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INTERVIEW WITH DR. AIDAN DUFFY

This is Yvonne Desmond in conversation with Dr. Aidan Duffy. The date is 4\textsuperscript{th} December 2012. It’s Wednesday and the venue is Kevin Street, DI.

(Y) Thank you, Aidan, for agreeing to this interview. You are a Civil Engineer by profession. Can I just ask you how you got started in your career?

(A) I suppose there were a number of different factors which resulted in me going for civil engineering. In fact, probably what I was originally most interested in doing when I was in school, was art or design. But my father is an engineer and I had grown up in a house with a big engineering ethos so I was constantly fixing things, mending things, putting things together, taking things apart and putting them back together again. My father would have been more inclined to have me doing a profession rather than something a bit more ‘arty. So I really enjoyed making things, always from an early age like Lego, Meccano and making all the electrical-circuitry things. I really enjoyed that. So engineering was a good compromise. It is very creative. I liked Maths, I was good at Maths, I always had an aptitude for Maths. So in fact, engineering, although it wouldn’t have been absolutely my first choice, it certainly has turned out to be a pretty interesting and creative choice.

(Y) It has changed so much I presume, even since you started, in a way.

(A) Well, yes, I remember my father handing me a slide rule. When I was at school calculators were just coming in so engineering has changed dramatically since I started. When I was younger, when I was just in my third year in college (I did Civil Engineering in Trinity), I was a kind of junior engineer-cum-draftsman in an office in London. Everything was done by hand, all the drawings were done by hand and ink. Everything was scratched out and all changes and amendments made out on the hard copy. There was no such thing as a soft copy and the talk then was of Autocad and the guys in the office were saying, (half of them were off doing courses in Autocad), and the other half were saying ‘there is no chance that this will ever catch on’. I wonder what has happened to them since? There were huge changes.

(Y) And did you enjoy your time in Trinity?

(A) Yes, Trinity was great. It was a four year course and the first two years are maths, maths, maths and science, and applied maths. There is a heavy emphasis on maths,. It was quite theoretical for the first two years and then you choose, you do two general years, but once I got to Civil Engineering, in particular, yes I really excelled. I really enjoyed that. My grades improved. If I am interested, I do well. If I am not, I don’t.
(Y) I think that applies to most of us, and your PhD, what was that on?

(A) I did it in Trinity. In my final year in Trinity I did work on structural analysis on historic buildings and I used some of the historical building in Trinity as a case study. So a lot of my research work was in the old library going through the old 17th century books. I found construction really, really interesting and I kind of married that with the theoretical side of things so it was quite an interesting subject to do. I did a lot of drawings of cross sections of historic building that were around the language of neo-classical architecture and things like that, very interesting. And then I worked very closely with a guy there who was the director of buildings. He looked after all the building stock in Trinity, a civil engineer called Tim Cooper who influenced me greatly I would say. He had just won some funding that was going to start the following year in what was then the equivalent of the European research funding, a thing called ‘Science and Technology for Environment Protection-the Next Step. That was the programme then and he asked me to join the team as a PhD researcher which I did. My supervisor was a guy called Professor Simon Perry, who was the Head of Civil Engineering in Trinity, a very dynamic, very effervescent kind of character and he died there - I can’t remember when, mid 2000 or so - and I stayed on in Trinity for a further four years. I enjoyed Trinity greatly, I really enjoyed research, I really loved my final year project and that love of research has always stayed with me.

(Y) And after the four years, what happened then?

(A) Well, during the four years, a lot of my work was doing my research for my PhD which was pretty much done on my own, well with some of my peers from the research project, but I rarely saw my researcher supervisor.

(Y) That is common enough

(A) But not in DIT I might add! As part of that, I was given more responsibilities; in fact what I ran as well during my last year or two in Trinity was the conservation programme in Trinity. My research for my PhD was to take a look at, despite the fact that urban air pollution is decreasing, the fact that building materials were deteriorating at accelerating rates and why was this? We looked into this. So, in fact it was due to the type of pollutant which is being produced now which is more from a diesel engine with a lot of catalysts involved. This results actually in higher reaction areas and higher reaction rates, quicker and faster reaction rates and results in the deterioration of these monuments. So we took a lot of this theory and applied it to the conservation from a very scientific perspective, the conservation of the buildings in Trinity. So we did a lot of work on what the mechanisms of deterioration were and we took a very hard scientific look, with geologists and environmental scientists and architects, at what were the best techniques for cleaning the stone without damaging the surface and leaving it open to further accelerated decay. So my job, during that time, during the end of my PhD, was to manage the programme of works for the conservation of the front of Trinity College.

