as to how everything works together.

Dave: Just something I really wanted to point out, a lot of the listeners, some of them are just kind of getting started in the industry, they're listening to the universities and trade school and I think its helpful for them to know, you don't have to graduate out of school and go right into management. First of all, its probably not going to happen but it helps if you go and you kind of learn what you need to learn so as you start moving up the ranks, you're a lot more valuable than somebody who just learned some management skills and now managing projects, people but not really understanding the technology because they weren't really working with it all along.

Stuart: Right absolutely and that's a very valid point. I know a lot of people in the industry that you know came in from grassroots and started way down at the bottom of the totem pole. While we all have aspirations that we want to eventually reach somewhere, we all have to obviously start somewhere being really grounded gives you that foundation.

Dave: There's a lot of talk these days about Atmos. I know people are very excited about Dolby Atmos so could you kind of explain to our listeners what it is?

Stuart: Yeah sure. It's interesting that as an industry we kind of spent the last decade really transitioning into digital projection and watching the sunset on film and then also the big push with 3D, sound to a degree sat in the background, nothing really going on. At Dolby, we started looking at this and I was involved from the very beginning when we wanted to understand what we could do with sound and how we could move it forward with digital cinema and the technology allows far more bandwidth and there's a lot more flexibility in what you could do. At 35mm, we were very skillful, craftily weaving in 5.1 channels of audio data between the sprockets of a 35mm release print but I also like to joke, we also got a logo in there as well. We were really restricted by the medium and that was kind of like why sound kind of froze for a period of time, but really a lot of the challenges over the years have been with channel based solutions is that you can be on a dub stage and listening to a 5.1 and then you go out into the real world and you go from like LA to New York to London to Paris as examples and you could have a different experience at each of those locations so one of the foundations for Dolby Atmos as fundamentals is, how could we improve the overall audio experience so that we have greater fidelity and greater resolution? Additionally, how could we unconstraint a content creator? How could we allow them to really express themselves in anyway that they want but both really do it in such a way that you know, the way our brains work with regards to when you go and watch a movie and can see and hear it, you're very unconscious to what you're actually hearing. Your brain is very this really focused on the images that it is seeing and its processing all of that data and also the sound on top of it is really reinforcing what's happening and that as filmmakers, they use a lot of great moments in sound to really elicit these poignant moments in movies where were trying to make the audience have empathy for a particular sequence as its taking place on the screen or were trying to terrify the audience by having something suddenly appear either off screen or behind the audience, you know using sound that way. With Dolby Atmos, what we created was a way to unconstraint them in that, you can now position sound uniquely down to an individual speaker inside the theatre but in addition to that because normally we have a ring of surround speakers around our audiences but now we've added two additional rows of overhead surround speakers over the audience. So now, now we kind of have between the screen, the overheads and the circle of surround speakers around the audience and extending them on the sidewalls from the forward to the screen so now we have a true 360 degree ring of sound. We kind of creating like a hemisphere or a dome of sound over the audience and that gives the incredible flexibility to the content creator that you know, if were outside we can create that feeling that you're outside with the characters as we did when we kind of brought a technology to life with Pixar and Brave when you felt that you were in the forest with Merida and hearing the birds tweak and things moving around now had, it was more lifelike and more natural. In 5.1 if I move something around you in the audience, it was two zones - the sound would go to left and then would go to the right. Now

as a content creator if I wanted to move that sound, now that sound can basically be positioned that comes off screen, hit surround speaker number 1, then number 2, then number 3, number 4, number 5, number 6 and then kind of rotates at the back of the arch. It can even be parked, positioned or placed wherever we need it to be and that for the first time gave a real big differentiator that it kind of broke this chicken and the egg scenario that we face with sound. Sound had been around since obviously you know the Jazz Singer, but with digital sound really with the release of Batman Returns in 1992. A lot of theatres had infrastructure and speakers that weren't necessarily full ranged. Mixers weren't willing to create full ranged surround and then deliver that to audiences because we had to go over the lowest common denominator and we didn't want to be sending out a mix that was going to overpower a theatre, you know stuff that could start to cause mayhem. We kind of became claustrophobic in that we closed ourselves in and that we were stuck in this never ending battle of how can we move it forward. What Dolby Atmos does is that we designed every movie theatre that plays a system back and we add additional surround speakers. If the surround speakers that were installed are not full ranged, we add base management to the system and that we will put two additional sub woofer channels and that will manage the base and then make the sides of the overheads full ranged. If it's a new installation, we can encourage the exhibitor to actually put in full ranged surround speakers so now we kind of fixed the problem that the cinema process can now take care of all this information. The mixer for Dolby Atmos doesn't have to worry about it, that they can mix beyond constraint, create all these wonderful content and then we can deliver that and play that back in the theatres with full range surround, much richer resolution and greater fidelity. So, that is basically what Atmos is it allows far more flexibility and freedom in being able to individually address the speaker now anywhere in the theatre, around or over the audience. The magic is when a mixer is creating an Atmos mix is the panning and moving a sound, our plug-in that sits within ProTools and the renderer that we have onsite of the dub stage is really recording the information as its happening but it's also recording positional metadata that's telling us where the X, the Y and the Z or that particular sound is placed and needs to be. If I move to sound say further the way into a theatre or in my dub stage, I don't know how it's going to play back in the theatre or I could be in a room that's the same size as the room I'd mixed in or I could be in a room that's even bigger and then what the Atmos cinema process does is when we install these and put these into theatres around the world, we actually give it a 3D virtual app inside of its brain. So that these cinema processors know the length, the width of the theatre, it knows the height from a floor to ceiling of the front. It knows the height, floor to ceiling at the back. It knows where all the individual speaker is, where it's located and then also what it's capable of for playback. Is it a full range surround speaker or is it bass managed? And then it knows how to handle that. As the mix comes in and is being played back into a cinema, then the positional metadata information that we audit at the time of the mix is transported with the audio file and so, now that sound that I created, that I placed a third of the way in my room, then in a 60-foot theatre, approximated roughly at 20 feet is where that sound will appear. In a 90-foot row theatre, it's now going to be at 30 feet and then like in a 100-foot row theatre, then it would be like 40 feet. It accurately now portrays the true intent of the mixer and that it will reposition everything back faithfully and accurately exactly how the content creator envisioned.

