Is Recording Engineering?
Consultation with audio professionals
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Present
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TP: Jez, how do the engineering community describe engineering? If there is cynicism about whether or not audio engineering comes under the umbrella of that term.

JW: Well, the hard-line view, if you like, that is held by certain engineers is summed up by a petition on the Downing Street web site. That petition was to reserve the title 'engineer' for those who are chartered engineers.

TF: Do you mean like in Germany where you have to be a Dipl.-Ing.?

JW: Yes, that's right and in the States as well it has a protected status. So, there is the chartered engineer and that is someone who has been through a particular program of education and has a certain number of years of experience.

TF: So none of us qualifies here?

BH: Well, there's nothing that would charter us.

TP: That's a spurious qualification because all you need to do is to form an institute, come up with some criteria that qualify people to be a member of your institute and then they are 'chartered' and that is just creating it for your own sake.

BH: Who charters the charterers?

TF: Well, then it's for us to define what it means. We are enablers, and we are out of sight.

JW: The softer view of it is that the discipline of engineering was around for a lot longer than chartering organisations were and that 'engineering' as a word is not under the ownership of these organisations. In the UK and many other places it possible to apply the word to a much broader range of activities than those covered by chartering organisations.

TP: There's a further complication as well because theoretically what APRS and MPG do under the auspices of JAMES is, by accrediting courses, we give a qualification to those courses in the same way that an institute would do. There were two courses that I went to accredit recently, both of which had a significant electrical and electronic engineering content and were both BSc degrees: someone coming from a course like that you could say could be conferred with 'chartership' or whatever you want to call it. Whereas there are a lot of other courses which are production based and are BA, or BMus increasingly now, which probably wouldn't fall into that area.

TF: So you mean that if you're a Pro Tools expert it doesn't make you an engineer?

TP: Yes.

TF: I agree.

BH: Absolutely

TF: But we are enablers aren't we? The man who built the first steam engine or sorted out the new trains on the Metropolitan Line: it's not very glamorous, people aren't very interested in it, but they notice when it doesn't work. We're in the same position in our job because if I'm sitting behind the mixer and the LSO's out the front, doing a concert of *Symphonie Fantastique*, if I do a decent job then no one will notice. If I do crap job and it all goes wrong, I'm in the most perfect position to sabotage it, wilfully or unwilfully. The same goes for the guy servicing a 747: if he's got it wrong and a wing falls off, suddenly they notice the engineer; but otherwise they don't.

TP: Historically, I would contend that some of the most famous engineers didn't start out qualified as engineers – they were innovators and inventors who became engineers...

PF: ...and did apprenticeships. In those days they might have joined companies like Decca, EMI and the BBC and went through a process to learn a profession.

TF: There are so many practical aspects that you do learn that way if you're and bright and you pick it up.

TP: Take Leonardo Da Vinci, if you want to go right back, was he an artist or was he an engineer?

TF: Or did he buy stuff from a Chinaman that he met? The latest story is that some of his plans that he had for the lock and the helicopter he actually bought from Chinese traders. In a similar way as Marconi or a lot of others. A lot of these people were Maitre d's rather than chefs.

BH: But where would a chef be without a good Maitre d'?

JW: What are the main criteria for JAMES accreditation?

TP: Well there aren't really 'main' criteria, apart from the course has to be validated i.e. it has to have educational status. Then what we do is we go and compare that course and its delivery, the course team, the facilities, resources that are used to deliver the course. Then we are in a position where we can say "this actually reflects what the industry requires, what employers in the industry requires and will give students the tools they need to go forward into the industry"

JW: Is it the case then that if they are not currently doing those things then they can't have JAMES accreditation, or is it guidance.

TP: Our system is based on the Institute of Electrical Engineers and it follows a similar profile to that. But, when we brought it about we decided that we didn't want to be too prescriptive, so we made the pre-application process one whereby we don't encourage anybody to apply for accreditation unless we feel that they are going to be suitable. So then it becomes a supportive process. We have a check-list of things that we wish to see. The idea of that is that then we've created an industry link between the course and the course team (and we only accredit courses, not faculties). So it is a supportive process and the idea is to enable the evolution of good practice and knowledge in the absence of the route that I took, starting as a tea boy and so on, which doesn't exist any more so we had to come up with a way that we could replace that.

BH: Well, that route does still exist but it's not as effective anymore.

TP: It's not as effective because the number of places available doesn't match the number of people looking for work.

TF: If you look at a place like Abbey Road, there're young engineers and there're people training and there're people putting chairs out, but most of them are people on their industrial placement year from the Tonmeister course or who first arrived during their placement year.

TP: That proves the point, really. An employer like Abbey Road can take a student from the Tonmeister course, and most of the time they take them in their placement year, and they're what we call 'oven ready'.

BH: Yes, they're usually significantly more advanced.

TF: But then how many facilities like Abbey Road are there any more?

TP: Well, there are three. Abbey Road, Air and Angel, and that's it!

BH: And Angel only has two studios now.

TF: So these places are not going to be able to take thirty a year are they?

TP: It's interesting that Abbey Road, Air and a couple of other studios have now started to take students from a wider cohort. They'll take LIPA students, the accreditation process has started to give a bit more confidence; but some of that lack of confidence is as much to do with the degree system as it is to do with the studios and that's the point really about creating this notion of a chartered status – the value of a degree has been considerably eroded as time has gone on. Employers don't feel confident that the existence of a degree is a reason for giving someone a job.

BH: You could argue that in sound engineering that a degree has little value, I did the Tonmeister course, and it had no value, pretty much, when I entered the pop recording world no one really was that bothered by it. That said, it got me a placement in a studio but nobody that I worked with was vaguely interested the fact that I'd done a recording engineering degree. In fact, after the first week I didn't tell anyone.

TF: I can remember the first time I did a job for EMI one guy, Richard Hale – we're good friends now, said "are you one of those types who's been to university?" and he was deeply suspicious of me.

TP: I think that's always been the case and the idea that we have been attempting to put forward is that we could get past that and we could actually give value to the qualifications.

JW: So has that changed now, do you think?

TP: It's in flux: it's changing, slowly but surely.

JW: You mentioned that the 'tea boy' route has started to close off no, or is completely closed.

TP: Yes, you're not called a tea-boy anymore, you're called an intern and you're not paid anything at all!

TF: and you've probably got a masters degree.

TP: There again, you've got the difficulty of giving any sort of conventional concept of engineering prowess to what we do. It's very difficult because it encompasses so much more than the one thing. There's initiative, instinct.

BH: You're not isolated in your role in sound engineering, whereas in many other forms of engineering you are there working with some*thing* mechanical or electrical and

getting it to work. Whereas [when recording] you have to interact with artists and performers.

TF: Well there is also team work. When you get on your jumbo jet it doesn't say "this was built by Fred" – a lot of people will have built, a lot of people will have designed it but you don't really want to know.

TP: Well, there's a pre-destined outcome isn't there? You build the jumbo jet and it either flies or it doesn't. Whereas there are so many random elements that come to bear on the success of a production. Quite often those are completely outside of your control.

TF: Well that's the artistic side - that's what makes our job interesting.

TP: There's also the promotional side, whether or not the artist bothers to promote themselves and you have no control over that at all. So then it turns around the other way and actually then comes down to a neat package of what you can do and contribute to the larger piece.

TF: A lot of it is psychology too.

PF: The instigation by the APRS and latterly the MPG to create this accreditation process was born of a realisation, probably fifteen years ago, that there were too many students being encouraged to go college to acquire qualifications which would do them no good in the industry. What we wanted to do was to make sure that students were not being duped by the educational establishments into spending their parents' money on courses that would support, say, Chemistry and Geography which were undersubscribed. You go to some places, which we have been to over the years, which have large numbers of 'bums on seats' doing various sorts of audio courses and lots of people playing with 'proprietary technologies' and are trained to use them – with these technologies provided for free, or at a very good price to these establishments ...

TF: That sounds like the Pyramix workstations in Canada. You to Banf, you go to Montreal, McGill, and the whole place is just crawling with Pyramix. It's a good system but they're churning out all these kids who can't use anything but Pyramix and can't use any microphones apart from DPA.

PF: Well, that's a software course isn't it? To extend that argument to America, we have tried to take the concept of what we call accreditation to the American system. Accreditation means something entirely different there, and they're not allowed because of antitrust laws to have this thing called 'accreditation' because it's saying that one thing is better than another.

BH: Which is exactly the reason for it, I would have thought!

PF: I know, but that is apparently not commercially fair. What I think you are allowed to say is 'yes, your course is pretty good' – at the moment we're not sure how we're going to resolve this. We've tried to create an understanding level of a playing field between America educational establishments and UK ones. I think our main desire when we first started was to try to cut down the number of opportunities for students to be duped...

TF: ...and waste three years of their lives

BH: ...and an awful lot of their money

TP: What that's turned into is actually encouraging the courses to be more diverse. The tendency in education is for everyone to act like six year-olds playing football: somebody kicks the ball in one direction and they all run after it. You had this plethora of courses that were all doing the same thing. That's in HE, In FE (BTEC etc.) it's even worse because you have four or five establishments in the same area all offering the same modules and they're all marketing to the same students and they're actually all failing as a result of that. So the whole educational landscape, in terms of the music industry and music production, has been a mess for a long time. Up until about a month and a half ago there was no National Occupational Standard for the music sector.

TF: Even though it's a massive business, you think of the number of exported music recordings...

TP: we've now managed to create those and they've been accepted and have gone on to the system. So much of this is historical, political. The other problem is that there are two what can only be described as quangos, one is Skillset and the other is called CCS which is Creative and Cultural Skills. These two exist and our sector is split between the two, so the creative part of our sector is in the CCS part and the technological part of our sector is in Skillset.

TF: But how can you separate them?

TP: Precisely. The reason for this is that it's employer led and that's important to this conversation.

PF: It's politically led because the music industry and recording industry are regarded as being in the 'creative and media' sector in terms of the economy. So we find ourselves at the facilitator end of a creative sub-sector, so we're actually doing the work that puts together the ideas of the creative people.