(Y) Very important

(A) Very important, yes and also a fantastic opportunity. I worked with a fantastic contractor and we had some great art historians and architects working as part of the team. It was this multi-disciplinary team which, in fact, I think probably influenced part of my work thereafter. I met a number of other people who worked in the industry and they said why don’t we set up a consultancy in this area? There is very little of that, nobody has really taken this approach before and see if there was a market for it or not. In fact my wife was undertaking her Ph.D in Florence at the time, so I got to go off to Florence for the write-up of my Ph.D. I spent a year and a half in Florence.
From Florence, with a couple of other people, we set up our consultancy. It just shows how easy it is to do things internationally now. So myself and a colleague of mine, a guy called Peter Cox who is a specialist in building conservation, set up a consultancy called Carraig. A lot of our work was in the UK, so I would travel from Italy to the UK and he would travel from Dublin to the UK. Then things grew and became busier and I had to go home and base myself in Dublin. So I worked in Carraig from the completion of my PhD at the end of 1994 to about 1997/98. We worked on some really interesting projects. We were the conservation consultants for the Tate Gallery of Modern Art with architects Herzog & de Meuron. We worked on Lloyds Register of Shipping which was an incredible piece of architecture in the centre of London. We pioneered a technique called cathodic protection for early steel frame structures. We have an example of that at Gloucester Road Tube Station. We also worked on other Irish monuments as well, Cork Court House, and I can't remember the names of the others.

(Y) Do you think people take that seriously enough, the actual protection of building structures?

(A) Well, it is very interesting, I mean architects! We immediately got into a clash with the architectural profession because architects felt that this was their profession and that they knew everything there was to know about it and I completely accept that. Architects should probably be the people driving these projects given their knowledge of buildings and their knowledge of conservation and all the rest. But then my view is a very strong scientific knowledge needs to be brought to bear on this so that you basically don’t damage the fabric of the structure and that you extend its lifespan to the greatest extent possible. So to that extent I still don’t think that the profession has enough of a scientific input. I think there is an awful lot of, in my opinion – this is personal, architects who tend to shy away from scientific things and things that they don’t feel comfortable with- but not all of them to be fair. I have worked with lots of architects who are extremely open to this.

(Y) You would think that people would be happy to buy in that kind of expertise?

(A) No. I remember at the time, in Trinity, there was a lot of controversy, in fact letters to the Irish Times, about this. It was really serious and there were some very well known conservation architects who attacked our work. Trinity set up a committee, to deal with this and to investigate, which I had to report to and it was chaired by the Professor of Physics. This conservation architect came in and complained. He was asked what was his essential problem with the approach that we were taking for the conservation of these buildings after we had outlined from an architectural perspective, historical perspective, conservation perspective, and scientific perspective what we were doing. They could only focus on the scientific bit and they said that they were very uncomfortable with ‘chemical cocktails’ being thrown at these buildings of great importance and that they didn't like the use of chemicals at all on these buildings. The Professor of Physics then went on to point out that in fact these conservation architects themselves were using, and they were using many more things that this, at the very least water and sand blasting and that sand is a silicon dioxide and water is H₂O and that these were both chemicals as well. So I think there is a great lack of understanding of science which is a pity because I think it is very important.
(Y) And how did it make you feel to be in the middle of that controversy? It was new technology basically. Wasn’t it?

(A) Yes, it was very much a new understanding. How did it make me feel? Well frustrated, actually. I think engineers get very frustrated because our training is very logical and if we see that there is a very logical, rational, scientific, mathematical reason for something we find it very difficult to understand why somebody doesn’t adopt it. Engineers always have that problem.

(Y) I can understand that. So you moved into DIT then, is that right?

(A) Well, no. My career moved on. I didn’t join DIT until 2005. In 1997 this consultancy was trundling on. We employed about 5 or 6 people but it wasn’t ever going to grow anywhere from that and I will explain later why I tend to move job every so often. In 1997, I was then approached by somebody else who was doing a lot of work on low energy buildings and that kind of area. They were looking for somebody to basically head up a start-up consultancy and I agreed to do that. I became involved in the design of a number of green buildings, a green building in Manchester, a green building in Dublin which I would have contributed to but more peripherally.

(Y) So you moved from conservation into actually new builds?

(A) Yes, I suppose it was engineering consulting. It was an emerging area and there was a lot of research being done in that area at the time. I suppose I would have had a lot of research skills, so it didn’t bother me. I just found it like another interesting challenge. So we went on as well and did a lot of work and pioneered some of the first district heating systems up in Temple Ba. That would have been one of the first private district heating system in the country and it is powered by combined heat and power plant based in the Civic Offices. It provides electricity to the Civic Offices and heat to all of the buildings in the area so it doubles the efficiency and halves the CO2 emissions associated with building energy use in the area. We worked on a number of other projects both in Ireland and the UK in those themes.

So I worked at that until about 2001 and the business then basically moved from being a consultancy to being an asset management company. So it really got involved in combining the use of power and utility power plants. Then a big Irish utility, Bord Gáis Eireann, moved in and bought that over. At that stage I exited the company because it was a very messy take-over. And then, the first time really being employed by somebody else, I became a managing director of another consulting group in risk management which was a completely different area again.

(Y) That is a leap!