Dave: I know one of the deficiencies of surround formats was if the theater wasn't setup correctly, you know when the mixers are on a beautiful dub stage usually when they're mixing the movie and then it

goes to a theatre in the middle of nowhere where dimensions are not exactly the same and I know that there are certain places I always like to see movies just based on sound because they were just acoustically setup correctly and what I love about this is I think it's pure genius is that you have the smarts in the unit itself that's in the theatre and like you mentioned with the 3D virtual map, it knows where to put things so whether the theatre is twice the size of the mixing stage or 10 times the size of the mixing stage or maybe even half the size of the mixing stage that it was originally mixed on. It knows here to put those sounds so I think that's a really interesting solution to a problem. It's probably a lot of mathematics though on that process to figure that out on the fly.

Stuart: Yeah, it is. It is somewhat processor intensive. In fact, we actually have a, we have a similar processor that we have like, I want to say we got over 20,000 of them out in the field right now and it was basically what we consider to be kind of like an entry level cinema processor for theatre owners just converting to digital. It plays back Dolby Surround 7.1. It plays back 5.1 in mono, couple of ProLogic inputs and you know, being able to decode DVD etc. That simplistic cinema processor, it would 1 Atmos CPA 50 which is the name of our now box equals 100 CP 750s. It kind of shows you the scale of how much processing power is going into our new box versus our old box. It's just incredibly articulate of what it does. You bring up a great point about the consistency of how we do this which was another feature that we added to the box which was auto equalization, in the Dolby span, in the past couple of years developing a auto calibration algorithm. We wanted to take advantage of, you maybe aware, your listeners maybe aware of a company called Lake which was a sound reinforcement company that Dolby purchased several years ago and Lake technology was used in a lot of touring bands like U2, Madonna, or etc. It has a really cool and very steep processing and contours and shelving in how you could equalize something. Our cinema processors typically as an industry have only equalized that third octave. Were now doing this at twelve octave resolution and its all being done calculated and mathematically done automatically. The Atmos cinema processor, you hit it, you put the microphones out, we put eight microphones into a theatres now, hit the button and it will then begin to send out tones and tests out of each individual surround speaker inside the theatre and then it will record it as a wave file and then it will then do a spectro analysis of the frequency response that its seeing versus what its end result needs to be. It has a bunch of smarts in there with regards to how it's going to adjust and either boost or cut adjacent frequencies but the characteristics of the filters that are in there are that for instance, say let's take third octave is an example. In a traditional cinema process today, if I boosted 500 hertz inside a theatre and then 400 and 630 which the two bands adjacent would start to pull up and as soon as I'm trying to correct the problem, I'm now actually starting to manipulate the adjacent frequencies. In the cinema processor technology we have now that when we do that, we actually because of the steep shelving that were using then I can boost the frequency then I'm not going to affect the adjacent frequencies next to it which is pretty amazing.

Dave: Yeah that's very impressive because that's definitely not an easy thing to do.

Stuart: No this is why yeah, I'm sure has aged some of our guys.

Dave: Why do you think it's taking so long to apply technology to something like sound and make it this complicated? You know we can render games on the fly on things like the Xbox. Why do you feel that

it's taking a while to get to this level of sophistication with sound? Do you think it's purely now we finally we have the technology or the research has been, you know Dolby's finally been able to really research this and really look at other systems and some of the deficiencies in previous systems? How do you think this all came to pass and why do we have it today? We didn't have it yesterday or aren't waiting for 2 or 3 years for it.