TP: Which is engineering

PF: Which is engineering. Especially in the manufacturing side and our site represents a lot of companies that are involved in all of these technologies. They have to respond to

being defined as being in the creative and media sector and not in an engineering and manufacturing sector. So we fall between stools there. I have to vie for grants, against the kind of people that are going to MIDEM and South by South West with showcases, for companies that are making things in boxes that are nineteen inches across: they've researched them, made them work, put them in marketing packets and know how much they're going to cost. They're on the van and you can buy one. They're competing with people who are paid by the same sort of money to go to South by South West and do a showcase because they haven't got a deal, they haven't got an agent, they haven't got a publisher – they might get one, but they are about four or five levels down from the same point in the supply chain than our people are. We actually make things and do things.

BH: But that's due to the heavy reliance in our industry on technology and it's always been that way.

TF: I do think that we're the 'elephant in the room'. I've been working with a microphone manufacturer on products to go with things like DSLR used for video. So many people – Canon, Sony, Panasonic – they all make these boxes that have got a 35 mm sensor in them which you put your fancy prime lenses on but what happens to the sound? It's usually crap, I mean seriously crap. While technology is moving in the direction that it is because of the internet, there has to be sound at every turn. If you go on YouTube and there's no sound then you haven't got a video have you? So we are very important but maybe we don't want to draw too much attention to ourselves.

BH: I think that this has also been one of the reasons for the difficulties that the industry is in at the moment: it hasn't stood up for itself and convinced people that the quality of sound is important. The fact that most people now consume audio via mp3 is a testament to that. People are happy to listen to stuff at that quality and don't understand the difference.

TP: Part of that is because, unfortunately up until recently, and this is another thing that's changing quite dramatically, the relationship between the practitioners and the manufacturers has changed quite demonstrably over the last two or three years. The manufacturers and their distributors are now realising that this closer relationship, rather than just get someone who says publically that your products are good because you've just given them one, to give proper feedback is worthwhile. There was one notable exception to that twenty years ago which was SSL when they first came out with their console.

TF: Well, he was an engineer wasn't he?

TP: Well, yes, but they did actually go out and get people's opinion and that's one of the reasons why, ergonomically, it was a major success.

TF: Well it was an engineer's wasn't it?

TP: Absolutely. But the problem was that you had major companies like Sony who came in, they were making boxes to sell to consumers and they decided that if that was the hardware then the software was the music that people played on them, so it would be a really good idea if they owned the software part of the industry as well. as the hardware part. That's why, I think, they bought CBS and all the bits that went with it.

TF: They were cash rich and also they wanted to push some formats and they'd run into opposition from conservatives in the record business who were non-technical – the lawyers and the accountants – in the top office. They thought that somehow by owning the software company they could control formats.

PF: It also illustrates what a tiny player, in terms of GDP or in more general terms the size of industries, we are; because people like Sony who are enormous conglomerate manufacturing industry, Vivendi who came in and bought BMG ...

PF: ...and now they have evolved that into Universal and all of those big corporations are a threat to how we started and how we see this industry, which is as a creative industry outwards rather than as a commercial industry which is exploitable and controlled financially. Which brings me to a question which we should maybe ask. A lot of the kids that we see, they are encouraged to go into audio engineering shall we say because they like music or because they like games. They see that that element within entertainment is something that they'd like to be involved with. They're not driven by "I can get a qualification in this and become commercially successful". It's not a business driven thing. It's an artistically, creative thing and at the core of that is whether our engineering contribution is creative and artistic, or whether it is fundamentally technological. We have for many years been trying to walk that cusp ...

TF: ...but that's the fun place to be isn't it?

BH: Yes, that's what it's all about...

PF: ...and my conclusion is that we are so lucky as individuals, I've never been an engineer but I've been in the industry for a long time and you look back and think "I'm extraordinarily lucky to do something that I really wanted to do and I've found a way to keep myself going through it, be it education or people that you know or the luck that you have. I've done something that I've enjoyed doing all of my commercial life"

TP: Try this as an analogy: if you're an architectural engineer then there's a certain amount of creativity involved in that, because you've got one foot in the structural engineering camp and you've got one foot in the "let's design something that's beautiful". So, in the course of your job you will use all sorts of drawing devices which have been built by technical engineers, you'll probably use CAD systems that have been

built by IT engineers and so on and so forth. That's the way that I see it. That if we come from the engineering background, and by no means do all of the people in production come from that background – I tend to call myself a producer and recording engineer because that seems to be the best description - the way I view it is that I have to have a fundamental understanding of the pieces of equipment that I use, because they're the tools that I use to do what I do and that is the engineering part of my functionality. I've chosen to go further than that to understand a bit more, a bit like the racing drivers who know a little bit more about what goes on under the bonnet, because I think I can do my job better. As I quite often say to students sometimes it teaches you how you can misuse equipment as much as you can use it.

PF: But that's creative isn't it?

TP: There are probably a load more analogies that we could come up with where engineering and the creative use of engineering – the use of engineering knowledge in a creative context – is there.

BH: It's a unique position in several ways because, not only should it work both ways: technologically you are the link between the creation of these devices and the use of them, and you are the link between the performers and the recording of the performance; but you should also be the link between how they create these devices. People should be asking us as experienced engineers "what do you want in a microphone?" or compressor, software or whatever it may be.

JW: Such as the SSL example

BH: Yes like that example. There's a huge amount of knowledge in the engineering community to help not only the people who are recording the music to make the recordings work, but also the people who are making the equipment to record music on to make *that* better.

TP: That comes back to the validity of some of these courses. One of the ones that we went to accredit recently was a BSc course. The day that we went they had this university wide event going on which was design and innovation presentation. One of the students on this particular BSc course, had been doing a certain amount of production but had also done a lot electronic engineering and mathematics, design and so on (and it was a design faculty). He'd come from the point of view of operation, he'd come from the point of view of music creation. He'd created this box, I was drawn to it because it was something that I'd been saying someone should make for a long, long time. Basically, it's a set of controllers. So you've got faders, you've got knobs and you've buttons and they're in little Lego packages and you slot them into the box the way you want them. So you've got a plugin, let's say your favourite plugin, that you want to operate from a control surface and so you set this up – your Oxford compressor or whatever it may be – you set the controls out, exactly as is on the plugin because

that's the one you use most of all, and there it is: it's intuitive and it's tactile. I said to him "isn't that counter intuitive because the industry is telling us that the beauty of all of this is that you can do it on your iPad" and he said "yes, but we all know that the feeling of a knob, or pushing a fader...".

TF: I've got a SADiE LRX that does the same thing – it's lovely. You can do this [makes fader movement motion] until you get the sound you like and doing that with a mouse isn't the same thing.

TP: So for me that's an absolutely perfect description of someone who's taken an understanding of the creative process and how the pieces of kit are used is imperative if you're going to design pieces of equipment which are useful and worthwhile. I remember a conversation with one of the manufacturers some years ago when they produced another digital box that had twenty layers that way and fifteen layers that way and another twenty up and down of parameters. I said "why have you put all of these on here?" because 99% of all engineers that use it, in fact 100%, will not use more than about half a dozen parameters.

TF: and they won't know how to turn it on or turn it off.

BH: The idea that you should control it all through a letter box is ridiculous. That's what you're doing: you're looking through this thing.

TP: The answer from their software engineers was "well we put them on there because we can".

PF: or "because our competitors have, and if we don't then ours isn't as good as theirs".

TP: The point about them starting to listen to us is that most of the boxes that come out now, the Bricasti for instance, simplicity is really at the heart of that.

TF: Well there's nothing on the front is there?

TP: No, and it's beautifully simple to use and very easy to get back to where you were before.

TF: I wish it was a thousand pounds cheaper.

BH: Yes!

TP: But it's unlike the Lexicon where if you brushed against it all of your parameters were changed.

JW: So we've covered the 'hard' definition of engineering which relates to chartering. There are some other ideas: some would say that engineering is the use of science and technology to solve problems.

TF: Are talking about sound engineering or recording engineering?

JW: I just talking about engineering at the moment as a general discipline. Some would say it's the use of science, technology and numeracy to solve problems or create things. Another take on it is that engineering is one step above craftsmanship and the definition, this is from something written in the mid eighties, is that a craftsman is a highly skilled person but they always know what they're going to make in advance, whereas an engineer...

TF: well that's very true to the word because *ingenium* means a skill or a craft and an engineer is fundamentally a craftsman or a skilled person.

TP: I could never support that.

PF: you might have been hoist by your own classical petard there

JW: Quite possibly! But this is what you find, you come across a lot of different distinctions which people claim defines what engineering is and isn't.

TF: Every job is different though isn't it? In a job like mine, one day I've got one stereo microphone in front of a guy playing the lute, the next time I'm doing a commercial session and you can't hear the Glockenspiel because the composer's written for twenty seven trombones playing fortissimo, so you have to do things creatively.

TP: and you go to a lutier who would consider themselves a craftsman and they would immediately say that they don't know what instrument's going to come out until they start working with the wood.

TF: My job, I feel, is to do with enabling and that is one word that you didn't use. If you're working with a major artist – if I've got a major singer or fiddle player or conductor then my ego can't have very much to do with the job because you're in a team.

TP: Absolutely

TF: I've been doing this job for a long time and I can remember being at home and my boy, who's thirty now but was about eight at the time, after the telephone rang shouted "Dad! Dad! It's Colin" so I came down and it was Sir Colin Davis. He said "I just had to call you. I've just got the first edit of Kalervo [that we did in Walthamstow]. It's rather good isn't it?". Now that for me, that's what I want to hear. I'm not interested in a

review in Gramophone or some silly person in The Guardian saying how lovely it is. I've performed my role of being a channel and that's what I like to do: you're enabling and you're being part of the team, but they're in charge really which does make us an engineer.

[PF left the discussion at this stage because of a prior engagement]

TP: I would echo that 100%. One of my best moments was coming out of a session with Denys Baptiste: we'd just finished mixing everything and he said "thank you very much, that's exactly how I heard it in my head when I wrote it" and I just thought "wow". There's nothing better than that.