(A) It wasn’t really. In the meantime, I had done an MBA as well because you need an understanding of business, and business processes. A lot of the work was in the engineering field anyway. I had a lot of site experience, design office experience and that kind of thing, so, no, it wasn’t a huge leap really. It was a big leap culturally for me to go from being self employed to working for a global corporate and being managing director of this small consulting firm, 15 consultants, based in Dublin. We mainly worked in Ireland but also a bit in the UK and there was a very strict reporting structure reporting - financial reporting, quarterly, monthly, quarterly, annual reporting.

(Y) There would have been no flexibility there.
(A) And just completely revenue driven. So I had gone from an ‘ideas driven’ to this ‘revenue’ driven organisation. My first challenge was to organise the consultancy. It had absolutely no procedures or structures and I was to knock it into shape. It would have taken six months to a year and then it was basically to get the pipeline going in terms of sales and moving into a new fuel product area. So we did a lot of environmental risk management, a lot of health and safety risk management in those areas. Then in 2004, I got bored again and I of realised at that stage that my career basically meant that I would get into consultancy and consultancy. This is about doing the same thing again and again the same way and making money out of it. I knew after about three years I would have learnt everything that I needed to do in each of those areas and in each of the businesses and we do the same thing pretty much again and again. I just kind of got bored. I had always kept a foot in the door, if you like, with research and I had continued to supervise final year projects in Civil Engineering in Trinity, through my supervisor. Then when he died I worked with other people in there just very tentatively and I had often thought about going back to academia. When I saw a job come up in DIT I thought I am going to give it a try. If I don’t try it now, I will never try it. So that was 2005 and I successfully got the job as assistant lecturer in Civil Engineering in DIT.

(Y) And that is basically teaching as distinct from research?

(A) Well, initially it was teaching. This is one of my bugbears with the structures in DIT in that as an AL (assistant lecturer) you are brought in and dumped with an enormous quantity of teaching in Year One. So if you have any research aspirations they are almost snuffed out in Year One. I think it is disingenuous of DIT to require people to have research backgrounds and there is this implicit promise, I think, in the interview that they will be supporting research and my view is that this is far from the case. Nevertheless, I think if you are really determined and you get a few lucky breaks, both of which happened to me, then you can get a research career up and running in DIT and you can probably - well I will tell you in another few years - sustain it as an academic. I stayed in over the summers and I worked putting my research proposals together, getting outa first conference paper or two, just trying to get back into research. It is very difficult after being in the private sector for so long. You have many disadvantages in that you have lost a lot of the technical skills and the knowledge of your subject area that you need but you have many other advantages in that you probably are far more focused, or you can think more strategically. For me the first challenge was what area do I want to research in? - because I had a number of different areas, in terms of conservation through to energy, through to risk management.

(Y) Before we move onto that, how did you find the teaching because presumably you hadn’t done any training?

(A) No, I still have no training because I got in before the training requirement kicked in, and I am a little bit of a cynic about that as well, but how do I find teaching? Well, I had, in the risk management, we had run programmes and courses and stuff like that, so I had been standing in front of people teaching and stuff like that. I am probably not the most natural speaker in the world. Lecturing is kind of different though. Lecturing is about communicating technical knowledge and you are not up there to give an awe-inspiring performance but it’s about getting the knowledge across effectively and getting your students to think about it and getting them to be inquisitive about it and trying to imbed the knowledge in them somehow so I didn’t really have major problems. I suppose for me it was the staying up until midnight every night for the first year, trying to get all my course material together, that was really hard.
(Y) It is hard. I have heard other people talk about that. It is daunting, to put it mildly.

(A) Yes, it is really hard. I don’t know if I would be able to do it again honestly.

(Y) You say you got a couple of lucky breaks that enabled you to move into research?

(A) Yes, I think every lecturer at third level should have research as part of their armoury. They have to be involved in continuous education. Just keeping their minds sharp, apart from anything else, keeping their minds inquisitive, generating new knowledge, imparting new knowledge and having that knowledge somehow preferably informing the course material. I think it is absolutely essential and I think that DIT is poor at that, very poor at that.

(Y) Is that because the emphasis in DIT is on teaching?

(A) Yes, if you look at the rewards in DIT, and this is purely from a management perspective, I mean what rewards to you get for research – none. You get no rewards for producing a paper, no rewards for pulling in research funding in most cases. So the rewards for research are extremely low in DIT and if you look the way the school budgets work, budgeting is done at a school level, so that is where it matters, it is all done from a teaching perspective and not from a research perspective. Now there are some heads of school who make an effort but that is the exception rather than the rule. So I think there are two things. The culture needs to change in DIT but I think the incentives need to change too. That is a different topic altogether. So basically I decided that when I joined - why did I leave industry – because I got bored every three years and what would keep me interested would be to be doing something new every day and what is what attracted me about research, that is why I had always enjoyed research. So I made a concerted effort to make sure that I would try and develop my research career. I applied for a couple of, I don’t know if you remember the Strand One and Three research funding programmes, and I was lucky enough to get two of those - one for a PhD student and another for a project which was for €400,000 and that was my lucky break. That really made a huge different to my, first of all, it made me work on a project and it wasn’t like it was a three year project, I was going to have to sustain the effort for three years. It gave me a couple of research students, it gave me a bit of teaching buy-out. And when you add it up, one of the good things about DIT is, I suppose, is this formula that you get two hours off for being a lead supervisor. For research students now, I have to say, it takes more than that. But it makes a huge difference. So that meant that I had about six hours off my teaching. I was down to about ten hours lecturing so that made a big difference. So that was my lucky break.

