



# Dr Michael Taylor

Interviewed by

**Richard Sharpe**

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**Archives of IT**

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*Welcome to the Archives of Information Technology, where we capture the past and inspire the future. It's Monday 20<sup>th</sup> August 2018. We're in the Worshipful Company of Information Technologists in the City of London. I am Richard Sharpe and I have been researching and writing about the IT sector since the early 1970s. If you google any of the other 62 people who have already contributed to this active archive you are bound to have found a lot about them, only of course you come to this archive to hear their real voice and to hear us interview them. Our entry today, Dr Michael Taylor, seems not to be of this planet, certainly not in the ecosphere, not on that internet. He is elusive, but as ever, the Archives can get to places and people that other people can't get to. And so, making his contribution to the Archives today is Dr Michael Taylor, who was born in 1947, his father was an aircraft engineer. Dr Taylor, did that influence you at all about your career?*

I think it must have done, probably more than I ever thought. My earliest memories, I suppose, are when we lived in Shrewsbury and we had a vegetable garden where the plants were covered with Perspex canopies, which I was later to realise were Hurricane and Spitfire canopies, and they helped the vegetables grow. And of course, every year I'd meet Father Christmas up on the air force base. I was pretty annoyed because it was a long wait. My name is Taylor, with a 'T', that's a long way down the alphabet. So yes, I did learn about aircraft and I think I was influenced. And later on, when my father was at Wroughton, and the weekend duty officer, I would accompany him up on the airfield to inspect the aircraft and the security of the place, and of course I got quite a taste for drinking beer and playing billiards in the mess and generally aeroplanes became a part of my life.

*It's quite a peripatetic life, is it not, in the services? Were you hawked around different places?*

I was lucky because my father was based there from '52, '53 until sixty... well, '66 I suppose it was. So that's a long time. Somehow he managed to wangle that and I'm not quite sure how, but they certainly found out in about 1966 and they quickly posted him off to another country.

*And your mother's family were the Robinsons of Enfield? Originally milliners – millers – and farmers, and later gunsmiths and industrialists.*

Yes. My mother always used to tell me about the way that they used to be millers and farmers, and of course she would talk about her father being a gunsmith and how relations had moved into industry. I really didn't take much interest in that until of course I reached a particular age. and then suddenly I found that I had no relatives that I knew about and I became very curious and tried to look up my family tree, which is what I've done recently. And I've discovered what an extraordinary family this was and the history is really quite breathtaking.

[0:03:11]

*You passed your eleven-plus.*

Oh well no, I didn't actually.

*You didn't?*

No, no. I did it at thirteen, I think it was called 'late entry'. I was previously at a boys' school, as I think a lot of people were at that stage with a background of parents in services and local businesses. My sister was at grammar school and it was generally decided it would probably be the better place for me to be. I think in hindsight it was probably quite right, I won't go into the details, but boys' schools do have some interesting history and in later years it transpired that the headmaster of this particular school had some quite colourful habits. So, I'd like to quickly brush over what happened in that school, but I did end up going to grammar school. But it was very difficult because I joined in the second year and the sort of curriculum that I'd followed in this other school was very different to that of a grammar school. And I found it very difficult to catch up, to be honest. I wasn't smart enough to ask the questions or admit to what I didn't know, so I was always under a fair amount of stress trying to understand what was going on.

[0:04:23]

*You began starting to repair radios quite early on, I understand.*

Ah yes. I was always interested in electronics and communications and this sort of thing and there was a company in London called Perdio Radio, and I'm not quite sure how I did this, but I think they went into liquidation, and I bought a load of sub-assemblies from them and I used to finish the construction and I would sell them as finished fully functional radios. So I had quite a nice line going and yeah, I did very well out of those. And shortwave radios, amateur radio. Military radios and all that sort of thing.

*And these are crystals and individual processors?*

Oh, my very first one was a crystal set, then it went to a valve set, then I went to transistors and then of course, transistor radios were the ones that I made quite a bit of money out of.

[0:05:12]

*You wanted to become an astronaut, so you applied to NASA?*

Well, the point was, my school kept going on about my future in banking, and frankly I'd never thought of anything like banking, I couldn't imagine anything worse. The idea was that I'd go into a bank, sit behind some sort of counter and give money out, was just appalling. I couldn't, well, that's all I thought banking was, and nobody explained that it was something different and possibly more interesting. So I thought well, I'm going to be different, you know, aeroplanes, going to the moon, yeah, I'll be an astronaut, why not? So that certainly shut up the careers advisers because they couldn't seem to get their head around how I could become one.

*But unfortunately you were turned down.*

Yeah, well, I was only about fourteen at the time and I did write to NASA saying that I would like to become an astronaut. They very kindly sent me lots of photographs and I had a fantastic collection of NASA negatives and colour photographs which I treasure to this day.