BH: I'm often asked about that, usually in my role as a producer but I think they [the production and engineering roles] cross over a lot]. It's usually "what do you do? What is your job? What does a producer do?" And I've said that the main thing you do is you get the recording done, you get the record made and 99% of that is getting the artist happy with it. Pushing the artist as they need to be pushed, helping them create beyond themselves or to their limits. I'm not interested in creating *my* record or my interpretation of their recording because they've got to promote it, they're the ones that have to stand by it and have their face on the front of it.

TF: George Osborne ought to take note of that as he screams at Ed Balls while the economy is burning. He's not doing his job because it's more fun being a drama queen.

TP: I've been fortunate enough to work with some extraordinarily talented artists over the years and I get the same question: "so what did you do? What did you bring to it?". My first answer, which at first I thought was a bit of a clever dick answer but I've used it time and time again because it's much closer to the truth, is "well the first thing that I did was not fuck up".

BH: Yup.

TF: Absolutely right: turn up.

TP: If you've got AC/DC in the studio all you have to do is put the microphones on and don't screw it up.

BH: That comes from a technical expertise and a technical knowledge. The first thing that anyone who has those learns is what they *can't* do, or where they can't go or where they're on dangerous ground. Especially if it's a time-based experience, like our job, you have to get a recording based on a time when they can record it and the most important thing is you get that recording. If you can get that recording sounding fantastic then that's the next step up, if you can help get the artist into a position where they can

perform it fantastically and it sound fantastic then that's another step up but fundamentally you have to get the recording.

TP: This is probably more relevant to you [TF] because you've done more location recording...

TF: ...I've hardly done any studio work in my life.

TP: I was fortunate at the very beginning of my career to do quite a bit of location recording with a couple of engineers from Island Studios: a guy called Brian Humphries and it was when we just used the EMI mobile rig which was a load of flight cases basically. It was very useful though because we did so many things at the Albert Hall and you could just walk in and out through the stage door.

TF: Not now

TP: No, but then you could and we discovered that if you put a load of patch cords around your neck then considered to be the recording man and were allowed in. I saw loads and loads of things at the Albert Hall with some patch cords around my neck!

TF: The problem there is the cable runs you have to go two hundred feet to get anywhere.

TP: The thing that they taught me right at the beginning, when I was totally green behind the ears, you inevitably come up with the "I've got a good suggestion" and every time it was "no, don't be clever! Make it work first".

TF: and if you can do it in a simple way don't make it more complicated than it needs to be and that's another engineering principle because if you were designing a new train for the Met line then you wouldn't make it over-complicated as there're more things to go wrong or more things to misjudge.

BH: I think the sound engineer should operate in the same way as the Bricasti, in that it doesn't have many controls: if you are as invisible as possible and as efficient as possible that's often the best way of doing things.

TF: Well if you talk to old time engineers, I worked with a lot of them, I did my apprenticeship with Bob Auger who was very good to me, Ken Wilkinson, Chris Parker, Bob Gooch. They're not people who look for a huge lot of recognition. They'd like a thank you and it would be quite nice to have your name it if it's something you're proud of but otherwise you've done your job and that makes us engineers because most engineers think that way as well. They'd rather be slightly in the background. I'm surprised that the RAE are actually looking for a higher profile for engineering. I don't see myself as an 'oily rag' but if someone wants to call me an oily rag then they can.

We're all in perfect positions to wreck the whole thing completely which is an interesting power concept.

JW: One of the things that we're also interested in exploring is the extent to which changes in the availability of recording technology, such as the very cheap multitrack recording systems now available as part of personal computers, have had an effect on the definition of the engineer.

TP: Well the idea that all of these very simple boxes that are extremely cheap has changed the face of recording technology is nonsense, because if you go back further to when recording first started it was as simple as it possibly could be and as cheap as it possibly could be: crystal microphones

TF: or people shouting into a horn

TP: Yes, it was so simple and so straightforward. The first recordings such as those old Blues artist who would walk down the street in Memphis and go into what was really a record shop and in the back they'd have somewhere that they could cut a side. This was do-it-yourself, at home recording. Joe Meek for me is a classic example of somebody who lashed things together and made it work and used the acoustics of the environment and so on. This notion that there is some great change because of technological forward movement is quite frankly a lot of nonsense.

BH: It could be said that the large multitrack studio is actually a blip in the development of sound recording.

TF: It was about making money, it had become commercial.

JW: So it was the case that things briefly went the other way and now have returned to where they were?

BH: Nowadays is a lot easier to go somewhere [other than a studio] and record something. Most of what I've done over the last five years has been on location, and that has involved me taking the equipment I need to somewhere that someone wants to record. In the multitrack pop recording world that's always been hard up until fairly recently.

TF: I suppose Pro Tools makes it easier doesn't it? You just carry your hard drive around.

BH: Yes, previously you'd have had to have taken a tape machine.

TF: When I go to Russia I don't take any of my own gear anymore. I just take a hard drive and I use their SSL and bring multitrack stuff home. I never used to do things like that but it's the most convenient way to work.

TP: There are probably parallels in other areas as well because, in electronics for instance, the first television was a fairly straightforward device and then it became more and more complicated until you had these massive devices and now we've gone back the other way to something that is very thin and small and much, much cheaper. It's the same with cars, the original car which just a cylinder into which you put petrol and exploded it. Then it became more and more and more and more complex. Now we've come back to cars having very small engines and power plants in them.

BH: The technology now involved in cars now is massive, but you do have something smaller which isn't designed to go so fast.

TF: But our role is still to do with the creative side of performers and capturing their performance so that other people can enjoy it at their convenience.

TP: It's the shortest distance as well. One of my mentors was Glyn Johns and I was quizzing him about which console he liked and he said he liked the API. When I asked him why he said "because when I switch the bloody thing out, it goes out" and that's it, you switch out the EQ on an API and it's a piece of wire then, you're not going through all sorts of bits that you're not quite sure about. He said that the shortest distance between the performer and what you're recording them on is the best way to go and I've never ever changed that.

JW: This idea of recording engineers as people have a big impact – as you mention you are in a position to easily sabotage the whole thing – they are in a position of power.

TF: So is the driver of a Route master bus.

JW: Yes, absolutely. So the recording engineer might perhaps have more to do with the sound of a Madonna record than Madonna herself...

TF: ...but only because she trusts them. If she didn't trust them she could make their job impossible.

TP: You've also got to take into account those recordings that are quite dreadful recordings that have got such amazing music on them that it doesn't matter.

BH: Yes.

TF: It's like a window – it might have a few cracks in it, it might be a bit dirty but it's what's on the other side of the glass that's the most important thing.

BH: Again, the fundamental element of our job is to actually make the recording. Sometimes you don't get the chance to do any more than the cracked window.

TF: If you keep it simple and the artists have got confidence that they can just get on with it and leave you out of the formula - I often do sessions where the artist comes in [to the control room] for one playback and they don't bother to come back again. I don't feel insulted. They just want to get on with making some music. With performance, once you've got a lather up and you've played more than ten bars and you're going, suddenly the music works and it will take off. If you stop them every five minutes because you want to change a microphone, or you want to move a fader or something, they will switch off – you start to look out of the window when the talkback speaker is going and some producer is telling you "I want to go from bar 3 because the violas weren't quite together" – there comes a point where you do just switch off. You look at your watch and think "oh God, when's lunch?"?

lunch break

TP: I remember being told a story about an engineer at Pye Studios, an old duffer who did all of the jazz sessions and he used to walk in about five minutes before the session and he'd dial in the same EQ all the way across the board, push the faders up to the same level, plug a couple of compressors in and then, without listening to anything, just push the talkback and say to the MD "alright? Off we go!". That was it! His default position was like that. So, I'm always aware of the fact that I find that frightening and horrendous and that [what we do] should never be doing the same thing time and time and again. But, by the same token you have to have those techniques...

TF:...I'm not so sure it's a good idea from an educational point of view though, because if you're going to get set in your ways then it's better if you've had a bit more experience. I go out to Banf sometimes and do master classes with small groups of engineers and producers. It's a lovely sort of artist commune but at the end of it, the lady who runs the course said "is there anything that you think we can do to improve the setup?". I said "well, get yourself a lock and a box and put all of the 4006s in it, lock it and throw the key away", because they're wonderful microphones but everybody got the same bad habits from using these microphones and that's not a good way to train. If you're training to be an engineer then you've got to be put in awkward situations where you look in the cupboard and there's three old RCA ribbons and you've got to record a string quartet with them. I think that bad habits can be formed with certain people who then become teachers and then these bad habits are everywhere. If you listen to the proms on the BBC it's the same problem there. There are two many small capsule omnis across the front of the orchestra and they lift them up high because they can't hear the back of the band and then it sounds like you've got a string orchestra up an Alp; then they put lots of mics out and you hear lots of second clarinet and glockenspiel and third harp but the body of the orchestra just isn't there. I always feel that, if I'm doing an orchestra, if all of my mics went down apart from my main pair it's still OK. If you're too reliant on all these toys and all this stuff scattered all over the place, then it becomes a mess. For example, I don't know if you heard any of the sound of the [Diamond] Jubilee

concert that was broadcast? It was unspeakable. The one thing that you want if you've flown Rene Fleming in from the States to sing Madame Butterfly, is people want to hear Rene Fleming – that's a good start! You don't want to hear somebody in the back desk of the violas which was all you could hear for the first two or three minutes; and that's because their technique wasn't solid enough.

TP: I agree

TF: They didn't prioritise what you need to worry about and even if she sounded a little bit dry and she was on an SM-58 it would have been better than what they had.

BH: You could argue that that's an artistic decision to some extent: understanding the intention of the performance. Obviously the person that is standing at the front singing is the person that you want to hear the most of.

TF: Of course!

BH: It seems obvious, but it is an artistic decision.