(Y) What is your current work now, are you still teaching, still researching?

(A) Yes, in fact I am going very little teaching at the moment for the last year because I have so many research students. I have about, sometimes I forget the number, but I have eight research students. It’s too many and the problem with this is that it is difficult to manage these things. It is a bit like consultancy, you either get all the jobs together or you are left twiddling your thumbs sometimes and that is one of the problems in DIT, it is that if it comes together, you get time off your teaching but then when it decreases a bit you are back suddenly into the struggle of trying to dig yourself out of teaching and keep your research career going. Yes, I have about eight PhD students and mainly I am doing final year project supervision in civil engineering and, the next semester I will be teaching a new module on the economic and policy appraisal of renewable energy through the Masters in Energy Management programme here in Kevin Street. So what is what I am doing from a teaching point of view.
(Y) Is that because of the environmental engineering, it’s probably the wrong term for it, is now a buzz topic, like energy aware buildings?

(A) Yes, it’s very interesting. Energy as a topic is emerging as a discipline, and you say what’s it called? And nobody really knows that it is called. Is it energy? Is it emissions? What is it? The thing about energy, that is my research area renewable what is what my research is about incidentally - renewable energy - but the thing about energy is that it touches so many aspects of life that it is very difficult to put it into one area. It is kind of a cross-cutting horizontal theme in many ways, which makes it very difficult to know how to handle it from a teaching perspective. Yes, it cuts across, obviously, technology, politics and policy, energy and politics have always been intertwined. Energy and clean water are probably the two things that have always allowed us to have the society we have today.

(Y) That is a thing that really impacts on society, and the policies around it.

(A) Enormously. - Energy - we are living through a period and have lived through a period of incredibly accessible cheap energy. I mean if you think about how much time people used to spend trying to sort out energy in their lives. In the past it was very, very high but now we just have energy on tap and it’s cheap.

(Y) .ish.

(A) Well, I think we will look back and say cheap was only $150 a barrel.

(Y) And what is your current work, what are you researching now?

(A) It’s renewable energy, I suppose the main, I have three main areas in renewable energy and they are kind of interrelated. One would be energy systems modelling, which is a very broad kind of description of describing the energy inputs and outputs and conversion processes in systems, and systems could be anything from, for me, a small domestic renewable energy system through to the national grid, if you like, and the components that make up the grid – its power production and its energy generation plant. The energy end-use, the people, how they use energy at the end of that and I tend to look at this from a dynamic perspective so for large scale systems you would be looking at maybe half hour intervals and how energy flows across that system and the flow of energy is very important because a lot of energy is very difficult to store so it has to be used instantly in many cases or a lot of it is wasted and this is a huge problem. So the dynamics of energy systems are one area and energy system that are distinct from devices and device development, and devices I would think of as PV panels, photovoltaic panels, the development of those new coding with new materials, so looking at the actual device itself. But I am more interested in looking at how that device sits into a system and how that system will have end uses associated with it. So we do a lot of modelling around that. So the kind of projects we are working on, there is a big project that we have been working on has been to model the dynamic energy flows of micro generation systems, a whole variety of different micro generation systems, so that might be photovoltaic systems, thermal collector for generating hot water, micro combined heating power, a small little plant in your dwelling that produces electricity and heat, wood pellet boilers, all of these renewable and energy efficient technologies and to see what are the energy balances of these and then that leads on to emission balances because then, as I will talk about in a minute, a lot of that work then flows on to policy and emissions policy of a very close make. So energy systems modelling is one of my research areas.
A second research area is life cycle assessment and life cycle assessment is about assessing the totality of environmental impacts associated with a product or service. So traditionally we tend to have a rather fragmented view, again from a policy perspective, because this flows into policy again, about what the environmental impacts of something are. So if you take a building and you take an energy in a building, you could say that the environmental impacts of energy use in the building are, you know what is the energy going into the building, it might be oil or what is coming out of the building, well emissions and stuff, so that might be an environmental impact. The totality of electricity that is coming in and there are no emission coming out. But, the emissions from that electricity happened way up stream, way back at the power station. So that has to be taken into account. And then you say, now you are just thinking about operational energies, what about maintaining those electrical systems, maintaining your boiler, in fact if you start looking at that, there are emissions associated with that. And they would say, in fact, there is a house there, so a house had to be build. How much energy went into building that house, how often do you paint it and all the rest. So if you thing about a living space for a human, then the emissions impacts, or the life cycle impacts, would occur to do with the construction of the dwelling, the operational maintenance of everything in the dwelling and you can even say then the disposal of that dwelling. And then you can even start going even further back and you can say, well if you build this house, well the blocks – let’s just take the blocks, as just one example - the blocks have to be produced in a factory and they took cement from somewhere. They were produced somewhere else. In fact, the factory had insurances and they have an office that powers in proportion and that must be allocated and when you start looking at this, there is an infinite flow, if you like, upstream and back to the beginnings of time where everything fed into everything else to produce that block. That is life-cycle assessment. So there are ways of accounting for these things but the fact of the matter is that the cement production facility and the extraction of that aggregate, wouldn’t have happened unless you were living somewhere and you were living in that type of house that you have chosen to have for yourself. So when you are looking at these things, to really get a good policy fix on things, you really need to know about what the total impacts of a product or services are, rather than just looking at one narrow aspect of that product or service. So I work on the application of methodologies to look at the impact of various things, like buildings, transport systems, and to see what is the total emission. So for transport, cycling, for example, would be regarded as carbon neutral but in fact cyclists use a lot of energy and food is very emissions and energy intensive. So how does that impact on things, when you think about it from that perspective. So we look at what are the emissions associated with various activities and produces and services, and then the other thing that we do is that we look at the methodologies and there are a number of methodologies that are used in this area and none of them quite marry up and there is a lot of uncertainty around these methodologies so we are working on a project at the moment to look at how do all of the different methodologies compare, how do we quantify the uncertainties associated with each and how can we learn from those and develop new methodologies so it is a kind of methodological work we are doing at the moment. It is very interesting actually.