Stuart: So, I think it's definitely a combination of things like, I mean, if we look back then, you know, traditionally and always the post production facility was obviously always the reference room no matter where it was being mixed. You look at the expenditure of the technology infrastructure inside a professional dub stage today and you're rapidly going into hundreds of thousands of dollars if not millions of dollars and a commercial theatre on average would probably spend around $80,000 on a room for audio so there's quite a disparity there between the two to try and make it work. Also, as I said earlier, the medium that we had at film really reached its limitation and that we couldn't, we were dealing with 16-bit audio on film and now we have 24-bit audio at 48K and also the ability to deliver in the future, 96K. Also, the timing of digital cinema, the fact that were, at the beginning of the year, we crusted like 90, we were at like, I think around like 90,000 digital cinema screens, we've probably surpassed 100 by now. So, having that footprint also helps and the fact that as usual technology, technology as it progresses the cost has begun to erode. I mean, if you look at you know, like color correction when color correction first came out it was into again, millions of dollars for a good color grading system and now with the consumers move everything that that price has dramatically eroded. All those factors combined have really helped make it to a point where it can be introduced into the entire system for cinema owners but also I think really the timing was from listening to over the years mixers, sound designers, sound editors, listening to their completely valid complaints or you know, their future wishes as it were of, I wish you guys could do this or it would be awesome if we have better resolution and fidelity. It would be awesome if I could just have like Gary Rydstrom has always wanted, full ranged surrounds, the ability to park a sound directly behind the audience. You can have a sound literally fly through the middle of the room. It was really combining all of those elements and then kind of, part of it as well was learning from what we did introducing 7.1 and then as an interim staff we wanted to bring at least exhibition up to par to what was available at home. In the background, still continue to work out how we would deliver this next technology from a distribution point of view. How do you put it inside a DCP? How does it go out? How does it work even with all of these different systems? Dolby is in a very unique position and I kind of put us a keen to being the hub at the center of the wheel and that we actually serve many masters. We have our amazing content services group in San Francisco, in LA and also around the world where our sound engineers go out and spend time on dub stages every day, help them with print mastering and finagling of motion pictures for audio. Part of the problem was that you have to understand how to, not only to create a technology but then also how you're going to distribute the technology and then also create a technology then to accurately keep playing it back so it was quite a bit of a puzzle and when we delivered 7.1, the first thing we discovered very quickly was we were now having two deliverables and that we were sending out 5.1 and 7.1 files on the same hard drives and that created initially, it created a lot of confusion with regards to distribution and how the studio was going to manage and ensure that the right theater got the right package because if you played 7.1 and 5.1 then obviously you'll be dumping the back surround channels. And if

you played 5 and 7, then you know it would still have 5.1 but obviously nothing would appear behind the audience and the fact that we were having to manage keys so that brought up another question with regards to audio was that on film, we have intelligence and the Dolby digital cinema processor would immediately detect that it had Dolby Digital Sound, it would then play it back. If it failed it will then revert it back to analog. With digital cinema, we created fully uncompressed audio but then we gave it no intelligence so there was just no way of identifying 5.1 and 7.1 so that was certainly one of the things that we've embodied inside Dolby Atmos was that it would intelligently identify itself to the box and then play back correctly and if for any reason anything should go wrong, it would actually do a very elegant cross fade and then revert it back to the 5.1 or 7.1 PCM tracks. There's kind of a lot of moving elements in there with regards to, you know like you fix the post solutions, you give the content creators what they want, you build the tools then you have distribution, getting it through the ecosystem and then coming up with standards as how you package and get this content out into the field. Then you have some changes that have to take place to the server manufacturers with regards to you know, creating an update and an identifier in their own internal workings that helps a server identify what a package is and then you need a decoder and then having to build the decoder. So, those are really all of the elements to try and help make all of this happen. If that wasn't enough of a project to take on, we also were very concerned for exhibition in that we didn't want them to have to go out there and tie with theatres which is why we worked with bass management. We also wanted to find innovative ways that they could easily hang and install overhead surround speakers. We started working with speaker manufacturers and then we also found in a research that typically a wider dispersion of sound over the audience from an overhead so that led to discussions with speaker manufacturers to actually help create Atmos purpose surround speakers for the overheads and that then led on to, okay, well now were amplifying every individual speakers. If I have a theatre that has 40 surround speakers, that now means I have 22 channel amplifiers so that's kind of a burden because now that means the exhibitor has to buy additional racks and again, talking with the manufacturers of amplifiers, we were like there has to be a way that we can increase the density. Today, we delivered 204 channel amplifiers inside cinemas and they came back and we were like we can do 8 channels and here's a really cool thing that we found, when we started increasing the density of the amplifiers and using newer technology, were also making them more power efficient so they're not like gas hogs that the old 2 channel amplifiers were so then the exhibitor that now you're putting in fewer amplifiers and you were then also taking less demand from the electrical grid. And that led to another innovation which was okay well, in some cases we could be adding more amplifiers or reducing amplifiers, how can we simplify simulation? Today, we kind of built customer harnesses to integrate and it could all of these different devices and we worked on this technology called Dolby Connect that now allows the cinema processors to output digital audio to Dolby Connect identified devices. So, everything on a new install can be plug and play and that you're just using Ethernet cables. Now, were using a specialized switch, data switch which will then basically reroute all the packaging and it goes off amplifiers that are Dolby Connect enabled and really helps to create this nice, easy infrastructure for exhibition so you can you know, quite easily tell from all of the things that I just rattled off, how complex and how big of a scope you have. In the beginning, when you start on a project, you kind of go, okay so we want to create a new sound format, this is what we want to do, and then you go okay, wait a second, now I need to back up, oh I need to back up further, oh wow I need to back up even further and that's when the scope of the project becomes pretty big.