TF: Yes, but it doesn't mean it has to be coarse and vulgar. It's just you have to identify what the project's about. I have quite a lot of 'microphone experts' who are in touch with me about the techniques that I've developed and talked about so they assume that I'm an absolute academic on this stuff rather than a pragmatist as well. They'll tell me that I should be using my Soundfield microphone 22 metres back from this, that and the other and I say "well that's fine, but let's try that next time I'm working with Pinchas Zukerman on the recording of a Bruch violin concerto and see if he's happy". If do that, he will come in the control room and look at me and say "is this a joke?" and if you are an engineer you have to anticipate that, not just in repeating bad habits but it is an artistic experience: when people are buying that CD, they're not buying it because you engineered it, or produced it, or I did. They're buying it because it's Pinchas Zukerman doing the Bruch violin concerto, in that order of importance probably or maybe Bruch first and then Pinchas Zukerman. It's not to do with whether I've used the Soundfield mic or oxygen free cable or done it at a 380 kHz sampling rate and 32 bit. That's all crap in the end. If you look at the biggest selling CDs that you've done you'll often find that they were done in very extraordinary ways that you wouldn't consider doing now. The biggest selling CD I did was by Gorecki for Warner that we did in CTS. We did it in CTS because I was supposed to do it in a church in Kilburn and I pulled the plug on it because the music was too quiet: I knew that all we would hear would be pigeons and planes and taxis. I moved it into CTS and got this huge bollocking from Warner, I had to do it for a half fee because they said it would never sell, it was done with 24 bit converters but they never took the 24 bit material away, it was truncated straight to twin-track and it sold four million copies. I still get emails about it now, people see my name on the back and send me an email saying "how did you do it?". Well, it was a pair of M50s over the conductors head and a couple of Schoeps cardioids in front of the singer because she

wasn't quite clear enough on the main mics, and that was it. So, what the heck? It was a window, it might have been a little bit dirty round the corner and had a crack in it but it was a window to the performance and people bought it. What more do you want? But these engineering courses don't teach you to work that way, from what I've seen of them, any of them. They don't teach you that philosophy of trying to keep it as simple as possible and just listen to what the artists come back with.

BH: I think that the photography analogy is always a good one in that anyone can take a great photo with anything that takes a photo, it's a question of being in the right place at the right time and having the imagination to know that that image will work. If you have the experience and the equipment with a Hasselblad on a nice medium format and get the exposure then it will be a fantastic photo, but somebody with their iPhone who's there will still get the same photo.

TF: Well, going to back to Zukerman. If you gave him a 350 quid Chinese violin he would play it much better than I would on his Guaneri, or whatever he's got. It's to do with person and what they're doing.

TP: To take the photography analogy thought, you do have the situation where you have to be able to recognise which is the best photograph because in the days before motor drives you had to set the shot up and take the shot and make sure it was right. Nowadays you just get photographers who shoot off several reels because they have a motor drive and choose the best one afterwards.

TF: And then play with it in Photoshop for a week.

TP: You get the same thing of course with people using workstations. They'll take twenty takes of a vocal and then muck about with it for weeks and weeks and weeks, rather than actually getting a couple of really good takes.

TF: Yes, that's the sort of 'speak your weight' performance.

BH: I would argue that the ability to work with artist and get them to perform it better and to record it well, will result in a better recording in so many ways because that artist will know that they can perform that well. An artist knows that if you've done fifty takes of the same vocal and you've had them singing the same word for two hours - which I have seen: when I used to engineer for other producers I saw some hideous things like that – you know that by the time they've finished recording that will absolutely hate the song, will have no confidence in it, will never be able to perform it properly ever again. You can see it die, because you've undermined that performance for them and you've probably undermined that piece of music for them.

TP: There are also layers of that feedback loop aren't there? Because there's the psychology layer, there's the creative/production layer and then there's the engineering

layer because, for a singer for instance, if they're overdubbing a vocal and they're not hearing something that's credible in the headphones, they're not going to be able to perform properly. If what they're hearing in the headphones is something that has a resemblance to what they feel they're singing then they're going to sing better, and when they sing better you'll hear a better result.

BH: I would say that one aspect of good engineering is knowing that you should be listening to the same headphone balance that they're hearing because that's using the equipment correctly: you will know as soon as you put the headphones on that the drums are coming out really hard on the right-hand side maybe because the assistant has plugged things in the wrong way around, and the volume is not what you expected and they can't possibly perform to that.

TP: and how often have you been into a studio where there is bad practice there, because the only way of checking the headphone [mix] is by checking the direct feed from the desk. You can't check what the musicians are hearing at the other end after it's been split etc. So you've then got to go and say "can we get a line from there into here?" instead of there being one under the console, and then the doors are all open because you've got cable running through them. That's bad engineering from those that actually do have degrees in engineering – the studio designers, the people that design the wiring and all of those things.

JW: So this is a situation in which you would, for example, set up a mix on one of the pre-fade auxiliaries and then it gets split on the studio floor?

TP: If you take a signal containing a mix and then you then want to feed this to twenty pairs of headphones, for instance. That gives you all sorts of potential engineering problems just from an electronics point of view because you've got to have a signal that is robust enough to be able to do that. Then you have the issue of "do I amplify first and then split it or do I send it out at line level and then split it on the studio floor" and the implications of that are whether or not you're going to pick up noise on the line level signal as it goes through to the other end and whether that's going to be detrimental etc. There are pros and cons.

JW: So in order to be absolutely confident about what is coming out of the headphones on the studio floor you need that same signal coming out of the headphone amp back into the control room.

TP: You need to hear it from the end point.

BH: Yes, you need to have the same amplifier, the same distribution. This then leads on to the way that I've been running productions for a while now, because studios were so badly equipped and so badly set-up technically - a lot of them, not all of them, but a lot of them – I've ended up now having to rebuild most of the studios I work in, I usually

end up taking my own studio and building it, usually, in their live room because I like everybody to be in the same room. It's something that I've experimented with over a long period of time and it means that communication-wise there're no issues at all. So as a producer it's fantastic, as an engineer it's far from fantastic but you learn to deal with it. I've made the decision that I think it's more important to get the performance and the communication right, because I know I can deal with the technical issues.

TP: That's something I've done a couple of times with a jazz clarinettist called Arun Ghosh . He wanted to do an album with him on clarinet, a bass clarinet and saxophone and drums and bass. Being a jazz album I knew that we were going to have problems with musicians coming in on the day of the recording that they'd been booked for and saying "by the way I've got to leave at four o'clock for a gig". So I suggested we did it in an out of town studio and I tried to find a room that I could get everyone in. Of course there was a tiny tiny budget as well. I trucked around to find a studio and, most importantly, I knew he was very nervous about this whole process and probably didn't want to work with headphones and needed the environment. So it was about finding the environment and then making the technical specification come up to where I needed it to be in order to complete the job.

BH: That's absolutely fundamental I think. In the same way that Tony will go and find a hall that an orchestra are happy in...

TF: ...yes, if you can find that one that you want. One that's changed a lot during the years that I've been doing my job is there's more intervention in terms of interfering with the artists from people who don't actually know what they're talking about a lot of the time. You get some producers that listen on headphones and they hear that something is quite together, or that there's a little squeak and they stop the musicians. That's the worst thing to do. Let them get on with it and then after you've done it and they've had a listen and a cup of tea and a laugh, go back and do those little bits again and maybe you can do a complete movement with three or four edits. But there is the tendency now to do these sequential things where you do four bars until it goes wrong and then you wind back three bars and then you go on. When you put it all together it does come across as 'speak your weight', it doesn't make any sense at all: there's no shape and everybody sounds bored stupid. The latest one is now: you take a big record company (which shall remain nameless), it decides to shed all of its staff, producers the lot. They've just got accountants, lawyers, marketing people not even salesmen really – they're further down the food chain. I sent of a master of a particular piece with a very well known artist - in his favourite studio, not my favourite studio, but his favourite studio. It was done very squeaky clean, a pair of M50s, two mic preamps, DCS converters, everybody approved it, everybody liked it. The, a week before it's due to go to the factory the managing director sends me an email saying "I want more glow". Well, what on earth do you way? I tried not to be sarcastic, but recording engineers do have a sense of humour because of the nature of our work and the way we have to suppress some of our feelings generates a need for sense of humour if you haven't got

one in the first place. So I just sent him an email back saying "I don't quite understand what you mean by glow, what are you listening on and what would you like me to do about it?" and that offended him and I was taken off of all work with this artist because of that. I've got a job this week for this label, with another of their executive producers which is some Renaissance Polyphony, which is lovely music. There are eight or nine singers, I would have quite like to have done it at St Jude's but we're doing it in Henry Wood, which is a very nice converted church: it's live it's got a 'ring' to it. But I had an email: "first of all your fee's been reduced by forty percent", which I wasn't terribly keen on and dealt with in a separate telephone call, the other was I'd said "what's going to happen to this when it leaves me, do you want to do more work on it (in other words do you want me to put more glow on it) at some later stage, I just need to know what to anticipate" and, this was a marketing person who said this, "oh no, just give them a microphone each and let them take it away and play with it". Well, I really don't think that's how you do that sort of music. I know I sound a bit like Prince Charles but that's not the idea, I supposed to be a channel of their performance. These are live performers, used to performing in churches, recording music that was performed in churches. Why would I want to give them a mic each so that they can cover it in Lexicon somewhere else? That's a fundamental misunderstanding of the music and it's an intervention from someone who's even further away from the music than some of these airy-fairy producers who come along and just want to control everything, like they're glove puppeteers.

TP: I would suggest there are two things at work there. One of them is a very direct misreading of the process of editing. My brother has been a chief picture editor for BBC news for years and years, I was discussing with him at one point when most of his technology was moving across from the 'three machines' Sony edit to Avid Newscutter as it was at that point. I was saying "constructing an edit when you're doing it on a tape machine, you have to visualise the edit, where it's going and what bits you're going to have; so you put the edit together in your head and then you go and get all of the bits". I found that it was quite often very easy to edit on a RADAR machine because you could do that, but a lot of people who learnt to edit on a workstation couldn't comprehend it at all. He said he had exactly the same thing. He could edit a package for one of the news broadcasts much quicker using the three machine system then the younger editors could do on the Avid, even though they were whizzes with the Newscutter. The reason for that is the way that Newscutter works. They play through the piece, they take all of the bits that they want and shove it in to the bin and then they have to piece it together.

BH: So they're having to find their pieces, and then as a separate part of the process they're having to construct it.
TP: That extrapolates out to A&R, because one of the things that I'm really boring about is that production isn't a load of separate stages. It's something that, for me, starts at the writing and pre-production stage of the songs and it ends at the mastering stage. Each of the progressions along that are a development of what you started to do. So you

actually have a fairly clear idea of how this is going to sound at the end when you start it, because you've had the discussions with the artist and you've gone through all of those things; and for me, it's also rather important to include the management of the record company, because the worst thing you can do is to start a production and then deliver it to the record company and it wasn't quite what they were expecting.