(Y) So your research could potentially really influence the shape of the world around us.

(A) Well, I am too cynical to think that but I do think it can inform policy

(Y) Do you find the policy makers don’t really listen

(A) I have been invited to comment on the new... it is interesting to see it coming to pass because I knew five or ten years ago that embodied energy and a more life-cycle
approach to buildings, for example, had to come down the line because we are looking at making our building more and more operationally efficient, you know, loads of insulation, energy efficient appliances, all these things. So that means that as you reduce the emissions from the energy and the operation of the energy and then all the other emissions associated with the other life-cycle aspects become relatively more important, so embodied emissions in terms of the emissions from embodied energy that have to do with the construction of the product, the building, they are going to become more important and now the Irish government, essentially the Sustainable Energy Authority of Ireland, just last week, they launched new guidelines for assessing the embodied energy of buildings so that will then be incorporated, I suspect, in the next five years or so, maybe ten, I don’t know, into building regulations. So it is interesting to see these things come to pass so I was asked to comment on the methods that were used. I was part of the assessment team for that new standard.

(Y) It’s a very positive link between research and the real world.

(A) Yes, absolutely. The stuff I do is very applied. And then, all of that, you can see feeds into policy, policy from the point of view of how do you quantify the emissions. So once you can quantify…so then policy is driven around, I mean the big policy pillars for energy are security of supply, sustainability in terms of really reducing greenhouse gas emissions and cost effectiveness. So basically sustainability, security of supply, anything you do from a renewable energy perspective increases security of supply because it is indigenous essentially. You are reducing your reliance on imports so that bit is parked, is gone when you are dealing with renewables, so then it is to do with emissions and costs and a lot of the work then, you can see from the life cycle perspective, we can quantify the emissions side of things and then from the energy systems modelling we get a very good fix on the dynamics of the energy balances in the system and those energy balances can be immediately converted into revenues in terms of costs. So then you have cost and emissions and you divide one by the other and you see, well if I introduce this for this type of policy, if I introduce, lets say I want to subsidise photovoltaic panels, well that’s the cost of it, and they are the emissions you are going to save over the life cycles so there is your cost per emission and then you can start ranking your technologies from that perspective. That is how that all fits together.

(Y) It’s fascinating. I never thought it would be. At the start of the interview you talked about being attracted to engineering because it is creative. That’s not something I would have thought of intuitively engineering as creative. Could you expand a little bit on that?

(A) I couldn’t think of anything much more creative than engineering. I mean, a bridge is creative, isn’t it?

(Y) Engineering to me is all about problem solving and those kinds of skills – logical, rational, not the instinct of leap, you know the artistic creative leaps. I am probably wrong.

(A) Well, engineers have to make leaps all the time, about how to solve problems.

(Y) Is that an insight process or ..

(A) I think it is the best engineers… I know one of your questions is about research, making break-throughs in engineering but I will come back to that. Yes, I mean lots of the engineering world is absolutely full of light-bulb moments. The arch, I mean, that must have been an incredibly exciting thing to discover and invent.
(Y) Somebody didn't just dream up the arch, they had a space to fill and worked at solving that problem. Do you see what I mean? I am obviously wrong.