Dave: I think it's interesting too how it's not just like you said a new sound format but how do you actually do this? How do you do the production? How do you do the exhibition? I think that's one of the strengths of Dolby that I noticed over the years. It's not just about oh, we have this new sound format but it feels like Dolby kind of stuffs back, looks at the whole process, figures out how to do it. I think even in the days when theatres went to surround sound, Dolby was very, hoping them to do that of course the whole THX certification which I thought was genius because I knew if I went to a theatre that was THX certified, I knew I was going to have good sound.

Stuart: Right.

Dave: And really the exhibitors weren't charging more for that which was great. I just knew that if I went to this other theatre, I get a better experience with pretty much the same price.

Stuart: The cinema going experience has kind of been this consistent for over 100 years. You know, we built picture palaces, we built multiplexes but now audiences are really more discerning and are looking for more value for the dollars that they're spending. I think it's great that exhibitionists are stepping up and really they're very aware of the pressures that they face as an economy by themselves and that we can consume content in so many different forms now – from iPhones to iPads to tablets, streaming. There's just so many options out there. How do you encourage someone to get off their couch and go on experience a movie? I think one of the things that cinema has and will always have is first of all is size and that we can have amazingly big images. Most theatres in these big rooms now are like typically 60, 70-foot sheets or bigger that we want better, I'm on a comfy couch so I want a nice seat. Exhibitors are putting in better seats, they're making them wider so they're giving you more space kind of you know being on a plane. We all aspire to be in first class but we start at the back and hopefully work our way forward. We kind of want all these nice things and I think Atmos gives exhibitions a true differentiator that it's, this amazingly big technology that gives you, really brings the WOW factor back I believe to the industry. Certainly, audiences like we've monitored Twitter since we started this and every release that comes out, it's really amazing to see the response of audiences talking about the technology and that they don't have to understand, okay how did you record that data? How did that get into that file? You know, but its more so the experience that they're getting that they're just literally blown away by the experience and its making them excited about wanting to go see a movie and experiencing it in this new way.

Dave: Picture is one thing. Picture is obviously important but I will take crappy picture and amazing sound over the opposite because you can't, you know, watching a movie and you can't hear anything, the movie is useless. At least if the picture is sturdy and then the film's weaving in the gate and all the problems that for years we had with film before it went to digital projection and all that pretty much have gone away, the key thing was can I make out what they're saying? Can I hear the music? I think that's the key and I think people are realizing that at home. A lot of people still don't have great media rooms. They have the big screen TVs. They use the speakers that come with the TVs. A lot of people, because they figured they spent all this money on the TV, the speakers must be great or they buy a sound bar and they're not going to get Atmos at home. I mean, that's just not possible, I assume someday it may be available but for now you have to go to a theatre to experience it.

Stuart: Exactly. It's like you know if you go to a very large theatre, I mean like if we take, I'm trying to think now like the Burbank ETX room at AMC - that room has like, I want to say like 46 speakers in that room. You can't fit 46 speakers in a house or you could, you'll probably be single for the rest of your life but it just becomes very difficult from a scale to try and be able to do that kind of thing. At some point, you'll end up seeing some former transition as to you know, how the technology can help in other areas.

Dave: How in the workflow road is Atmos different from a regular sound mix and what are you seeing people doing as far as really pushing the technology to its limits?