*Would you go to the moon or would you go into space if you could now, buy a space?*

Well, I think my present health determines that I would probably be a bit of a risk, but I certainly wouldn't mind going to the moon. I think going a bit further would probably make me feel a little worried about if I'd ever come back, but I could just link up with the moon.

[0:06:24]

*Your A levels were quite successful, were they?*

Well, I left with O levels. I decided that I wanted to go into engineering and the school just wanted pupils to stay on for A levels so you could train to become a teacher or, things that I didn't really want to be. They didn't seem to get the idea of a pupil wanting to be an engineer. So, I decided that, while Marlborough was a better school than my previous one, I really didn't enjoy being at grammar school. Fabulous friends, I mean I had a great time, I'm still in contact with a load of them, but it wasn't the happiest time of my life. I think my parents were hauled in one day because the school thought that I was a disruptive influence, which I think was a bit harsh really. I think one master had taken against me, or two or three maybe [laughs], who knows? And they were somewhat surprised when my mother went in to meet them and explained what I did in my spare time and it was just like a veil was taken off their eyes, they couldn't believe that there was this young chap who making radios and running a little business as a sideline. Also, that he was actually designing and making things. I think they couldn't get their head around that. That was the first part, but the second part, I think, was that my activities didn't seem very academic and as Marlborough Grammar was a very academic school. I love physics, biology and chemistry all these things – but they hadn't made the twist then, (if you like, the contortion) to go from physics and biology, chemistry and general science to engineering, it was something that someone else did somewhere else. And apart from a small number of teachers (physics, music, literature and history) I always found that it was really hard to engage with them so I just couldn't wait to leave, to be honest.

[0:08:07]

*You couldn't wait to leave and you got out after your O levels and decided to take an apprenticeship?*

Yes.

*An unusual route for a grammar school boy?*

I suppose so, but on the other hand, this was an American company, it was 51% American, 49% British – Plessey was the British part, Square D was the American part. And they'd just branched into some products called Norpak, which were logic blocks, and even at that age I could see what you could do with logic, and I was really excited by this, because I thought I could automate the world. Bear in mind, you know, we're talking about mid-sixties and to me this opportunity sounded really great, I believed all the brochures that they produced, I even believed what they told me when I went for the interview. [laughs] But it didn't work out quite like that.

*What is your feeling about the inability of the government to recruit enough apprenticeships, people into apprenticeship at the moment?*

Well, you know, the reason I left Square D was that when it came to the six months point, I had to sign up for another four and a half years. Unfortunately, Square D were far more interested in electro-mechanical switch gear than digital control logic. I think that signing up for such a long period was a fundamental flaw in that apprenticeship system (of the sixties), but there was still some tremendous value in the overall apprenticeship scheme. And I found it extraordinary that the government in the nineties actively closed down apprenticeships. When I was with the Met Police, we used to have engineering apprentices for transport and various other areas, and we stopped them as far as I recall, to comply with government dogma. And I thought, how are we going to get the new generation of young people interested in following an engineering career? And of course, suddenly, some – who was it – some sort of notorious celebrity decided that, being an apprentice was a good way to go and suddenly apprenticeships have become the flavour of the month. But what you see on television in terms of *The Apprentice* is not what I understand to be an apprenticeship. You know, it's about understanding how things work, understanding about business,

working as teams, and making a difference, not putting each other down and stroking egos.

[0:10:06]

*Is there a pattern here of you jumping out of places you don't like?*

Absolutely. You know, we're here for a short time and I do try and stay for quite a long time because I'm aware that I might have a tendency to say, look, this isn't what I want to do and I'll get out. But I think there does come a time when, if it doesn't work, you've got to make a decision. It was my future and if a 5 year training with Square D wasn't going to work, then why stay? I ought to put my hand up and tell you what they actually did instead of putting me on Norpak. It appears that I knew more about Norpak than most people in the company, because Norpak was being developed over in America and few staff in the UK appeared that interested. So they put me on all sorts of strange activities so that I could learn how to do things that I already knew, but I'm not a slow learner when it comes to getting things together. I was being used as a form of cheap production labour. And I was bored to tears, I mean it was just completing the same tasks over and over again, and I didn't need five years of doing what I could learn in about six months. I wanted something that I could really get my brain around and an apprenticeship with SquareD now looked hopeless. It was a great experience for 6 months, I don't regret the short experience for one minute. I met some fabulous people and I saw what it was like working for an American company in the UK. About every month somebody would come over from the States – you could always tell them because their clothes were very bright, very colourful – and then by the time they'd gone, next Monday, different names were on the doors. People would be kicked out so quickly, and it was ruthless. I don't know what they were kicked out for because I wasn't at that high level, but I remember walking down the corridor and seeing the changed name plates and thinking, oh, here we go, a change of management again. I wanted an apprenticeship where I could learn to become an engineer in digital electronics and control systems and Square D wasn't going to work for me, so...