(A) No I am interested in discussion this.

(Y) If you are an artist you look at this space and you …I do research into the artistic process, that is why I am interested in this and it’s a kind of an imaginative eye that sees something in your imagination and you paint it or whatever.

(A) That’s the same in engineering, particularly civil engineering. My view on engineering is that if you can’t draw it, you can’t understand it. I know I say this to my students, even for really abstract concepts, if you can’t write then, well within my realm if you get in theoretical physics, engineers, I think, have to visualise, well that is the way I work, everything has to be visualised. So yes, you have got a blank canvas and you are thinking about how do I get from that point to that point. Well there are a whole range of, originally you would just have put a plank across it. Just think about how imaginative somebody would have to be to think, well why don’t we should put a whole series of bricks in at different angles all on top of each other and that might form an arch. To me the beauty is to think about how the maths of that works as well in conjunction with that concept and engineers, especially civil engineers, would think about forces moving down through that and how that works

(Y) I stand corrected. I think most people would think of engineers as non-creative, that’s wrong obviously. Well, ok, maybe building a beautiful bridge, you can see the beauty and the symmetry in whatever. That’s probably a bad image.

(A) The LED? I mean how creative was that? You know somebody is thinking about a whole new application for that. I think a lot of these inventions require a huge lateral and imaginative thinking. I regard engineering as a fundamentally creative process. I mean it’s about changing the world that we live in and you can argue about how good or how bad that has been but when you think about all of the great inventions, so many things had to be imagined and tried and tested and refined. The fundamental concept had to be imagined. Something as simple as clean water flowing through pipes in the ground, I mean that is an amazingly imaginative idea.

(Y) Or the skyscraper?

(A) Yes, well yes of course. All of these structures they are coming up with, so everything to me in engineering is imaginative. I think then that what happens is engineers are obsessed with standardizing things.

(Y) That’s true, that’s possibly what I am thinking of

(A) And in a way, that has been of huge benefit to the world because it has made the creation of things so incredibly cost effective. So things now can be created really cheaply through standardisation and engineers have completely driven the concept of standardization. So there is this huge creative idea and something is created and then the next phase is they think about how do we standardise this and how do we refine it, how we have it so that it is repeatable in a safe manner, in a cost effective manner but safety would be an overriding concern so that these things don’t fall down. And when they do fall down there is another amazingly, fantastic opportunity for more creative thinking. Why did it fall down, what can we learn from this, how can we improve this design. There is a very famous bridge, the Tacoma Narrows Bridge in the States, I don’t know where it was in the States, it was the very first suspension bridge that was
built and this was a huge breakthrough but then the wind started blowing up the valley
and this bridge started, I don’t know if you are familiar with this, the bridge started to
vibrate and we learnt an awful lot about harmonics, how it was basically like plucking a
guitar string and a bridge could behave like this. And somebody had to think of a
whole new way of designing a suspension bridge.

(Y) But I don’t think that that would ever happen now because you could model that
with technology now before you build it?

(A) Yes, that has been a huge change in that things can be imagined and they can be,
and this is what we do now, they can be modelled using very computationally intensive
programs… finite element analysis, finite diffident analysis, computational fluid
dynamics, all those kind of things.

(Y) So that presumably allows you to dream bigger?

(A) It does yes, it allow you to dream in a much more cost effective way. You can think
of solutions, structural solutions, and test them but you never really know how its going
to behave until you do it. You know, I was thinking about sending people to Mars last
night and they are talking about it, and you have to think about so many assumptions
about, if there is atmosphere there, if there isn’t atmosphere there, what is the density
of the atmosphere, would parachutes work and all the rest, and then you fire somebody
off there.

(Y) Yes, and that all kicks off.

(A) Well, you have people, that is the ultimate test. They are the engineering
challenges. Engineering challenges require huge creative thinking, but I take your
point. I see your point in that much of engineering is about repetition but the really
important thing to get across to students is, although you see standards which allow
you to design things in a formulaic way, is that they are only standards and you must
understand the basis, the foundations on which they sit, and if any of those foundations
are different in your case then you must be ready to take it and throw that away or
rethink that bit from first principles and come up with a whole new way of doing
something in that case.

(Y), Very interesting. Nowadays of course there is huge pressure when you go looking
for funding. Do you find that to be the ultimate pain in the neck, when you write
proposals and trying to compete all the time for money?

(A) Yes, it’s a pain in the neck and yes, it would be really lovely if money just arrived at
your door but I can see that doesn’t happen in the real world.

(Y) How do you feel about all these research assessment exercises that are going on,
say at the national level, to see where are our strengths and weaknesses and all the
rest are?

(A) I will just come back to..., I do see some advantages in research funding
proposals. First of all, it does make you think hard about the kind of projects that you
want to work on, and come up with project idea and methodological. So it does
actually get you to firm it up and come up with the concepts. It also, for FP7 type, I
have just finished an FP7 proposal yesterday, these are European funded grants, it
does get you to work with other people, and working with other people is so important
in I think most research in that it exposes you to new ideas, new ways of thinking,
different disciplines and the creative ideas flow from that.
(Y) And would you work across disciplines?