Stuart: There is an interesting even within the industry and that everyone does everything kind of differently. You can sit through how things happen like at Skywalker as an example and then you go down to a Hollywood stage and then Hollywood will do it like differently than the way Skywalker does it and then they do it to a degree again somewhat differently. So, Atmos is so new we introduced it with Brave and Brave obviously being the first movie and you know, we're very excited that we've actually announced 30 titles within our first year which has just been an amazing embracement by the content creation community to want to do that. So, pretty much the way the workflow has been so far is that the, predominantly the majority of the movies that have been popping up so far have been in that they were generated typically in 7.1 and then they've taken the pre-mixes and then basically done an after mix. Because everyone has been kind of waiting for technology to prove itself before they wanted to take on that kind of like, there's always that little unknown about, I've put my toe in the water right now, how far in the water do I want to get? And Skywalker's an amazing facility and I was very fortunate to work with Joe Kasinski who is the Director of Oblivion. I met with the production team and Joe and the producer Steve Gob last year and we talked about Atmos and we met. We gave a demo at Century City and one morning with Joe, we talked about technology and he was completely jazzed about what he could do with Oblivion. One of the things that we were very interested in as we were kind of going through this whole thing was we want to get a motion picture to go through this from the beginning and the way Atmos was built and because of how articulate it is as a rendering engine is that you live and breathe in the Atmos world and you do all your pre-mixing and then your final in Atmos and then at the end you can then render out. We can then deliver a 7.1 and a 5.1 so basically you get three versions out of one main mix. For any reason you didn't like a particular pan, and like if it's something didn't go where particularly you wanted it to and either the 7.1 or 5.1 down render, you can go back and edit it and it will then basically only change that particular area. If you wanted to change in 5.1, you can make the change for 5 and it doesn't affect anything else. Basically, it's a ProTools plug-in. It sits same ProTools 10 or higher so HTX architecture and its basically, we have a pan plug-in and it gives you a 3D representation of the room so you can see it. We also have the full panning moves in there so you can have these different pre-fixed pans if you're doing repetitive panning coming through the room for certain things. Basically in system ProTools, we allow up to 128 objects and that's a combination of channels and objects or if you wanted to stay purely object based you could do that but typically you would have a 9-1 bet so that would mean left, center right, left surround, right surround, left rear surround, right rear surround, top surround left, top surround right and then that would give you a 9-1 base and then you can then deliver on top of that up to 118 simultaneous objects at any one time. And then our engine can render that out up to a maximum of one box 64 individual speaker feeds so then

that way we can cross out obviously the many sizes of theatres that are around the world. The plug-in works in that, when you're doing any pans, you streamline automation, you can go in and nothing has changed. You can go in and make the edits so that way you can be conforming and editors can be moving the surround and not having, it's not going to break anything. So Oblivion was kind of the first mix we've done, its a true 100% native mix and they started, they conceived and design in the very beginning in Atmos and then in the end rendered out in the 7.1 and the 5.1. We actually just finished the print masters about a week ago. Gary Rizzo, Juan Peralta, Ren Klyce, Gwen Whittle, and you know which were the main sound team on there, they were pretty ecstatic with the results that they were getting.

Dave: The ability to do that many objects because that's the key, it's not just channels anymore like you mentioned, it's all about, what can I do with this it if I track him by object rather than channels. It just sounds amazing. It sounds like not only from the creative scenes but I'm sure the studios and the exhibitors have to be excited as well.

Stuart: Yeah. Exactly. That certainly, I mean as we've been, I spend a lot of my time being kind of like the face of Atmos and working with not only with filmmakers like, so we went out to, I've been working a lot over the years with Park Road Post and we went out and met with Peter Jackson last May. We actually took a kid out there and temporarily took over one of his dub stages and we played back. We spent a week out there, we re-mixed a couple of sequences from early Hobbit footage and we played it back for him and he just got it straight away. He was just like, wow, now I know what I can do with this. He started talking about, oh okay, I have this sequence in Rivendell and The Quias as up around the audience. I want that to embrace and come off the screen and being able to kind of wrap around the audience and be able to create this amazing soundscape for a movie like The Hobbit. For exhibitors when we started to show this, as a technology you always have this, you know, maybe it's a little bit of fair at the back of your mind but sometimes when you're presenting a technology, a technology has certain merits and sometimes you're having to spend a lot of time explaining what the technology is and how it works and then people start to feel comfortable about it but sometimes it takes a lot of coaching. The great thing about Dolby Atmos has been the experience has been so demonstrative, the technology speaks for itself whether you know, it doesn't matter how you get up there or talk about it. You play a clip, let them hear it as it is the proof of the pudding, it does what it says, it meant to do on a can, and they were completely blown away by it. That's why we've been very fortunate that we've been able to deploy 96 auditoriums around the world actually using the hardware that we created for studios because our cinema processor doesn't actually shit until the week of cinema con. So right now we actually have 20 of those units or just over 20 in the field right now that are finishing out their beta deployment but pretty much the predominant hardware that's out there is, it's MADI interfaces, its DTA converters, I mean it's like half a rack of equipment that's inside movie theatres that will get replaced by one elegant 2U box that will do everything that they needed to do.

Dave: Yeah but right now they were able to exhibit the films with Atmos so I'm sure they're excited to have that versus having to wait until the cinema processors are available.