*Would you call yourself an impatient person?*

No, I wouldn't actually. It's been said I'm perhaps more impatient with people who are, who don't understand what I'm trying to do, I think that's probably correct... Some people say I don't suffer fools, but I don't think that's true, I think I'm... If people really want to learn, if they want to do something, I'll bend over backwards to help them, but if they're not interested, then absolutely I can be impatient. If they don't want to try, then I won't. But... I mean, I do admit it does look as if a job doesn't work for me, then I'm off, but actually where things have worked, I've stayed on.

[0:12:36]

*And you found a job as a trainee at the Radar Research Establishment in Malvern.*

Yeah.

*Now, this is a highly prestigious part of the establishment of electrical engineering and electronic engineering...*

Yeah, electronic engineering, physics.

*... in the United Kingdom, coming out of radar, so big breakthrough in the Second World War. And now you're a trainee and to enter that I imagine you had to sign some document?*

Yep.

*Which you have here?*

Which I have here. Four pages, beautifully typed on a hand typewriter, telling me what I can and can't do. Rather daunting when presented to you at such a young age written in black and white, but it was a fantastic opportunity, you know, to work in such a place. The people were inspiring, I loved it. I can't articulate just how exciting it was. I mean this was real science, real engineering, real forefront stuff. I was also a bit inspired by, Harold Wilson and his 'white hot heat of technology', and



this was it, I was in that place of 'white hot technology'. And very junior of course, but it worked for me. Funnily enough I wanted to work in electronics but I was put in physics, in superconductors, so I was working in an establishment where there was research into low temperature cryogenics one side of the corridor, lasers the other side. Thin film displays and lasers were also being developed. We were doing cutting edge stuff in cryogenics and superconductors, developing the sort of magnets that are used in MRI scanners now, we were developing those exciting technologies all those years ago. I mean the sort of stuff that we were working on was just absolutely extraordinary and it was, oh it was a buzz, I loved that.

*So, this is a positive example of state expenditure for military and defence reasons...*

Yeah, absolutely.

*... but also having a lot of civilian spinouts.*

Huge. Huge. You know, those thin films, were used on many computer and TV displays for a long time. They came out of UK research, lasers came out of there, the LED, the light emitting diode as well. The cryogenic work. It was put to me that we were trying to develop superconductors in order to send high power energy down very thin wires. Because to make a superconductor, superconductor, you have to freeze it down typically in a liquid gas, and then as if by magic the superconductor can carry huge amounts of current. And the idea was that we'd be able to save money by not using heavy copper cables we would be using thin superconducting wires instead. But it occurred to me that using liquid nitrogen or liquid helium to freeze down these thin wires all around the country would be a bit of a problem, nobody ever did explain how that was to be achieved. But this was pure science, we had to go down that route. And yeah, a lot of good came out of it. And I have to say, I know it cost a lot of money and I know that money was often wasted, at this young age I had a catalogue and an order book where I could order an item and make a single mistake that could end up with me accidentally ordering a blue streak missile on a trailer. If you wanted it, you could get it. I didn't order a Blue Streak missile, but I made a mistake one day, with the wrong number for some special spanners for an evaporation furnace that I had created. Anyway, this delivery guy comes along with an enormous hessian sack

full of something that was clanking, and inside were my special spanners. And I thought, I never ordered those but it turned out I'd got a digit wrong in the ordering, so these huge spanners were what I had ordered but they were not what I wanted. I ended up hiding them in a dark corner of the lab out of sheer embarrassment. But that's the point, if you needed them, you could have them. And that was the way it was. So, it did cost a lot of money, I'm sure, and there probably was wastage, but the whole point about it was, there was a buzz in the air. The scientists were fantastic and I've never worked with such great engineering people. If there was a problem, and most of the time every one of us was being challenged, I'd be asked to do things that I'd never done in my life before. My boss, John Hulbert, would explain what he wanted, give me a book to read or send me down to the library and say well, you'd better make one of those then. And this was, state of the art, world breaking stuff. And so...

*Dr John...?*

Hulbert.

*Hulbert. H-U-L-B-E-R-T?*

Yeah.

*And he was in the physics group and you were in that physics group?*

Yeah, I worked with him, and he went on to be one of the world authorities. Last I heard he was in Canada. Haven't seen him, spoken to him, written to him since the sixties, but I've sort of watched his career. [laughs]

[0:16:57]

*Superconductivity seems to me to be something that's already, always fading across the horizon.*

Yeah.

