



Science and society: Prof. Joe Sweeney

Alia Boda and Aikaterini Marnella

Prof. Joe Sweeney in conversation with members of the Biomedicine Society

The Biomedicine Society's Alia Boda (AB) and Aikaterini Marnella (AM) discuss overlaps between science, society and art through the lens of higher education in conversation of Prof. Joe Sweeney (JS), Dean of Science, Engineering and Environment.

AB: How have you settled at the University with your new role as the Dean of Science, Engineering and Environment?

JS: Oh well, I guess you should ask everyone else about that! From my point of view, I think I've settled in very well. I really enjoy the place. It's a big job, you know, I think we've got 371 staff and 5300 students, so there's a lot to do. I'm still finding my way around how things work. I've got a feel for the overview of the place and now I'm going to get down into the details, but so far I'm really enjoying it. It's an exciting place. I really like Salford, I like the geographical place, the staff are great, students are great. So yeah, really enjoying it.

AB: That's very nice to hear. We'd like to hear more about your journey to get to this point.

Aika: So looking back on your entire career, your scientific career, what would you describe as the weirdest but most wonderful moment?

JS: I'm predominantly a researcher, or was before. The wonderful moments in science for me are when you get things that work, like when you get a research idea and it works, but also when things work in a different way. So what I'm thinking of, is a time where we had one chemical reaction we wanted - I'm a chemist by training. We made molecules, so-called chiral molecules, which are often start points for drug substances, but we also had started making more functional molecules, including imaging agents. These are fluorescent compounds which can be used in cells and in vivo.

And you know, generally research is pretty straightforward. You have an idea. You try it out. You see what happens, and then you revise the idea and you try it again until it's better. And then you finally reach a point where you think it's not going to get any better. So you write the paper and do something else. We did a reaction which we were sure would work however it was something that wasn't done before. The reaction worked but it gave us something we weren't able to recognise. In order to look and identify organic compounds, we use Nuclear Magnetic Resonance (NMR), which we did in this case too. It was clearly one compound that had formed from this reaction but we couldn't work out what it was, and when I suddenly realized what it was, it was a completely different reaction to the one that we thought would take place, which is really cool.

And so you know, those moments, they are the kind of the best moments we and then we went in a completely different direction and the compounds fluorescent, so we couldn't work out what it was. And then as soon as we worked out what the compound was, everything fell into place and now we've made a

range of compounds that are fluorescent that we've used for imaging in cancer cells so that those kinds of serendipitous things they're really wonderful, I guess.

AM: That sounds very amazing and how long did it take you to figure it out?

JS: Oh, it took us a day to figure it out. It's like that Sherlock Holmes story isn't it, when if you've ruled out ideas wherever possible, whatever remains, however improbable, must be the truth.

AB: I'll ask you the third question now. So what is the most weird yet wonderful, so unusual research happening in the science, engineering and Environment Department?

JS: We have lots of wonderful stuff, so we have we have a wide range of research ranging from archaeology through acoustics, robotics and environmentally sustainable buildings. I'll tell you about some of the cool things that we're working on at the moment: We recently co-commissioned a piece of music which is premiered at the Bridgewater Hall with the BBC Philharmonic Orchestra in November.

I think it was November the 6th and on the back of that I met with Simon Webb, who's in charge of the BBC Philharmonic Orchestra. Then, we were saying to him, it would be really cool if we could get together more. I really believe that science and art should work closely together, where everything is about knowledge and culture. And so I said to him, what do you need in the way of science? What does orchestra need? And after a bit of conversation, the idea of pop up concert halls came out.

So this notion that because obviously Bridgewater Hall is a massive place and orchestras, are large organisations, and most people are 'man in the street'. I come from a council estate and I'm first in the family to attend University - I've never seen an orchestra until I left home. One of the things I was saying to him is, I'm very passionate about social mobility. And taking science out into shopping malls, schools, and so on. He then spoke about this idea of being able to take concert halls around, you know, move them around the country. And so we had a bit of a conversation and I hooked him up with one of our guys, Neil Currie, who works in the built-in environment departments.

We're going to try and work with Bridgewater Gardens, the RHS Gardens of Bridgewater to build a pop-up, repurpose-able concert hall. We don't know when it's going to happen yet. We don't know how it's going to happen, but it's those sort those sorts of cool things that I really like changing because one of the things I'm really keen on is making sure that everything we do in the school is really seen outside by what you might call ordinary people, you know taxpayers, and especially where we are in Salford, within area with low socioeconomic status. You know we've got Council estates everywhere. I want to make sure that these people understand what we're doing and see how it can affect our lives. So that's something that mind be called weird and unique.

A pop-up concert hall is a bit of a weird concept, but I think it's going to be really cool when we do it. So we've got experts in exactly the source materials that you need to re-purpose the building. And bear in mind we've got acoustics experts as well to get involved in the design of the building to make sure it's got proper acoustics for the orchestra and all these sorts of things that really define a musical experience. We think we can collaborate with BBC Philharmonic to bring classical music to anyone anywhere. So, that's pretty cool!

AB: I'm really looking forward to that.

AM: Yes, that sounds very cool because it seems that you want to make a wider positive impact.