Stuart: Yeah, and then the fact we got like, we worked with some amazing talent on our trailers to kind of showcase because you know Dolby has been in tradition with sound technologies and we want

something to appear before the movie that demonstrates to the audience that you're going to hear something completely different. We worked with Eric Aadahl, is a great friend and spent a lot of time talking with Eric and was able to actually convince internally because I mean, traditionally like a trailer happens, you go to an outside agency, they come up with some concepts and then we go to a sound department and say, we have this visual, we want you to create a sound for it. For Atmos, I really want it to be different and so I got Eric to basically create some sound pitches, come in, play them afterwards and then we then pick the one that we wanted which was for this trailer called Unfold. It's actually very, pays a lot of homage to a degree to Transformers because it has some interesting sound moments in the trailer that kind of really gives you like that moment of, wow that kind of reminds me of Transformers which was funny because I actually play that back for Michael Bay and he made me played it back 5 times and he just completely loved it. We wanted a lot of movement and we wanted to like let the audience know straight away that this is incredibly different in the way you're hearing something move around you that you're not used to before. So, Eric created that trailer, Will Files was our amazing re-recording mixer at Skywalker that did that for us and then in addition to that, Gary Rydstrom who was working on Brave, again amazing credit to Gary. I've known him for like many years. One day on a coffee break, he just, watching the amazing beauty of the Skywalker ranches and that gave him the genesis for this trailer which was really the wind blowing a seat pod of a tree and then it's those little moments where the seat pods whispers around the audience and we're hearing wind and leaves rustles through the theatre, a little bit of crack of lightning and thunder and the seat pod eventually falls and lands in a ripple of water and then reveals the Dolby Atmos logo. He created that for us and then you know, Pixar animation, they hand drew and animated all the leaves and created that entire sequence for us.

Dave: Yeah, and sometimes it's the simplicity in the picture that's ideal and it's a lot more about the sound, even the old Dolby trailers when THX, you know the old THX trailers, they were so simple, I mean you just got so involved with the sound, you're like wow, this is what the movie's going to be like in a few minutes. It is exciting and I imagined with the Atmos trailers, same thing, the audience is just getting excited about the sound and it's not about anything up on the screen visually, it's just about, this is what we can do with the sound, get prepared.

Stuart: Right, exactly. And the instruction is just maybe remember, we did a great remix just as a test that were never actually released but Scott Derrickson directed Sinister and we remixed a sequence from that movie which was perfect for Atmos. The sequence was setup where we have our character on the screen, Ethan Hawke. He's inside a kitchen. He's watching a news report about some murder taking place in the house that he's in and then the lights kind of like go on and off and then you hear these footsteps run over the kitchen and like Ethan Hawke is looking up at the ceiling. In the 5.1, all of that had to remain on the screen but when we remixed it to kind of show Scott what could be done with the potential of Atmos, those footsteps literally ran through the middle of the theatre over you and you could feel the hairs on the back of your neck start to stand up from that kind of experience being, you were kind of being fooled into thinking, oh my God, someone just ran over me.

Dave: I think sound is just so important, I mean, I look at one of my favorite movies, Field of Dreams. When I look at the movie, I enjoy the story, it's a father and son story and everything but most of all that score and that mix, that what makes the movie for me. It just sounds so exciting now for all these years,

the mixers wanted to have more tools, you know, really be able to like engulf the audience in sound and now they can. They can do it with their standard tools out there like ProTools. They don't have to worry about how this is mapped to the theatre. What's next for the technology? Do you have some things on the roadmap that would use this technology, take it to another level or you guys are pretty happy with where things are right now and now it's all about it being applied in the production realm and the post production realm.

Stuart: Before I answer that, one point I guess I didn't cover and you made a great example of it was the music from Field of Dreams and you know, music is very powerful. One of the interesting things that you can actually do with Atmos that we couldn't do before is you can, we kind of call it a proscenium effect and that you can pull the sound off the screen and literally pocket into the first surround speaker. Now in the regular theatre, the first surround speaker is kind of a screen high back so it could be 20, 25 from the screen but in Atmos theatres, the first surround speaker is literally within a couple of feet from the screen so now you can create a much bigger image and literally hold it there and make that scene more powerful or you can actually pull it slightly into the overheads or as far as you want and kind of create that engulfing moment for sound. But to go to your question, technology wise, I think the interesting things for Dolby Atmos now is the, I think were up to the kind of like we call version 1 and its really getting the technology deployed, getting into as many theatres as possible. Our goal right now is we would like to see by the end of the year is to try and get 1000 screens worldwide for the technology so were working very hard with exhibitors and our partners to get that technology out there and then that will allow us then to continue to really work with the content creation community. That was one of the strengths of Dolby Atmos was that we didn't literally just take something, bake it and then go, oh by the way, we made you a cake when you know, maybe the world turn around one day and say, actually, were kind of gone off cake, were into ice cream now. We actually worked diligently in the background by bringing in industry people and giving us a lot of feedback as we actually created technology before we unveiled it so that was key for us. I think really it's more about features. How can we build upon what we've done and make it better and give you that flexibility and the things that you're looking for? Maybe there is a feature that we missed that you'd like to see in the next iteration of it. Certainly, the benefit of technology is, it's so flexible that if the industry say 5, I don't know maybe say 10 years down into the future says, we think a concept like wave field synthesis should be the next way to go that based on the pipeline that we created, we could accommodate bringing that in and making that work so that way we've, to a degree kind of future proof the technology so that we made sure we've given ourselves a lot of growth and lateral movement within there so that we can take it wherever it really needs to go. Some people have asked, for me personally, I think it's more so for me to be like an event theatre or a dome theatre wanting sound lower or maybe having something coming from below. I think in a commercial theatre coming from the background then you know, first of all Coca-Cola, no offense to Coke dropping sodas and stuff on speakers would not be good. But in a controlled environment like in a theme park or a special event or venue, I think you could do some very interesting things with the technology.