*Huge amounts were poured into it, then huge amounts again were poured into it in an attempt to get Josephson junctions working, which would be faster than transistors and silicon, and all to no avail.*

Well...

*To little avail.*

I think that's true, except just recently I've had various parts of my body scanned with an MRI scanner, and to get the high intensity magnetic fields they use superconductors. If you ever visit an MRI facility you may notice that they have to get it ready using liquid nitrogen or helium to cool down the superconducting magnets. So, there is an example of a superconductor being used for what I consider to be an incredibly valuable purpose. But you're right about the electronics side, it's not just the cost of liquid helium and nitrogen, these liquid gases can be very difficult substance to handle. They are so cold that they can easily burn you, so if you get a leakage, the liquid gas can burn a hole through your hand pretty quickly.

*Did you think, in retrospect, that the British government had a good technique for actually commercialising what was happening in places like Radar Research Establishment?*

Well, I think I was really too young then to really understand what the process was for taking it out and commercialising it. But one thing is for sure, a lot of amazing technology came out, and I suspect the government did give away some of our developments in published scientific papers. So, in other words, those of us who worked there were bound by pages and pages of what we could talk about and what we couldn't talk about, while other more senior people, were encouraged to share in open scientific journals. I suspect some of the more astute countries understood what was happening, and probably got in on the act before we could patent our work or otherwise protect it.

[0:18:40]

*Right. One of the things you said in your notes before this interview that you learnt there was that you learnt to ask questions when you didn't know things.*

Yeah.

*That seemed to hold you back, you said, in grammar school, you didn't. But now you were taught that here.*

Well...

*The experience taught you to do that.*

Yeah. I think that's true, because, as I said earlier, at grammar school I didn't really understand why I couldn't understand some of the things, but actually, missing two years is quite a hard thing to catch up with and I felt I didn't know how to articulate the questions. But when I was at RRE, I don't know, somehow it seemed a safe environment, and to ask for and find that people would help you, and I didn't find anybody who was not prepared to help, it was just very stimulating. Not only help with knowledge, but help you improve your skills on how you do things, design things, test what you're doing. And explain things. It was fantastic. It was, yeah. So now, I probably drive people mad. Because if I don't understand something, I just keep asking people to explain. And what I found later on in my career is that by asking people to explain certain things in more detail can throw up some interesting assumptions. A number of very clever people have written very good scientific papers explaining the things that I couldn't understand. Later on they have admitted they didn't quite understand the issue themselves and only when I had asked them to explain in greater detail, did they realise it didn't make sense to them either! So maybe sometimes I can see anomalies and complications which help identify further analysis and discovery .

[0:20:17]

*So by now you're about twenty? Nineteen, twenty?*

Er yeah, I guess so, yeah.

*And the thought of entering the RAF in your father's footsteps, did it occur to you?*

Yes, course it did. But before then, it was round about that time, my father was posted to a different country. My mother didn't want to go, they had a home in Wiltshire, and she was getting a bit stressed out, quite sick in fact. So, my sister and I decided the only thing to do – my sister was teaching, I think in Bromsgrove – was to move back home and try and keep everything together. Because it was quite traumatic for my mother after living so long in one location and building a permanent family life in a Wiltshire village. I also then had an opportunity to go to the Military College of Science in Shrivenham where I could train to become what I wanted to become, which was a chartered electronics engineer. And also, then to explore becoming a pilot in the air force. Well, an engineer or a pilot. So I was there for about five years. Again, it was a very stimulating environment, obviously army focussed, but nevertheless, I learnt an awful lot. There was a lot about communications, a lot about computing. My time at RMCS was really very stimulating and when I'd finished the whole thing – oh, by the way, you also learnt a lot about interesting and exciting things, such as how to blow things up without blowing yourself up at the same time. [laughs] Rockets and explosive devices had always been a bit of a hobby of mine. It came to, well, now it was time to decide about my future. And of course, it was an army establishment and I had actually applied to join the Air Force and the Commanding Officer of the (RMCS) establishment, was a bit upset by that. He asked why I did not want to join the army? And I said, well, [sighs], I always really wanted to fly. So off I went for the whole recruitment process. I travel to Biggin Hill and there's a social evening beforehand and the examiners are assessing your personality, they mingle, as if you don't know why they're mingling. So, they asked why I wanted to join? So, I said, being somewhat flippant that I liked the uniform, it looks pretty good. I also said that I liked the mess life, even that was good... [laughs] So I went through the whole thing and I did the three intensive days at Biggin Hill. And it was both interesting and scary because it's broken down into stages of IQ tests and nobody tells you what's going to happen. I knew there would be some IQ tests, so I bought Eysenck's book and decided to sort of get my IQ level up to Mensa, if only for about five minutes. So that worked quite well, and I got through that stage. And then I had all these various