(A) Yes, I am very interested in inter-disciplinary work. So for me, policy is, you know I am dealing with economics, I am dealing with technical stuff, I am dealing with scientific aspects.

(Y) So your background actually really feeds into all of that.

(A) Yes, I think that is why I do that, is probably because of my background. But in terms of the research assessment exercises, I would say I would be quite cynical about that. For me, research is a bottom up process. It is very creative, it’s about people, it’s about getting the right people together. It doesn’t work top down. It’s very difficult to quantify or parameterize research success and, there is an awful lot of smoke and mirrors involved in it in term of winning funding that I don’t really engage in.

(Y) I suppose the hope is that if these research appraisal exercises are done properly that it will actually concentrate money where it can most usefully be used. But whether of course that happens is another matter.

(A) I would be cynical about that. I think there is a deep conservatism in allocating research funds.

(Y) Some people have said to me, it a game, you just have to know how to play it.

(A) Yes, it is a game. Its just like everything..

(Y) It is just like most things. It is interesting. The artists were saying exactly the same thing, it’s even more of a game and more irritating.

(A) It is about framing it, if you have got a research idea which doesn’t fit into something, it’s the skill of actually, you know

(Y) Of squeezing it in there

(A) Exactly, and trying to think of more, well its about selling, its about thinking what does this funder want to buy and how can I package my research so that he will think that he is buying that.

(Y) It does take up a lot of your time, though, doesn’t it, doing that kind of stuff?

(A) Yes, it does.

(Y) You would think there would be a better way of doing it. You would think there should be a centralised office.

(Y) I think there should be some kind of amount of money that you are just allowed to do with whatever you want with it. That would be nice.

(Y) That would be nice. I think that is even further away than it ever was.

(A) Yes, Just to get a really good PhD student and just for you to sit down with him/her and say listen, what will we do. That would be lovely.

(Y) It used to be the way it was in Trinity sometime ago.
(A) Well, yes. I never experienced that.

(Y) Does your research, can that lead to a commercial output

(A) Yes

(Y) And is the pressure on to do that?

(A) Yes, the pressure is on at national level and both in DIT as well to do that.

(Y) How long would that normally take for something to go from an idea in your head to the end product?

(A) It depends. We are working on a project at the moment and there is a kind of a web based tool that came out of it within a year and there is potential for a more detailed kind of web based kind of assessment package. But, yes, it depends, if it was something like a web based tool or something like that that can be done very quickly. If you are looking at device development, that takes much longer.

(Y) And presumably that kind of commercialisation then increases your chances of getting more funding?

(A) Yes, your track record is extremely important

(Y) And would that attract companies, for example?

(A) Yes, but I think it is always problematic dealing with companies. Research – companies and academia have two very different ideas as to what research is. I am sure you have heard this from the others. I haven’t spoken to them about this so it’s probably coming out of me independently. But companies think, for them research could be changing the colour of a product. It could be something as basic as that. Research and development could be something very incremental in product development, what we regard as product development, whereas for us research is about the creation of new knowledge and we wouldn’t see that as new knowledge and there can be tension between companies and academic researchers in that area. So I have had a number of industry funded projects and you have to be very clear up front about what you are doing to do because you have to satisfy the company’s very practical needs but at the same time, most of these research projects have PhD students in them and the PhD student has to be seen to be creating new knowledge in their research field so the company mightn’t be so interested in that and they might be interested in something far more practical and immediate so there is always this tension.

(Y) And it is a question of control, isn’t it? Because at least if you are in academic research you can go where the knowledge leads you, if you know what I mean, whereas if you are controlled by a company they can stop it when they feel they have reached what they want.

(A) I agree and I would be very wary about getting into that kind of relationship so you would want to sit down and you would want to have your kind of social contract with them first..

(Y) the definitions of all the words used.
(A) Yes, you can write it all down, but at the same time, you have to sit down with them and say this is what we have got to get out of it and that is what you have got to get out of it, now we both need to get these things out of it and be clear.

(Y) But it is something more and more that the institutions want you to do, isn’t it, to work with companies, the short fat pipe to industry?

(A) Yes, it is a bit worrying, again my work is very applied but I don’t want it to be so applied that it is just basically subsidising industry directly. Industry should be doing its own thing.

(Y) I suppose it all comes down to a question of money. So how would you like to see your work in your area develop?

(A) Yes, I hadn’t really thought about one

(Y) Or do you just want to keep on the track that you are on, see where it does, because it does sound to me to be that you are no longer bored anyway?

(A) No I am not bored but at the moment I am too busy, too many things, too many papers backed up that I have to, people are waiting for me to do, because I have been working on all of my research proposals.