Dave: That might be the next stop, the next market for this is start applying it in the Disney theme parks and other theme parks out there.

Stuart: Yeah, exactly. How can we make this more visceral, more reverent, more immersive and help give that moment of magic and escape that you go to these places for.

Dave: And also help lower their costs. Many years ago, I cut a Circle Vision movie and they had to build through this specialized system. For Circle Vision, they had the special audio panners and it was pretty complicated and with something like Atmos, I can see that just dropping into the theatre and using standard, pretty much off the shelf technologies where they used to have to spend a lot of time and money or in doing specific for that one venue.

Stuart: If I go back 13 months, we brought in Will Files and we had him mix a sequence for us and it was the very beginning of Atmos as to where we got to. We didn't have a panner, I mean we had a panner in the software could pan but we didn't have, I mean, there was no joystick or anything so or initially we had a mouse and then Will was like, guys crazy, I need something better right now to work with. He brought in a Wacom tabula and then made that work. Here we are 13 months on, we worked with like AMS Niv, we got great integration with DSC, we've been working with Harrison and Avid and Euphonix so like in uCom mode, the system 5 console can be talking and controlling our panner. And so that's been really important because as a mixer, they are very performance orientated and they're very tactile and removing them away from the way that they work like every mixer has their favorite console and the way they like the interface and they way the fate has glide and all of that is incredibly important to them and giving them something alien or giving them an external joystick which is kind of what we had to do in the very beginning and it creates a little bit of resistance to them that it's like, oh you added a step on now there's something comfortable I'm not really used to. My artistic maneuver is that I do a certain maneuver on the DSC and I know that's what I'm getting and going into something else isn't necessarily giving you that kind of performance but now that that's integrated and done for like the AMS Niv they have the flexibility there.

Dave: For a lot of these guys, you're right they know their tools, they know the board they like, they know how the fader feels and how to get that perfect mix through the faders and then all of a sudden they get a virtual control surface, how do they deal with that? And now they have a new technology, how do you deal with all the functions in the new technology so it's all really important. I think one of the key to all of this is it sounds like Dolby went out to everyone, went out to the exhibitors, went out to the content creators, went out to the mixers. I mean, when you have somebody who's like Gary Rydstrom who's won so many Oscars, I wouldn't even know what the count is these days and when you get somebody like that giving you input, and he's mixed everything, animation, live action, you name it, I mean that's just got to be amazing. What he tells you and the things he says, I've always wanted this or you know what this is something that's never been correct in my viewpoint of how we mix audio, can you guys fix this? It sounded like a great opportunity for Dolby to kind of come in and take the technology of today especially with that cinema processor can do. Apply that with all the years of knowledge of the industry and Dolby and being out there and setting up all these theatres, I'm sure Dolby has a lot of experience doing that.

Stuart: Yeah absolutely. I mean you know we, one of the things that we had to do in the beginning when we developed this was we couldn't do this at Dolby. We have screening rooms, our screening rooms are

used and they're not, from a size perspective representative of what audiences experience at a commercial multiplex. We approached AMC. AMC has a location in downtown in San Francisco which was perfect for us and we worked with them and we took down in all the commercial auditorium and in a multiplex on Van Ness and locked that room off for 7 months and used that as a research facility. We put speakers in the beginning as we were trying to figure out what were the configuration of Atmos should be. We basically put speakers everywhere and that allowed us to quickly kind of whittle it down as to really, alright what's really giving us the best back for our buck? Also, did a lot of blind testing in there, what happens if I move a point source sound from one speaker to one speaker. At what point does it become objectionable if I make the distance too far? From an array point of view, if I diffuse a sound across an array, if I densely pack it, again if I make it two far apart, at what point does it become objectionable? And that was really what we used that for was to really refine the playback experience and really understand what's going on inside a commercial theatre.

Dave: So just to kind of wrap everything up, what is your definition of an elegant workflow? This could be around Atmos or this could just be in general over your core experience but how do you define an elegant workflow?