interviews. You would be waiting in a reception area with a number on a large card hanging around your neck, then after an exercise or an interview you'd go and sit in the hall and they'd callout a series of numbers, for example, "numbers eighteen, fourteen, twelve, eleven - please report to room so-and-so". And you thought, oh well, I've flunked that out. But happily, the numbers they called out were for those who were to report to the room and leave. So gradually the numbers were coming down, and down. And then they had medical doctors looking at you and all manner of skills, initiative and leadership tests to pass. These were then followed by yet more interviews. It went on and it went on, and to my amazement, I got through these three days. I think to this day I think I made a cock-up of one of the leadership exercises in the hangar and would like to go back and get it right. Anyway I wanted to be a pilot, because I thought that as I had failed to become an Astronaut, I'll just be a pilot. And then they pointed out that I couldn't become a pilot because I wore glasses. It was only later on when I was doing my PhD, I was flying with a naval test pilot and I looked at him, and I said, Keith, you're wearing glasses. And he looked at me rather surprised as if I was mad. And I said, but how, you're a pilot and you're wearing glasses. He said, you can have glasses when you're a pilot in the navy. I said, is that true about the air force? He said, oh I don't know about that lot. But, you know, it was far too late and anyway I was enjoying my job in aerospace. So I made the decision that it would have go into engineering. I talked to my dad about this and together with a colleague and friend of his (who was also a great friend of mine), they sat me down and said, look, you can do engineering but it's not the engineering that you would like, it's just line replacement activity, you'll never get to the top in the RAF anyway, being an engineer. You need to be a pilot. I was shocked as I never thought of getting to the top, I mean what, Marshal of the Royal Air Force? Nowadays you don't have to be a pilot, because Chief of the Defence Staff is Air Chief Marshall Sir Stu Peach who was a navigator, and he got to the very top, now he's about to be appointed Chairman of the NATO military committee. But at the time, in the early 1970s that's what it seemed to be. So, I thought about this and I thought about that, and the conclusion was that it would be much better if I was to go and work in industry and get my aircraft fix there. I think the other thing was, just at this time, I'd met a new girlfriend and the last thing on my mind then was suddenly going away. When I think about it, I had all these great ideals, but really, when you get that special girlfriend, everything in your life changes.

[0:25:44]

*So what were you actually doing at RMCS?*

RMCS?

*Yes.*

Okay, towards the end of my 5 years I was working in a research group, investigating microwave integrated circuits. The aim was to create integrated circuits for, strangely enough, radar systems and microwave communications systems. It was real leading edge stuff and suddenly there a Professor Fred Hyde had joined us from Bangor University. Very inspiring guy, and he said to me, soon after he had arrived, if you do this and if you do that, you could well study for a PhD. I thought, this is fantastic, I can't believe this. This was really great. And then, in the summer he dived into the RMCS swimming pool, broke his neck, and that was the end of it. So, you know, it was, suddenly taken away, I thought I'd found something that was really good and then it just disappeared. So I thought okay, right, have to move on. So...

*But you were there five years?*

Yeah, yeah, yeah. I finished all the work and studying that I should have done and, yeah, I was quite happy, it was a very good and positive experience.

[0:26:51]

*So, so far you've been basically in the public sector, apart from a very short period?*

Yeah, apart from when I had sidelines, because I had to earn money to live and I enjoyed trading. I'd buy government surplus bits and pieces. At that time, you could buy government surplus from auctions held at many army and airforce bases, Aston Down was quite a famous place you could go to, and all the government surplus stuff would be put in hangers and sold at auction there. As a member of the public, you could go in and bid. I would buy armoured cars, oh, you wouldn't believe the stuff it was possible to buy, I found it amazing. You could buy stuff there, put it in a

different environment and you could sell it for an awful lot more. And so, this was a hobby, but I did well on this hobby. And I think I was the only person at RMCS who had his own private armoured scout car, I had a Daimler Dingo, which went just as fast forward as backwards, it also had a 5 speed preselector gearbox. It was a convertible, so I used to say it was my British racing rust and green Daimler convertible, which was pretty good for the £100 it cost. Pretty good. Not exactly like an Austin-Healey, but it was good fun and certainly made an impression in more ways than one. So yeah, that was...

[0:28:08]

*And you then decided that okay, this has come to an end, five years?*

Yeah, yeah, yeah. I'd got what I wanted, I'd got my qualifications, I was on track to become a chartered engineer, now this was time for responsibility. Because, look, I was a member of the IEE, and to finally qualify to become a chartered engineer you had to have a position of responsibility for something like, I think it was a year or eighteen months' after you qualified. So, I had to have that. My girlfriend and I were now married, she was at Bristol University, I went to see one of the professors of engineering and he said, mm, well, we'd like you, you could do a PhD. And I said, mm, yeah okay, that sounds pretty good. But I thought, you know, I just wanted to get this engineering experience. I'm twelve months, eighteen months from ticking the box and becoming what I have long wanted to be, a chartered electronics engineer.