JS: Sure, absolutely. I mean science is all about getting out into society. My notion is that science is about understanding the world around you, so you can do better things and make life better for people. So, and I think one of the things that is starting to be ignored a little in the modern climate for education is that the notion of culture and cultural education is just as important in scientific education and in my opinion, education shouldn't just be about preparing people for employment. It should be preparing people to think and then a happy coincidence is that they become more employable, if we train them in the right way. So,

knowledge to my mind is a valuable commodity in its own right and the association of knowledge with culture is really important. That's something that's very special to me.

AB: Yes, and I agree. As I come from a less privileged background, I completely agree that we don't usually get all the chances of the things that we want to do, and I think I'll these ideas are great.

JS: I think a lot of people out there that think they don't belong in these things. Meaning people think they can't get in, and Science and engineering something that's not relevant to them, or that classical music is something that has nothing to do with them. I think it's really important that we at least give people the chance to see these things, the chance to actually decide properly whether it's something they want to do, because there's talent everywhere. There is talent absolutely everywhere.

I think my job as Dean is to make sure the school works for all the students in it, that we deliver the best possible experience in terms of learning because learning changes lives. It definitely changed my life. You know, I went from a council estate in Liverpool to do a PhD in Oxford. I spent a year living in Switzerland, as well as a being society fellow and I'm Dean of the faculty. My job is to make sure that we change students' lives for the better, but it's also to make sure that every single person in the Salford area knows what we do and what we're about because it's important. I just want you to know I don't just see my job as being in charge of education and research, it's about making sure that Salford Sciences act a beacon for the local, national and global communities.

AB: It's very inspiring to hear about such a massive role! We read stories on inspiring leaders within the Biomedicine society, as part of our book club. Can you tell us - What is your favourite book and why?

JS: I can't. I haven't got a favourite book. I've got too many! One book that comes into my mind first of all, is Anna Karenin. So this book by Tolstoy, which is about it's about a woman trapped in a loveless marriage, who falls in love with someone. So it's a kind of routine story in many ways, but the writing is fantastic, and it's got a lot about women's rights movements in it, so that's the book that that immediately came into my mind.

I also really like the writing of George Orwell. George Orwell is in many ways is a hero of mine, and not only did I enjoy his writing, but also the way he wrote. Orwell, had this, I think it was six rules of writing. I don't if you've ever seen this, it's basically a list of how to write properly, which may sound kind of snotty(!) but actually I think it's perfect in what it says. Things like never use a complicated word when a simple one will do, and so on. I think it's just wonderful. All those novels, I mean the famous ones are 1984 and Animal Farm, but there's a bunch of other ones.

AM: That sounds amazing, I think it's also great to appreciate how the technicalities of skilful writing meet with the art of it. It leads us nicely onto our next question - What are your thoughts on the interface between science and art?

JS: So that's a really good question. I think there is an interface, and there always has been. If you look at a lot of structures, and also concepts in arts and culture, you know the concept of beauty is human beauty is based on things like Fibonacci numbers. So there's supposed to be the distance between the eyes and from hair to chin ratio is probably one of the finest and it's based on something called a Fibonacci number, which is a sequence of numbers. So art is pervaded with scientific phenomena and of course music is a great example of that.

All music is essentially a sequence of frequencies and how you can define that. And if you look at digital music, now we're in a situation where a piece of music actually is a number. It's just a series of ones and zeros, so there's always been measurements of science and art. I think in all aspects of performing arts, if you look at the way people dance, the way people move, the way people play music, then there are great scientific features which underpin that.

If you look at, for instance, the cadence of a piece of music, classical music - if the way you play classical music gives you a different piece of music unit, with contemporary music, it's pretty much always that the

same piece of music will be played the same build, but classical music, the way you play and the speed and the energy that you put in, which are all scientific things that we can measure, that lead to a different performance in terms of art. One of my favourite artists is Jackson Pollock. He let paint cans go from strings and let them go about, and the way a paint can goes when you push on a piece of string is defined by simple harmonic motion, which is a mathematical equation and so all these beautiful paints patterns that you generate are all caused essentially by maths and by physics.

I think knowing that, brings a whole new dimension to enjoying arts, the fact that you can see why something is pleasurable and why it stimulates you in a cultural way. A lot of TV adverts, the musical ranges in the mid-range of the frequency because that's the part that is most pleasurable - Certain frequencies are much more kindly received by the ear than others, and so knowing all these things, the experience is completely fascinating.

If you are a big fan of recorded music and you go hang out in the anechoic chamber and things like that you can really understand how the mathematical basis of sound underpins modern life. Have you ever been in an anechoic chamber?

AM: No.

AB: No.

JS: The anechoic chamber is filled with foam, and it's all precisely engineered to stop all reflections of sound. And when you take people in an anechoic chamber, it is the weirdest sensory deprivation and people can't do it for more than 5-10 minutes without feeling disoriented. And most people are unaware of that. Most people aren't aware of the fact that the effect that sound has on your life. So yeah, absolutely. The boundaries between science and art, and I don't think there are any boundaries, I think it's really important that we maintain the connections.

AB: We're having similar discussions in the BiomedSoc through our BioArt projects! Because time has flown by and we don't have much time left, we'll come to the last question: If you could say something to your past self as a student, what message would you leave for him?

JS: Be bold. Understands that what you're doing can help people's lives. And don't be afraid to stand up for knowledge for its own rights.

AM: That's very good advice.

AB: That's a very bold statement, yes.