BH: Yes, they have to be brought along.

TP: But it's become more and more difficult to have that conversation with the record company. Because they are marketing people they are in the business of throwing shit at the wall and seeing what sticks. From their point of view they'll sort the problems out at the end because they think that technology can do that. That's a point at which one's engineering and creative engineering knowledge suddenly rubs up against somebody who has no knowledge of the product at all. You're really saying to them, from a creative point of view and an engineering point of view and a construction point of view, it's not a good idea to head in to this without some reasonable idea of what the outcome is going to be. From their point of view they think that technology can solve anything.

JW: So they think that the final product magically emerges from chaos but actually they're missing the point that it's the interventions of the people that are making the recording that allow that emergence to happen?

TP: Well you even have it from musicians as well. An analysis that I've had to make, especially working in jazz circles is the difference between the jazz musicians of the past, who were at one with their instrument and their music, they did the music, you did the recording. Now you get young jazz musicians who expect you to be able to lift the solo from that take and put it into that take even though there's leakage because they know there are ways that you can pull that around. They expect to not have to play it all in one go and so on. So the expectation there is that technology will, once again, make up for, sometimes massive deficiencies in their own skill base.

TF: They may not even bother to prepare because they know you can sort it out. But it's the not the same. If the stuff sticks to the saucepan when you're cooking you can do certain repairing but it's not what you wanted it to be.

BH: I think this is a fundamental change in the way our industry is working technologically. Previously, before the advent of multichannel digital workstations and the amount of manipulation that you can perform after the recording. Previously you got what you were given: you could a certain amount and the skill of the engineer was to make sure you could actually do that, you could actually record on to multiple tracks and you could get a good, representative recording at all. Nowadays I think it's much more about managing expectation. It's about managing what you'll allow people to do. From a technological point of view we've never been more able to do more. So we can

do everything now: we can change the pitch of stuff, we can change the timing of it, we can make whole sections of one song work with another.

TF: Yes, if the basses are late I can grab them and move along the timeline.

BH: But the thing I find with my job, that makes it a lot easier is I'm a complete Nazi about it I won't let anybody do anything.

TF: Well I'm a Nazi about it because I do a lot of telly now and when you're doing a video you can say with your hand on your heart "I'm sorry, I can't do that amount of editing because if it's somebody playing the piano how can I possibly change it dramatically because you'll see that the fingers aren't working! If you have singers singing, it doesn't work. You can't keep cutting to a wide shot or, like the BBC, to a lighting fitting which is what they do at the Albert Hall.

TP: There's a friend of mine, one of his main jobs is as a Pro Tools vocal editor for a very well-known pop singer who did a large outside festival recording. This guy said he started doing his usual thing of auto-tuning and re-timing and all the rest, but doing just while listening to the vocal and then plonked it back into the rest and suddenly realised "oh dear! That's so far away".

TF: It's Photoshop syndrome isn't it? But if it's out of focus, or it's noisy there's nothing you can do about that. There is too much emphasis now on post production. There's a lady called Sue Tomes, a very fine pianist who does a lot of accompaniment work. She's written an autobiography. she's written in there that her worst moment was when she was doing Schubert B-flat trio with the Florestans. I was on the sessions, I was the engineer. She said that the most disheartening thing was that they played for two hours, just the first movement and she said to the producer "how's it going?" and he said "I think we've got the first eight bars". He wanted it to be completely together, and who wants music to not be together or out of tune? But, even after doing that many takes, maybe forty takes of the same bars it's still not perfect and if he'd gone back to take two and just lived with it, musically it would have worked because the thing's got some lift and some run to it. It's very easy now for people to be OCD and there're a lot more OCD people in the box.

BH: I think that's a fundamental misunderstanding of music.

TF: Music has got to be shaped, it's on a time line and you must remove howlers, if you're doing Bruckner 4 and the horn player falls off you have a duty to him and to Bruckner and to the people buying it, you have to fix it otherwise it's not fair but when it comes to pissing around a bar at a time I just think that is such a waste of time. You listen to it and it sounds like a sewing machine – it doesn't sound like music.

BH: There's a terrible thing in rock and pop music nowadays about the concept of in time and in tune, and the concept is entirely based around Pro Tools. People think that things are in time if they're 'on the grid' in Pro Tools, and things are in tune if Autotune says they are. I don't work with these producers any more because I'm a producer myself now – but the reason I wear glasses now is because I used to spend hours staring at a computer screen putting drums on grids and making them sound worse, and putting bass and vocals through Autotune and removing any sense of performance.

TF: There's a story of Lorin Maazel's, an American conductor, years ago he was at Cleveland and they were doing Porgy and Bess, for CBS I presume. Now there's a lot of jazz in that, and jazz groups within the opera. They kept on and on re-doing it because it wasn't together and in the end the bass player said "that ain't not together, that's jazz!". And a lot of that is true in music, things can be a tiny bit late or a tiny bit early: that's called phrasing and isn't it lovely!

BH: I had a very long row with a very well known producer, who is an excellent producer and has done an awful lot of big records. I was engineering and programming for him and he had me recording a band. We spent hours recording the drums and the bass and to get the drummer in time we'd programmed a drum machine. I programmed up a little Roland drum machine with a groove that the drummer would play along to that was similar to the groove he played but it had a kind of swing to it, a sort of feel to it that we felt fitted the sound of the drums. The drummer played with this template very well – he was a very good drummer. I was fixing some edits between takes, fairly early on in the life of Pro Tools. I had the drum machine on one track and you could see the bass and snare drums on other tracks; I was fixing an edit, doing a crossfade or something like that, so I had zoomed in fairly close, closer than I would do normally, and he was looking over my shoulder saying "that snare drum's out of time". I said "no it's not" and I zoomed out and played it to him and asked "which one?". "Well zoom back in again and I'll show you", "well, no, you've got to hear it", "but I can see that it's off the grid, it's not on the line". I said "I'm going to zoom in on the drum machine and the drum machine isn't on the grid. The drum machine moves around, it's a piece of electrical equipment, it has a feel. It's different to the feel that Pro Tools thinks that it has on its mechnical grid. You're not going to start telling me that the drum machine is out of time, because it's a machine". It's a fundamental misunderstanding of the way that performance works. He would have me remove all the feel of both the drum machine and the drummer and make it feel like someone else. It's just a different feel, and if you wanted that feel I could have done that straight away.

TF: You're talking about the concept of service. In our job we are at the service of the music and the performers and we have to have an eye to where it's going to go in the end, but we're not there for our own agenda really.
BH: Absolutely. But when somebody is insistent on undermining the quality of the performance or the quality of recording, then you always feel that you have a duty to tell them that.

TF: I've been on sessions where one lady producer, who was very mouthy, got an earful from the conductor and he ended up kicking the talkback loudspeaker in and smashing the phone and smashing the red light so that he didn't have to have anything to do with her. He came in and told me that he was just going to do a run-through , we were doing a complete film score for a film scores album - not a picture, could i record that and then a complete take and then he'd come and listen on headphones without the producer. They get sick of this intrusion. If you're a conductor you have to have an ego, that's your job. You want them to have an ego because that's what they do. If you're an engineer you have to know whether you're Jeeves or Wooster. You can steer and you can be helpful but in the end it is their show and not yours.

BH: It comes back to that line that we were talking about earlier between the desires of the performer and the producer and the desires of the technology.

TF: That's probably where we are different from other kinds of engineer because if you're an aviation engineer you're not dealing with creative egos .

BH: Nobody's going to start telling you it should be flying differently.

TP: On the other hand perhaps we're still like the pioneering aviators who would go up in something that could just about fly and keep it in the air, no matter what. That's one of the attractions that I always convey to students about it. If you're happy to come into this career on the understanding that it's going to be something of a rollercoaster ride...

TF: ...the problem is now that there are too many safety nets in post production that they immediately start from the concept that they couldn't fall over. In the same way that Bob Diamond knows that Barclays couldn't be allowed to fail. It changed the ground rules for him because he knew he couldn't be wound up and he couldn't get into trouble and he was still going to get his bonus. So it's more dangerous for us because there are so many apparent options for tidying it up later, but musically you won't. If you've got a jazz group and you make them play the same piece eleven times, four bars at a time, it's not going to sound like any performance you'd ever want to listen to live.

BH: I think there's a legacy issue as well in that, I think it's different in the world of classical recording because people actually care about the quality of the recording, a lot of people in the pop world don't care about the quality of the recording.

TF: They just want to be loud.

TP: I'd dispute that actually.

BH: Well, I'm not saying everyone, but in my experience it can be the case.

TF: Does Lady Gaga worry about vocal quality? I've never met her but I imagine that she does. I don't know. I've never met her, I've never done anything with her.

TP: It's the other end of the chain. I have a greater respect for consumers. I think people consume music because they want to consume music and they will tend to do that , regardless of the quality because it's the music that they're after. However most people that I've tried a comparison with can tell the difference between an mp3 and a CD. There was a story, it maybe apocryphal – I'm not sure, they set up in one of the Apple stores two identical boxes, one that was playing mp3s and another that was playing a CD of the same piece of music with the same pair of headphones. Everything was identical and they asked people walking past "tell us which one you prefer" and everybody preferred the CD, not one person preferred the mp3.

TF: You're right punters can hear it. We were in Walthamstow when I got my first twenty four bit recording and playback system and I was thinking about whether we needed to use noise shaping or flat dither or truncation – you know, really boring engineering talk but these are important questions because if you do truncate there's no issue of buggering around with clocks and getting jitter but it does things to the sound and it's a matter of how important that is, whether the noise in the signal is enough to cover it up or if that's a specious argument or not. I was sitting in that little back room in Walthamstow, which is a horrible room which is used for catering, with a pair of quads, nice duke power amps, pair of DCS converters and a black box from Meridian which was a redithering thing, 618, you could truncate 24, 22, 20, 18, 16 and you could do different kinds of dither: noise-shaped, flat, etc. I was sitting there listening to stuff we'd done the previous day, Beethoven 4 that we'd done with Previn and the RPO, I was listening for my own satisfaction really to see what I thought and one of the cleaners knocking around and I used to work a lot in Walthamstow in those days so I said "do you want to come and have a listen to something" and I set up something so that you could hear truncation to 16 bit or with flat noise dithered to 16 bit and he spotted it 100 %. Which is fascinating, that he spotted it but the producer wouldn't have spotted it and most critics wouldn't have spotted it because they have their own issues that blind them or deafen them from hearing that.