*Why is that so important for you, being a chartered engineer? Just doing your job, that wouldn't fulfil it?*

No, I don't think so. I think because it was something to aspire to then, it's very hard to explain it to people now, not many people even want to be members of the IET or chartered engineers today. It's odd, but to me that was a profession, I wanted to be an engineer, I wanted to be a proper engineer, if you like, I think it was also because it was a challenge. You had to pass these exams, you had to do certain things, then once you've done your twelve months or eighteen months of responsibility, you're able to register as a chartered engineer. Then I thought, well then I can relax and do



whatever I want. But I want to grab that now, while I can. It was a target I had set myself and if I once set myself a target, I rarely give up.

*And there's a responsibility there as well.*

Yeah.

*You're chartered, it is a profession. There is an ethical part to this?*

Totally. [sighs] There was a big thing then called the Engineer in Society and it was about the responsibility of engineers, basically not only to do good, but to be responsible as well. So it was about engineering within society. All the stuff now about eco, ecological stuff. That was all part of it, if you were going to be an engineer, you were going to be responsible. And I thought that was very worthwhile and I've always tried to stick with that.

*Is that lacking now?*

Yeah, I think so. The trouble is now, people call themselves engineers and they may have created, an application for a smartphone or a similar digital tech innovation. I'm sure they're good at doing that, but they often don't have the background, all the multi-disciplinary training that you go through to become a professional engineer, the demonstration of your responsibility and understanding of the bigger picture. I think it is lacking. Obviously, that might not generally be the case, there must be some exceptions? I suppose I feel that it's more old school to be a chartered engineer today than it once was, amongst the young tech people of today maybe we're seen as rather fuddy-duddy and a bit old school.

*But do you advocate it?*

I do, yeah. I think it's a great profession and I think if it is your profession, you must always do the very best you can, don't cut corners, do a professional job. I think where I got really cross was in Whitehall government at the turn of this century. It became fashionable to belittle and ignore professional people, and that included

chartered engineers. HMG policy makers would happily blame engineers for failed Government IT systems when the problems were frequently caused by constantly changing requirements, insufficient funding or the lack of suitably skilled project management staff. Frankly, the wrong people would have the authority while others, less junior, would end up with the accountability. The accountability for failure. I used to think, what is going on? This is crazy. Who designs your buildings, bridges, aircraft and infrastructure... you know? But there was a feeling in government that you don't refer to or consult with an engineer because they'll just make what you want too difficult or too complex. My answer was always that we would try and make it work well, be reliable, and most of all be safe and secure. I would then point out that politicians and HMG officials would be the first people to complain if the aircraft or train in which they were travelling crashed because of a lack of testing. I used to ask if they would ever knowingly fly in an aircraft that had never been flight-tested? Of course, they would not. So why did they think it was acceptable to be so trusting of a new IT system that had never gone live before? IT systems are complex, things will and do go wrong. They need to be designed to meet end user requirements, thoroughly developed, tested and optimised.

[0:32:31]

*What's your response to the title, software engineer?*

Yeah. Well, I know what it means. I think quite often, yes, you can write code, okay, but can you test the code effectively as well? Can you test the system, do you understand how to interpret requirements? Can you evolve a solution that is actually what the end user wants? These are things that are about interacting with people as well and I think there's quite a lot of that missing with some software engineers. You know, it's just a view I have. Sometimes I get really cheered up when I meet some young people who really are fantastic talented and creative software engineers. So, it's wrong to condemn a whole sector of engineering. But I do think society has dumbed down professionalism and responsibility.

*Maybe society pays as well, because if there'd been some chartered engineers looking after that bridge in Genoa... it may not have collapsed.*

Well, this is so true and if you read the great and the good who've come forward and said "...well, the design was flawed right from the beginning", where is their responsibility? If they knew that, they should have drawn it to the attention of the authorities and then if the authorities turned it down, fair enough they did what they could. But, you know, just to be smart and not say anything is not good enough. One of the things that I was taught as a professional engineer – and I had trouble with this in the public sector, I have to tell you – is if someone says two and two make five and you know it makes four, you've got to point that out. And I've done that in a couple of occasions and it's not always been very easy.

*Has it hurt you?*

Yes. Yeah, yeah, definitely.