(Y) Yes, you publish a lot, don’t you

(A) Well, I try to, I mean my view is that any of my PhD students should publish three journal papers and three conference papers – that is kind of my threshold but it doesn’t always work out like that; some do more, some do less. But that is what I would expect and I find it a really useful way of becoming really engaged with the student in their work is to go through that process at a regular interval in their work, because it really gets me to focus on their methodologies and their findings etc. It’s something that I find, and it is good for their career and I see that as something that is obviously good for my career also. I do keep the pressure on them to publish.

(Y) But there is a sort of growing pressure on academics now to publish – publish or perish

(A) Yes, I think maybe that is growing in DIT, the pressure has been there for a couple of decades in most other places.

(Y) It doesn’t always work to the good of the discipline involved.

(A) I have very little time to do any of my own research. I am constantly in… I come up with the project ideas and broad methodologies for all of these and I get the student involved, but then basically I am working with the PhD student or the post-doc. where they take over the day to day research function and I get very little time to write my own papers. If I get a paper of my own out in a year, I am doing well.

(Y) And you would obviously like to do more.

(A) Well, yes, of course. There are about two or three ideas sitting there that I have had sitting there for about a year now. That is very frustrating. That is one of the downsides of it. Yes, I am at a stage now where I can have more international involvement so I am kind of working on that and DEL which I head up (The Dublin Energy Lab), which is the energy research centre in DIT, that is also at a stage where
we need more international involvement so that is one of my strategies for the next one to two years.

(Y) And the DEL, that is not just DIT researchers, are there others?

(A) Well, that is a good question. At the moment, it is just DIT researchers but I would like it to broaden out and we have good contacts with people in Trinity, we work closely with a few people in Trinity and it might be worth extending it to that and some of their students participate in our seminar series with the option of extending organically, shall we say, I am always an opportunist. That is one of my characteristics. And the other interesting idea would be to have industry membership as well.

(Y) OK, That would be interesting

(A) Yes, and industry and policy membership, government membership. I am not sure how that would pan out, because that would be..

(Y) It would be interesting to try though.

(A) It would be interesting to try but I am thinking of it from their perspective, to be associated with a particular college or institute might not be something that they would be terribly interested in, certainly for a larger organisation, for a government organisation.

(Y) But still in that area to get all the stakeholders around the table discussing something would be quite an achievement, I would have thought.

(A) Yes it would. What we probably should have is a kind of board, at the moment we have a kind of internal management group and we need probably some kind of external committee. I have a fear of committees.

(Y) I know yes, if you don’t want something to happen, form a committee.

(A) Yes, I don’t like that. I have always preferred working in smaller organisations, smaller span of control.

(Y) Yes, you can move quicker, be more flexible and adaptable. So we have come down to the last question. What aspect of your career has given you most satisfaction, or the least?

(A) The most satisfaction or the least satisfaction. The least satisfaction is that there is too much stuff that I have taken on, usually my own fault. The most satisfaction - I suppose it is when a research finding comes together, you know if you have an idea, if you have a research question and you have a methodology that you think might be the right methodology to solve it and it works out good. Usually after many iterations that it gives you the results that you are looking for.

(Y) Do you ever abandon things, do you ever just say this is not going to work and I am wasting my time here, or do you persist?

(A) I persist, I think it is the most important success factor in life, forget intelligence, anything else. The PhD students who do best, I think the people who do best, who are the most successful in life, are persistent. I can’t think of an example. I have certainly changed tack. So if I think something is not going somewhere I might change the tack, it might be a tweak or a change in the objective or it might be change in the method,
whatever, but I rarely give up on things. I can’t think of an example. I suppose there is always a great pleasure in seeing your paper published, out there in the international world for other people to use, it’s nice to see stuff being cited.

(Y) Do you think you will stay in academia?

(A) I don’t know. I have no firm opinion, one way or the other. At the moment there isn’t much happening elsewhere and I enjoy academia. I have certainly stayed here longer than anywhere else and I am not bored. I know that if I do get bored I can probably do something different within academia, change research area or maybe focus on maybe programme development.

(Y) I think the whole inter-disciplinary widens things for people

(A) Yes, I really enjoy the interdisciplinary. But I suppose ultimately the most satisfying thing is to have a PhD student graduate, to see them coming out at the other end of the process. A different kind of person, thinking about things in the different kind of way and having a different set of skills and think that you probably personally have put a lot of work into the development of that person. So that is very satisfying and I think it is more pronounced with a supervisor of a PhD student that it would be with a lecturer and a class, you can see more of your own hard work in that person.

(Y) They say that that relationship is a bit like a marriage – persist until one divorces the other.

(A) Yes, but I try to stay in touch with all of my ex-students. It is not always easy to keep up the contacts but, yes, we stay in touch.

(Y) And that is something that you enjoy doing

(A) Yes

(Y) It is a kind of a human aspect of it all.

(A) Yes, I of like people

(Y) That is great, Aidan, Thank you very much

Interview ends.