BH: Absolutely and my comment wasn't aimed at consumers. I think they can really hear the difference between recordings and the quality of recordings. My issue is more with the practitioners. I have a studio in south London which we run commercially and I do a lot of my recordings in, and I am constantly amazed at the fact that, it's set-up to run a Pro Tools HD rig at 96 kHz, 24 bit which on a multitrack basis is pretty good, I'm pretty much the only person in there who uses 96 kHz. I would say 40% of the engineers and producers who come through use 48 kHz 24 bit and 60%, the majority, use 44.1 kHz. Just because they can't be bothered.

TP: I don't know, I think I'd take issue with that. I use 48 kHz 24 bit all the time, simply because I know that when I get to the mix, that running a mix at 96 kHz 24 bit is going to

be very difficult to do. It's going to need a lot more power to run it, more power than I might have available on the rig. I've had some fairly big rigs, in fact I did this remix of an Antononio Forcioni album and we did that at 192 kHz 24 bit...

TF: it sounds nice doesn't it? We do a lot at 192 kHz. It's fabulous.

BH: I think the difference is large and I specifically changed the way that I work so that I can do it at 96 kHz. Most of the stuff I get sent to mix is recorded at 44.1, usually badly, and I, over multiple tracks with no artistic decisions made so you'll always get a drumkit that's been recorded up to 24 channels.

TF: I think that's another definition of a serious recording engineer is that you're always looking to make it better.

BH: Yes, and if you're a serious recording engineer you know that concise is always better. As you were saying, the more data you put through a computer the less chance there is of it sounding good. In the same way that if you record everything on to tape with all the needles in the red, you're going to back yourself into a corner. If you're recording a drum kit on to twenty four channels you know that you're going to have to bounce that down at some point and if you don't do it at source and make a decision about to make it sound good enough, with enough possibilities for variation, then you're always going to be lumbering somebody else with the problem of doing it and keeping the integrity of the sound.

TP: This 'integrity of the sound' I think is an important factor because, first of all, there's this ridiculous idea that if it's digital you can't damage it. To go back to the 96 kHz issue, one of the problems that I have with that is that there are not that many plugins that work effectively at 96 kHz, so when you're working within the box you're not staying at 96 kHz anyway.

BH: I take the same view with that as I do with allowing people to do too much editing. If you put a plugin in and it instantly makes things sound worse then don't put the plugin in. In the same way that it used to be considered a good mix if it had hardly any EQs in.

TF: One of the things I like about plugins is that, if you've got a producer that you don't like very much, if you put a plugin in it often puts a second in the loop and so when they use the talk back they can hear (hear) themselves (selves) coming back (back) and that shuts them up, it's wonderful! A lot of those plugins do put quite a lot of latency in.

TP: Yes, and I think that one of the problems with using workstations is that quite often the degradation in the sound occurs as little bits that chip away, that you don't notice over a longish period of time. With analogue it was better in one respect, because every time you got a degradation it was something you noticed and you had to work really hard to minimise the degradation, so you were setup the other way around: this was the

technical challenge that you had to face all of the time. One of the things that the guy I do my mastering with, Ray Staff, and I have spent a long time going through various delivery systems. I discovered at one point, completely by accident this thing about interleaved and non-interleaved and the substantial difference between them, even though you can take these signals and flip one against the other and they cancel out 100% so, theoretically, they are bit for bit accurate but they don't sound the same according to the tests that we've done. Sending something via Digidelivery, it doesn't sound the same but it's bit for bit accurate with the one from your hard drive. It even comes down to two different hard drives. When I did this 192/24 for the Naim label, which was specifically for them to use to sell to their punters who had got their beautiful distribution network, and their 192 full-blown system, with the separate pre-amp and the separate power supplies, sounds like the most wonderful thing in the world - the detail is just incredible – but we found playing off of two different USB sticks sounded different!

BH: But they also one of the best ways of delivering it, because they're solid state, don't use error correction etc.

TP: Well, possibly, but we had two different USB sticks that sounded different. All of a sudden you come into an area of engineering that isn't actually being addressed by the people that ought to be addressing it, the real hardcore engineers because the only answer that they've ever come up with is that if it's bit for bit accurate then what more can they do?

JW: There's a difficulty there because in a lot of the experiments that they've tried to design – and it may be that the experiments themselves are flawed – but there's the classic one in the AES journal a few years ago.

TF: The Marsden paper?

JW: Yes, where they had put an HHB CD-R in parallel with the output of an SACD player.

TF: That was fundamentally flawed as a test method. I really have no confidence in ABX listening tests.

JW: Yes, that was what they had used.

TF: The first time I heard ABX used in a big was when they were trying to introduce watermarking. I went to a whole load of listening tests where 'A' was with watermarking, 'B' was without watermarking and 'X' you were asked to state whether you thought it was the same as 'A' or 'B'. The problem is that listening like that is not quite the same as sitting down and listening to Mahler Five. If you listened to Mahler Five at 192 kHz for half an hour and then you switched over to an mp3 at 44.1 kHz and 90 kbps delivery, you would think "shit what's happened? Have I got a cold? Am I going

deaf?" But on an ABX these differences are very small and lot of these tests are done this way, it's used as a way to let things through and I don't care for it all and I've been involved in lots of listening tests.

TP: It's also about the question you ask. I'm not sure if it's true, but there is a story about Rupert Neve being played four or five different pieces of the same music by a Japanese company and he was asked, basically, if he could hear a difference between them and he said "no, I can't, but that one made me feel better than any of the others" and the one that made him feel better was the one that was full-band, no filtering whatsoever, going up as high as it possibly could and as low as it possibly could. All of the others were filtered to varying degrees. They were still wav files, they hadn't been compressed but they were filtered in the same way that an mp3 would be filtered. So this idea that "you can't hear anything above 20 kHz, take it or leave it"...

TF:...well you can't via ABX, but when you listen to it then something has air around it, something has harmonics and the other thing is dead as mud.

BH: I think that this is a fundamental problem that audio delivery and recording systems have, and it's become a problem since the dawn of digital technology.

TF: Yes because the degradation isn't as you would get if you made a cassette copy, where you'd hear the compression and the hiss.

BH: I think it's a measurement thing. The standard for measuring the quality of an audio recording/reproduction system is bandwidth and signal to noise ratio, which is far too blunt a tool. You can listen to something as an mp3, which has a reasonable signal to noise ratio and theoretically has a reasonable bandwidth, and you can compare that with something that has been recorded onto cassette which has a much worse bandwidth, much worse signal to noise ratio but, as a delivery system, will sound much better I would argue. As a piece of music, something that you will want to listen to it will be much better. The reasons for that are that the transients will be intact, there's no jitter, the quality of the sound isn't constantly varying.

TF: The timing as well.

BH: The timing between tracks is consistent – that's a problem with have with digital workstations.

TF: Well it's worse than that. Five years ago I did a job for EMI Korea of Beethoven 'cello sonatas, just cello and piano. For reasons of convenience we recorded it in London, the pianist lived in Berlin and the cellist lived in Korea. To save time I was YouSendIt-ing them mp3 files and they kept on coming back with queries about ensemble. They would say "I'm sure we played that more together". They weren't being obsessive about it, I would go back to the master and it was fine. In the end I had to send them wav files

which took a lot longer to send but it was together when it was wav files but it wasn't together when it was mp3.

.....

BH: I think what's holding us back is until we have a recognised way of measuring the timing variations in music delivery.

TF: We're still measuring the way we used to measure an A80.

BH: Exactly, which is completely irrelevant.

TF: Yup, like you're talking about bandwidth and noise, that's the way you'd measure an AM transmitter and it's very relevant to that, but it's not relevant to an A to D converter.

BH: I think if somebody could come up with a decent way of measuring it, you'd soon start to see what systems work well and what systems don't.

TP: Well what this comes down to, which is very pertinent to this discussion, and I have banged on about this as have colleagues from the MPG, is that there is not enough research. Those of us who are practitioners have got lots and lots of areas that we think ought to be researched, and it's no being done because you get various organisations that look into the slightly more abstract areas of production and what makes a hit record etc. There're loads and loads of people doing their PhDs on that. What we need is some people doing some significant research on digital audio and the manipulation of digital audio and all of these things that we're talking about here: delivery of audio etc.

BH: This is fundamental to our work, absolutely fundamental.

TP: We wanted to do a research project on the potential harm that mp3 files could create, because they are compressed audio there is a tendency on walkmans for people to push the level up further than they would otherwise. Because it's compressed, the increase you get for a much louder increase in sound pressure is less.

TF: You've got a whole community of people who listen too loud. A lot of the stuff I do in the Albert Hall, there's so much coming out of the PA system that you can hardly hear the live sound. We do videos for DVDs of the Schools' Proms because there's a good market for that, all of the mums and dads and aunties and uncles and friends. When we did Hertfordshire they had a rock group from one school, Watford or St Albans, and then the whole orchestra, a huge orchestra, came in and did Mars and Jupiter from The Planets. Looking at the meters, the rock group of four people were 6 dB louder than the orchestra playing *Mars*. Which is quite a concept, we're so insensitive now, there's a generation of people who are deafening themselves.

BH: Also the way that music dissemination has gone is that record companies expect things to be louder than other things in order to get attention. In reality, as we all know, if you do a recording which is really good, it sounds great and the integrity of the sound in that recording is very consistent and it's a simple recording where you can hear everything it, then that sounds fantastic. You can listen to it anywhere, you can listen to it on the radio, you can listen to it as an mp3, you can listen to it anywhere and it will always sound good because the frequency make-up of that recording hits your ears in the right way so that you hear it well. That's being overlooked by the fact that now you just distort things and compress them to the point where they're so loud that...