*Hurt your career?*

Yeah, definitely. On one occasion in particular, which I won't identify, but yeah, it does. Nobody wants to hear the truth sometimes. But at least I have no regrets having stood my ground and discharged my responsibilities honestly and I think with professionalism.

[0:34:39]

*Then you moved into the private sector for a little while, for about a year, paper company.*

Yes. Yeah.

*Robinson's Wax Paper.*

Yeah, I think they started off making cartridge cases.

*Right.*

But actually, it was a printing and packaging company and you might say why, why on earth did I end up in a place like that. Well, we were living in Bristol, I needed to earn some money, decided that I needed a position of responsibility for this vital CEng year, and this role unexpectedly happened to be become available, so I went for it. And it was fascinating, I'd never worked in the printing and packaging industry before, but what an experience that was. I had never been in an atmosphere like that and I've certainly not been in one since. The atmosphere, huge machines with printing webs which are, as you may know, twelve foot wide, going at some speed, together with the noise and vapour! The atmosphere could get you high in a matter of minutes, today we talk about air quality and health and safety but in the 1970s it was very different. The air was so laden with solvents that the RWP factory had something called a solvent reclamation plant which would take the factory atmosphere, compress it and distil out of it all manner of toxic and carcinogenic solvents such as carbon tetrachloride and acetone. People were breathing this, and when I asked them why are you breathing this atmosphere they said well, they pay us more money to work here. I said, well surely, why don't you ask for better ventilation? Well, the management offered it, but they said if we kept on working as it was we'd get another five pounds a week. So that's what they did, you know. It was just shocking, oh, you wouldn't believe it.

*They were gambling their own health.*

Oh, totally. I mean they were gambling their health because they needed the money, the management were irresponsible for just not putting the right environment in place. But, you've got to remember, we're talking about a time when printing industries were very rigorously controlled by printing chapels, even though I was offered a job, this engineering job, by the top people there, I couldn't start until I'd gone to the Stag and Hounds on a Thursday night and joined a printing a chapel and become a brother. You know, the whole experience was surreal... it was an extraordinary procedure that I had to go through. They didn't put the requirement to join the chapel in writing, I had to phone the personnel department. So, I phoned them and they said – and this was the senior management – you must go down there and once you've joined the appropriate organisation, then you can have this job. It was a fascinating role, I had to modernise certain processes, using electronic digital technology. It's extraordinary

now, people talk about digital, I was developing digital systems back in the seventies, for goodness sake. You know, building digital control equipment. But it was exciting and I suppose I came away thinking, the workforce and the management were lovely people on their own, but they were so aggressive and confrontational to each other, something had to give. It was no way to carry on.

[0:37:34]

*You were still dealing with discrete logic, were you? Not microprocessors yet?*

Yeah, yeah, yeah. Yeah, largely 74 series logic, so I was designing stuff using Karnaugh Mapping and all that those interesting logic processes. But great fun, and satisfying because...

*What type of applications then?*

Okay. Well, one particular example, was stabilising the printing web as it goes through various printing processes, it was a synthetic material called filamented polypropylene, which was like a synthetic silk, and RWP had a huge contract with Lux toilet soap to produce a wonderful new wrapper. The problem was that Lux toilet soap sales were falling, so how were Unilever going to get the sales back? Right, we're going to put it in a different shape wrapper— actually, it was about, I worked out, 25% less soap – but we put it in a cardboard wrapper, and then – this was the key selling point – the soap would be covered with this luxurious wrapper that looked like silk. Great. Next thing was, to print on it. Great, RWP had won the contract. Trouble is, the filamented polypropylene would expand and contract as it went through various processes. So, my job was to design a machine that measured the expansion and contraction in real time and fed back these parameters to the control loop managing the overall printing process. So that's what I did. And it was fantastic fun. I used discrete logic, it was very quick and responsive and it had to be simple so the operators could use it. But, the downside of this role was that I was neither management nor production staff, I was from development, so both viewed me with suspicion at times!

[0:39:02]

*And we're back to this, solving a practical problem.*

Absolutely, yeah, yeah.

*This is what you like to do?*

Yeah, I suppose it is. If I'm not researching how you mine for gold, you know, doing something that's totally bizarre like that, let's have a problem, and let me try and solve it.

*You then went into the family business.*

Ah, before then, I worked for a company, a consultancy company in Bristol because RWP wanted to have their digital control box manufactured in quantities for use in their factories around the globe. So, we had to find someone who could manufacture our new wonder box and the company chosen was called Brensal Electronics. This company was a subcontractor to the British Aircraft Corporation Filton and SUD Aviation of Toulouse, who were jointly building the Concorde Supersonic Transport. Brensal Electronics also designed, developed and manufactured electronic systems for the security industry and various other organisations. This was very important to RWP because the digital control box that I had developed was going to be used on all their machines all round the world. So, to cut a long story short, the company that was actually going to manufacture these digital control systems, quickly employed me.