Stuart: I think everyone has different ways of doing things and I think everyone has their way of doing things and I think as, one of the interesting things about humans is we can become someone set in our ways in how we do things and not necessarily want to deviate or change, it can also become a comfort factor. Its tried, its tested. This is what I do, this is what I know. If I've driven a Ford Focus for 20 years, why would I want to deviate and buy a Mercedes Benz, mid-life crisis perhaps but the elegant workflow, I don't know if I could particularly answer that really.

Dave: I think you brought up a lot of interesting points though. I mean, maybe there's a certain elegance in doing something different and being open to new technologies and being open to trying something that hasn't been tried or doing something based on your experience.

Stuart: There's a lot of interesting things, I mean obviously sound's amazing and we don't think about it. We just take it for granted. I think watching a lot of these different people with it have done some really interesting things. I think that was one of your questions where, was to talk about a moment in a movie and like Oblivion, Gary Rizzo and Juan Peralta really pushed what they were able to do in that movie and there's some really interesting things that take place that I did not experience before in a movie that were very different in the way sound could be either coming on top of the room and coming into the audience or either shooting through the room or literally having something take off and disappear into the heavens. I just found incredibly different and very visceral, especially the one where you just, having something take off into the center of the theatre and disappear into the heavens where you're like, wow. It is like, you're kind of being fooled and that its going and its going and its going and it are still going. Much like the way if you were outside, you heard the helicopter take off and then disappear. We never really done that in theatres before because we only have sights around so we literally have something fly in the theatre or fly out of the theatre and kind of give you that sensation of flying over. Like now, it's very literal that you can kind of accommodate that and just have that flexibility. I think one of the interesting things that I've noticed is that I think people are willing to use surround sound more

and not in a gimmicky way because you could certainly see or have that hesitation of like, oh well you know I could do my movie that way but maybe becomes too gimmicky or I'm going to like snap the audience out of what they're doing but you know these guys really, obviously know what they're doing as their craft and how it's important to be focusing on certain things that are taking place at the story where it's like, oh okay, I don't really need music there or I don't need a sound there. Be able to create these amazing moments using surround sound that they kind of haven't thought about before and even as if, you're maybe not aware of it but now all of a sudden that scene just seems to, it's almost like going black and white to color that scene seems so different, without it being to this point of like disturbing me that I want to turn around and go, wow what was that.

Dave: I think there's a certain elegance in what you can do with technologies like Atmos. If you look at 3D, there's elegant 3D and then there's hawkeye 3D. You know the monster from the whatever the Green Lagoon in the 50's, I love when they used to replay that when I was little on TV and then they mail out the 3D glasses versus Avatar, The Hobbit or Life of Pi, these movies that they really used 3D to tell a story rather than I'm going to shove something in the middle of the theatre. I can see now with full range surrounds which is huge with the ability to take these objects like you said, have a helicopter take off from the theatre and actually go away in a realistic way not just down on a fader like we used to do but actually be fading down and moving off in a direction and being full ranged. When it drops into the surrounds, we don't lose the high end or lose the low end depending on how because sometimes the theatres, it's funny you would go to a theatre and if it wasn't a THX certified theatre, the surrounds always sound different to me. I think it's amazing now like you said, with the technology that we can have a much more standardized mix, we can map that mix to the theatre so that the content creators know that they're getting what they mixed on the stage and most of all, we can take some more chances I think and try to do something that are just different and then see, maybe it will work, maybe it won't work. I think people probably do a lot of experimentation and it probably will take a while before they set a workflow from mixing these movies or maybe not. Maybe there will never be a set workflow because there's so many different ways that you can use this technology.

Stuart: Yes, someone actually asked me if I would use this, because obviously when you think of surround sound and everyone thinks of obviously the big event movies, the temple movies, the action, and then someone asked me about a dialog movie or even like a romantic comedy and it's like, the fact that you have better resolution and fidelity, you don't have to have obviously things flying into the audience but even a romantic comedy with you know, being able to portray and being able to adjust and move that score in and out of the room for any particular moment and then just really using the surrounds for just something more subtle or naturalistic of like two people are having a conversation outside or even in a restaurant and then having little nuances around you that's kind of like, it's gone in a way that you're not wanting to turn your head but you're just kind of like going, okay I'm in a restaurant, these tables are around the actors, different conversations are taking place and those are the kind of things that I'm hearing but I could still focus what the actors are saying as opposed to like having some random noise coming off that would be completely alien and then snap you out of that reality. Even a romantic comedy, a dialog movie basically benefits from just having better fidelity and

better resolution and just having that nice, simplistic control over what you can do with something like a score.

Dave: I think there's so much more you can do because you now have a whole new toolset so thank you. Thank you for taking so much time with us and really explaining the technology. It’s so new and there's not that much information out there about Atmos so thank you for spending time with us today.

Stuart: Yeah absolutely.