TF:...everything's bold and underlined

BH: Yes, so you've got far too much low frequency, far too much high frequency, nothing really going on in the middle and the instrumentation's wrong but if you put enough distortion on it it will attract attention, but you won't want to listen to it more than twice.

TF: It would be like a conversation with John Prescott wouldn't it?

BH: If you give people music and you say "this is great music it's really loud" they'll say "yes, it's very exciting and they'll listen to it once or maybe twice and they probably won't buy it because they've listened to it twice and that's enough and they don't really want to have it in their house. Whereas if you give them a recording which isn't over-distorted and over-compressed and too loud and painful to their ears, then the first time they hear it they say "oh, that's quite interesting", the second time "actually, I quite like that" and the third and fourth time they might actually want to go and buy it.

TF: Because it sounds different every time.

TP: It's also about the environment in which people consume music. Something I quite often do in response to lay people asking "are mp3s any good?" is a demonstration where I put a mp3 on their stereo and say "OK, you turn it down until it's at a level where you're quite comfortable to talk over the top of that, and see where it goes to". Generally speaking people can't turn it down enough because it's almost like having the loudness button in.

TF: Yes, it's annoying.

TP: It's always there, and then you put the CD on and say "OK, do the same" and then, if they've got a turntable, you put the vinyl on and all of a sudden they find that they can have the music on at a very pleasant level in the room and still have a conversation over the top. When people are listening just in their own personal environment these things aren't nearly so evident.

BH: I think that maybe this is something that we need to grasp as engineers in audio. My fear is that there has been a slide in audio engineering for a long time, the amount of sales has been dropping hugely, and if we don't address it and find a way to explain to people that this is wrong.

TF: If you look at companies making money out of this now you have to look to people like BT and Apple. It's ISPs, these people aren't anything to do with music or music technology.

TP: Well, music sales aren't actually going down, sales of CDs are not going down either. It's just that the only sales of CDs that are counted are the ones that go through record companies. In fact artists are selling vast numbers of CDs, there are vast numbers of CDs being sold directly.

BH: There's a huge desire for music, there's probably a greater desire for music now than there ever has been.

TF: There's certainly more people listening to classical music then before.

BH: Everybody has the technology to listen to music. When I was young I had a hifi, maybe another of my friends had a hifi but nobody else did. They might have had a radio and that was it.

TP: There are so many bad practices. I'm not a great fan of Logic because it encourages bad practices amongst the people that use it, simply because of the way the thing is constructed. It's not a bad program it's just set-up in a particular way that Apple thought was best; but the bad practices go much deeper than that in terms of how people approach music and how they consume music. You take, for instance, the situation where if you've got a PC and you take a CD and rip it into the PC using the software that is normally provided for doing that, what you want to do is make a copy of the CD retaining the wav files as wav files or whatever they may be, the default position is that it rips it in as mp3s at a fairly low bit rate and it then makes a CD of the mp3s.

BH: If you plug an iPod or an iPhone into iTunes, if you haven't un-checked the box that says "convert all files to 128 kbps AACs" it will convert all of the files to 128 kbps AACs for you!

TP: The reason that they do it like that is, quite simply, because of people's short-term attention span. If they've got to sit there and wait for their computer to churn this through then they're not going to do that. There are ways around it – one of the ways round it that I tried to get record companies to adopt was to let us make enhanced CDs and put good quality mp3s on the CD with the wav files.

TF: 320 kbps?

TP: Yes, so that people didn't have to rip it, they didn't have to keep it in their computer all they would need to do is drag and drop onto their mp3 player.

BH: I've spoken to them about mastering specifically for mp3s. Bearing in mind that pop music now is pretty much entirely listened to on mp3s, I've spoken to mastering engineers and said "If I gave you these mixes and said could you master this for mp3, or CD or vinyl would you do it differently?" and they've all said yes, but we're not given the option[1].

TP: We (MPG) had this conversation with the Fraunhofer institute some time ago about mp3s and the big problem is that all the big companies use different algorithms so iTunes uses a different algorithm from Orchard and so on. So it's very difficult to know what it's going to sound like using the different algorithms. Fraunhofer had come up with the idea that it might be good if you could drop your mixes into different algorithms to check them, but they'd come up with it in a way that wasn't a real-time process. We said "we think it's a great idea but the way that it ought to be done is with a plug-in" but they didn't know how to go about achieving that, so we ended up introducing them to Sonox. Between Sonox and Fraunhofer, with us sitting in the middle doing various tests, there is now a plugin which enables you to preview your mastering through any of the algorithms.

TF: But why do we still need to use mp3? People are no downloading and streaming video which are much bigger files.

BH: I agree, I think mp3 is a blip.

TF: It's the 'piss in the soup' principle. The whole design of it was "how much can you piss in the soup before the customers send it back?" and that's where the mp3 level has been set. That's not a sound engineering principle and I'm sure that's not what they consider to be a sound engineering principle at the Royal Academy: "we'll build a bridge as badly as possible and we'll just hope that a big bus doesn't go over it". That's the wrong way to come at the problem.

TP: When you're faced with a problem and good engineering approach is to try to minimise the compromise.

TF: But it would be nice to get rid of the compromise now.

[1] Since the discussion Ben Hillier has provided the following update: "Labels will now accept different masters for mp3s, although it's not as a common a practice as it should be, but it is done so that comment is no longer correct."

TP: Yes, it would be and to that end we're working with the EBU and the AES for the inclusion of metadata in a broadcast wav file as the standard configuration for it so that credits and everything else will go in there. That's potentially then a tracking device.

TF: Well it's much better than watermarking then because it doesn't bugger up the music.

TP: The point about that is that it then encourages the use of a wav file for musical dissemination.

BH: There are well credited rumours that before Steve Jobs dies Apple were working on Apple HD.

TF: I've delivered ten 96 kHz masters to them. They can't go above 96 kHz because legacy technology that Apple produced in past can't reproduce anything above 96 kHz. So I've been resampling all of stuff down to it, because all the LSO stuff we did since 1998 was done at 176 kHz and it sounds fabulous, but it was only ever put out as CD or on iTunes. Suddenly, about six months ago I got these emails saying that they wanted 96 kHz masters and we've gone back over all of the archive material. But it's still compressed and so comprised in a way that I think is now unnecessary because the amount of data that you're moving around is quite manageable.

JW: So you were talking about the need to do proper research and you said that audio engineering is in danger of sliding away. You've also said that you can do AB comparisons but if you're listening to a ten second excerpts and then trying spot the difference between that and another ten second excerpt that is nothing like the experience of sitting down in your favourite armchair with a cup of a tea and losing yourself in that listening experience. So given those things, what needs to happen?

BH: I think we need a measurement standard.

TF: What would be nice would be some kind of 'body', there always used to be 'bodies' that set standards. Whether it was the BBC or Decca or EMI there was a sort of *de facto* standard and in video there were people like Sony and Ikegami who had certain standards about how cameras were made and they would talk to NHK and BBC and whatever. But this is so spread all over the place now, it would have been nice if the AES had been able to step up and act as a standards organisation but in practice it isn't.

TP: That's why I keep referring to things that we're trying to do with the Music Producers Guild. The latest set of standards that we've been talking about is QC for mastering, to try and establish a set QC procedure for mastering to make sure that all the people who should take responsibility take responsibility and that includes the artist and it includes the record label so that you don't get any of these major manufacturing errors and there's a way of comparing the DDP that you send out with what you get

back from the factory afterwards. It's kind of being left to us to forge a way forwards with this and it's generally very well accepted but the credibility of the engineering and quality assurance part of the what we do is very difficult to thrust through without something coming back from what you might call the more formal part of the community.

TF: Well there's nothing like plane crash records are there? If someone puts out a CD and it's dodgy then people may stop buying it or they might not, it's much more random and nobody dies.

JW: Going back to the listening test discussion there may well be a disconnect at the moment between the people who are actually recording the music, and who are saying there are audible differences between these things, and the people that are making this stuff, and I use this guy because he's someone who's made a name for himself by standing on the parapet and saying "there's nothing in higher sampling rates", there are the John Watkinson's of this world who are "I understand how this bit of kit works from the bottom up".

TF: But he's never had to work with a musician has he?

JW: Well, exactly and that's what strikes me as interesting about recording engineering, as opposed to audio engineering, is that you're listening to audio in different ways.

BH: There's a disconnect between the people who are writing the software as well I think. I've talked to a particular DAW company and said "why does version *x* sound much worse than version *y*?" and they say "oh no, it sounds much better" and I say "no, it definitely sounds worse, there's far more jitter there are far more timing issues between different tracks, and I can add a track on and it will affect the sound of the whole project" and they say "oh no, no, that doesn't happen".

JW: It sounds like there is another set of tools that you need then.

TF: That's not completely new because I can remember when I first came into the business having to listen to test pressings. You do a nice recording of a piano, edit it all up, get it approved by the artist, send it off. I'd go up to Pye, where I used to do all my cutting, with Malcom Davis or Tony Bridge or Brown. They would do a lovely job and then what would come wouldn't sound anything like we'd delivered. So there are just different changes that happen now. We think we can much more clever about them now because they're digital and they're easy to measure, but we're still not measuring the right things. I've got a number of friends in the audiophile business, I don't consider myself an audiophile, but for historical reasons I've got friends in hifi mags and things like that. There's a guy called Martin Colloms who writes a lot, used to do Hifi News and various American ones and has his own called Hifi critic. What I find consistently is that when I take CDs round to his house, they don't sound like I thought they would. When I

take a hard disk recorder and play the material from that through the same DAC it suddenly sounds right again and I'd love to know what's going on. I know CD is not a completely transparent process: you've got EFM coding, you've got jitter, there's a lot things going on but they're not easy to measure at all, unless there are gross errors and then you can spot them.

BH: This is what I'm saying. If we hadn't had measurements of signal to noise and bandwidth to compare cassette and reel to reel and vinyl then I think there would have been arguments about which was the best. Nowadays we don't have any method of measuring the quality, or lack thereof, of this technology.

TF: So I feel that the AES has let us down, but maybe I just have artificial expectations.

TP: Well, that's why they're called the Artificial Expectation Society!

TF: But there is no body that defines these things, apart from within NHK: there's a few people there who care and are very fussy and do lots of measurements.

TP: I think you're absolutely right. It's always dangerous to get into the area of "better". I think that is a word that I'd like to eradicate from the language because it tends to be with music or art, "what you prefer".

BH: It's a lack of degradation that you want, you want something that is less messed up.

TP: It's getting people who have the time, the expertise, the equipment and the space to start looking into these things. There are plenty of questions we have. There are always going to be two ends of the engineering spectrum: the engineers who operate stuff and the engineers who make it and make it better. The engineers who operate have moved forwards quite dramatically along the technological timeline but I don't think that the people who have been making the kit have been quite keeping up with us. Certainly those people who ought to be researching and coming up with new ways, new ideas and new concepts for audio have not being doing that. Whether that's because research budgets go on more lucrative or sexier things...

TF:...well they go where the money is.

JW: But you take somebody like Ray Dolby who wrote an article in the AES Journal ten or fifteen years ago saying "it's all been done, we can relax now and know that all of the major problems in audio have been solved". So as you're putting the finishing touches to a research proposal to the EPSRC asking for, say, £200k to research something in this area properly, this kind of statement makes things difficult. It's becoming harder to make the case for audio because lots of people turn round and say "but it sounds alright doesn't it?". As you've have been discussing there may still be issues to resolve but it's finding a way of making the case.

TF: Audibility of filters is a very big issue because the whole Dolby system - Dolby A, Dolby B etc. - completely depended on filters, that's how it worked and a lot of people, particularly some of the old time Decca engineers and EMI engineers said they hated Dolby systems because they buggered up the stereo and buggered up the ambience.

BH: Yes, it's hugely audible. Dolby always was.

TF: I don't think there's been enough work done on the audibility of filters. A lot of measurement systems have to use filters, that's how they work and so they are deaf to that problem. If you compare 192 with 44.1 there are a number of factors and one of those is the filters are soft and droopy around 90 kHz it's very different from 100 dB per octave at 21 kHz and you can hear it: it makes the sound congested, it's like you've got a heavy cold. There are default filters that everybody just assumes they've got to use. You know, you're in Audition or whatever it is that you're using and you say "I want a 44 kHz output please" because it's going off to the CD factory. Who bothers to listen to it in the expectation that it's going to be qualitatively, significantly degraded? If you use different filters and different strategies you can actually rescue much more of it, there can be a lot less damage.

TP: When we were recording on sixteen track machines at 15 inches per second with BASF LGR 30 tape we had an idea of what was going to go wrong, so a large proportion of what we did was to reduce the compromises as much as possible.

TF: pre-condition in other words.

TP: Yes, so you would do some things that were good engineering and some things that were bad engineering to get around the problems that you knew you were facing. So you would make the best that you could out of something that was, on the face of it, in pure engineering terms a pretty dodgy format. In a way I'd still apply that same principle. So, in a way, with regard to 96 kHz and so forth, you'd be better doing your session at 44.1 kHz and 16 bits because that's how it's going to end up and if you're listening all the way down the chain to that, you're going to get the best possible result, because you're going to be able to come up with some ways to negate the compromises.

BH: I think that works differently when you're multi-tracking. The quality of each track in the multi-track I think is a different thing to quality of the delivery medium.

TP: Well, of course, but then one of the things that I think is most frightful is the number of people who still use mixing 'in the box', bouncing within systems like Pro Tools. Then all you're really doing is you're expecting all of the mathematics to work within the box and nine times out of ten it doesn't. I don't see why we've thrown out of the way this

idea that you have a mix machine. From my point of view the best scenario would be to record at 48 kHz, 24 bit and then mix out onto a 96/24 or 192/24.

BH: Just a separate machine would be good!

TP: So that you're not bound by the same rates within and you can then take the best.

BH: Which brings me back to my comments about a particular DAW system, where you put a track into record and it changes the sound of the whole session, albeit subtly, and I don't use it any more because of that. The biggest problem in that area is that people don't have a particularly long view of what they're doing I think. Certainly a lot of younger producers, I find, have a very short-term view of what they're doing. They don't worry about legacy, they're not worried about their record selling in twenty years time or thirty years time, they don't really see that they're going to get royalties from it, they don't really see that they're going to have a back catalogue of stuff.

TP: They will do in twenty years time!

BH: They're making records, which in twenty years time, are going to sound terrible. They're making records for people to listen to as mp3s at the moment and one of them that I know who are a very big producer, are quite celebrated at the moment are quite happy to deliver masters as mp3s and they don't see a problem with that. They're like "what does it matter?" and I've said that in ten years time when mp3s have people just laughing at them, because emails will take up more data than that and everyone won't even notice the speed of an internet connection, their mixes will still sound like mp3s.

TF: It's funny that people are much more picky about pictures and video than they are about audio. I don't mean people like you and me because we are picky about it. You can't get away with using cruddy cameras which in low light are all mushy or out of focus because it's very obvious.

BH: People will happily spend £200 on a not particularly good sounding pair of headphones nowadays, but they will spend £200 and then spend all their time listening to mp3s through an iPhone. I think there is desire, people want to hear good music, they want to consume good sounding music. There's a real desire to do that, I just think that a lot of our industry is sorely letting them down.

JW: So you definitely wouldn't agree with Ray Dolby then?

BH: No, I think we're only just starting.

JW: So not all problems are solved, and perhaps Ray Dolby started some of them?

TF: Well, not everyone likes their steak rare but fussy recording engineers do tend to like their steaks rare because it's closer to the music (it's closer to the thing running round the field). Where there may be people out there who are happy with something that's been well done.

TP: The psychology of music comes into to it quite clearly though. People's affinity with music tends to be because of associations, so they music they like the best they associate with where they first heard it or in a particular set of circumstances. The music that will stay with them for longer is the music that they will associate with very key events in their life or performances that they've seen of that music that evoke certain memories. Their recognition of the music comes from a very different place to whether or not it sounds good. That's different to when people are enjoying music as a sensory experience.

BH: I agree with that, I also think that an issue that we have is because music is much more disposable, much more short term, people are now more used to listening to a much wider range of music for a much shorter period of time. So rather than getting one piece of music and listening to it over and over again, they will listen to many many pieces of music for a short period of time. That's great from an experiential point of view, you get to experience an awful lot of things but you're not really getting to connect with music in the same way.

TF: It's like when you do The Planets now, you might sell some CDs but if you look at the online sale of tracks it's all Mars and Jupiter, ten to one. Nobody gets Venus unless they're getting the whole lot. The problem with that is that the industry isn't set up for the funding to work for everybody.

TF: No the revenue isn't there if you're only selling two 99 cent tracks instead of a ten quid album.

BH: So if you're getting artists who are getting paid hardly anything for all their recordings because they're only selling two of the tracks off their albums for 79p a track, then their income from their recordings is so much less and so they don't want to spend so much time in the studio, they want to go on the road. It's fundamentally altered the balance.

TP: It's matter of keeping up a little bit with the way that that works because, again, there's this concept that the album is something that is so precious it has to be retained. Albums are a contrivance that came about rather than the original way of putting music out.

TF: 78s didn't play for long did they?

TP: I'm not hugely attached to the album but I like a period of time to work with an artist Having a week to work with an artist to do a song or two isn't great because unless you know the artist very well, developing a rapport and an interaction between the studio team and the artist is quite difficult over a short period of time like that.

TF: It's like them going to the dentist you mean?

BH: Yes, they turn up, play it and then go.

TP: Well yes but from an artist's point of view the music is something that they create over a period of time and it's part of a larger package of their interaction with their fans. I think in the classical world a lot of orchestras will go out and perform a repertoire of pieces that they know.

TF: The players won't have any choice in that, that will be set by managements but if you look at, say, the Festival Hall or Barbican programs for the next twelve months you'll see a lot of repetition and a lot of the same composers. A lot of Mahler, a lot of Shostakovitch.

BH: It's very hard to find stuff that's off the beaten track.

TF: They're a bit nervous of exploring. That's a much longer issue which is all to do with how orchestras are funded because at least half their money comes from the Arts Council or the Corporation of London or some particular sponsor who's got an agenda, and you have to go with the money because if you play in the LSO, for example, or the RPO you're not on a salary, you're freelance and you get paid for the work you do and that work that comes into the diary often comes with strings attached - if you were going to sponsor a concert in the Barbican next week you'd want to have some kind of input on what they were going to play. So they all have to play what's put in front of them and smile and do it. I've spent more of my life with orchestras than I have with audio engineers and it's a lot of fun, and a lot of their attitudes are very similar to ours in terms of excellence. A fiddle player will spend fifty thousand quid on a bow and they'll argue about what kind of strings to use. They'll say they've tried this fiddle or that fiddle and it's fascinating. There's a huge debate about flutes. I used to play the flute and I've been participating in this discussion about just flutes. There's one particular old flautist, William Bennett, who thinks that everybody should throw their flutes away and buy new ones with slightly different spacing of the holes so that they'll be in tune, but he hasn't worked out that if you pull the instrument out, because it's a hot day or a cold day then all the ratios will go wrong again. There are a lot of people out there who are just as picky as you are, and you are and I am. But they have to live with the fact that they're in a commune and a lot of things come between what they would like it to be and how it turns out the other end. In the end it's funny with us because we're dealing with the musicians right up to the waterfall and then it disappears and goes into Apple land and executive land and bullshit land, but at the every end the people who are

buying it want the music. There's a huge chasm in between that you don't tend to have so much in other forms of engineering. I keep on talking about planes, but the closest we've had recently is where Quantas decided they would start saving money on maintenance and doors started falling off. That's an example where executives got in the way and thought that they could make cuts. The same happened at Nat West because they decided to fire thousands of people who worked in their maintenance department because, it's bit like looking at the fire brigade "what are they doing? They're just sitting there playing cards! Let's fire them all" which is fine until there's a fire. In a way that's the same with our job, a lot of the time it doesn't look as if we're doing very much at all but if we weren't there things could be slightly different.

BH: I would argue that with pop music we're already at that stage. There's an awful lot of pop music that isn't made with any engineers or any engineering ability.

TF: Just autopilot.

BH: Yes.

JW: Going back to Logic...

BH...exactly!