*Brensal Electronics.*

Yeah, Brensal. It started off, I think, between two people, a guy called Salisbury and a guy called Brent, hence the name Brensal, very creative. But the real money came from their work as subcontractors to Concorde. So, I joined them and I thought developing the unit for RWP was what I was going to be doing, making these little digital control boxes even smarter as well as developing various other digital systems. However, Brensal then won a contract to design and make some electronic security systems. The Chief Engineer quickly saw a great commercial opportunity and quickly

left Brensals to start his own company. Almost the day the Chief Engineer resigned, the boss called me into his office and said you're now the Chief Engineer. So, at, I don't know how old I was, but I was still in my mid twenties, I was the Chief Engineer and it was pretty scary. But I learnt a lot in that relatively short space of time, how to price up goods and how to run a pretty successful business.

*All of your work so far has been, or the way you've described it, has been dealing with things, the physical things of the world, making them work better and so on. And you are now in a position of some degree of man management, as it's called.*

Absolutely.

[0:41:15]

*What did you learn from that? That engineers don't make good managers, or what?*

I think I learnt that probably I was better as a manager of people than as an engineer. I think my abilities as an engineer are OK to a particular level, but there are other people who are far cleverer or more talented engineers than me, but they don't seem to be able to get other people to do their best. So, I was able somehow, I think, to persuade, even inspire other people to do some really good work, and I really enjoyed that. I learned how to engage, encourage, persuade all manner of people as well as knowing how and when to nudge fellow engineers to achieve extraordinary results. The pressure during my time as Chief engineer though was immense, because we had tight deadlines, we would have people flying over from Toulouse, landing at Filton, driving across Bristol to our facility in a Land Rover and asking for the electronic equipment when more often than not it was still being constructed in the rear of our assembly plant. So, the pressure was relentless, and I really mean relentless...

*How do you deal with inspiring people to do things that are probably, they think are beyond their capabilities?*

Well, it's interesting. I think I use what works for me and I would always try and find what they wanted as people as well as engineers, what they wanted to achieve in their lives, what was important to them. The key is to be genuinely interested in them as a

person, or as a group of people, and their families. Also, to understand what was going on with them. Because there's no point assuming somebody's going to spend god knows how many hours a day working for you, if they've got somebody at home who's sick or they can't pay the rent, all these things are vitally important. So, I'd get to know them as people. And that didn't mean going out drinking after work on a Thursday or Friday, which might have been nice, but it was about knowing them and their families as people and just trying to understand what was going on with them. So, I found it was more about the psychology of understanding and motivating people than anything to do with engineering. They were quite capable of doing 'the engineering', it was just that they needed a little bit of guidance, a little bit of nudge here and there, and it seemed to work, and it seems to have worked through my whole life really, tell you the truth. Most people know when they're doing a good job or a poor job or where and when they're cutting corners. And if you just get them to look at it and say, well, this is what we're trying to achieve, how does that work for you, how can you contribute. The results can be amazing, people can be brilliant.

[0:43:44]

*How do you deal with stress?*

Ah, yeah. What now or then?

*Then?*

Oh, then? I think erm... that's a very good question. It was stressful, that period. Try and take breaks. I know at the weekend we would try and go away. You know, just try and go away at the weekend if we could, somewhere completely different. But, you know, we were young, we'd got students around, we'd got things going on at the university student's union, you could switch off with those distractions. I mean go to a Shakin' Stevens dance and that would leave you physically exhausted and you lose all your stress. But such work can be very stressful, particularly when you take it very seriously...

*Do you blow easily? Explode?*



No, I don't think so, not compared to many people that I've worked with. I mean the best comparison is with first my father-in-law, he had a fuse that was about three seconds long, and he would just go wild.

[0:44:51]

*This was your next move, into the family business.*

Yes, yeah.

*A family business, anyway.*

Yes.

*In Dartmouth, south Devon.*

Yes.

*They were developing new marine engineering and electronics section they wanted you to be involved with?*

Yeah. They had a boatbuilding business. It was quite an operation. It involved transforming a traditional shipbuilding business that used the new medium of GRP. So that was their part, and my part was to run the engineering part, and that sounded a good challenge. I think we went down to Devon one Easter and walked on Berry Head, the sun was shining, the insects were going chk chk chk chk, I thought, this is a cool place to be. I would rather be here than up there in Bristol with all the pressures of working for Brensals. I thought, the leisure industry might be quite a relaxing place to work, it seemed attractive, I'll have some of that. And of course, that's the biggest trap you can ever fall into, the marine leisure industry might be fun for people at leisure, but the pressure of keeping a leisure business going is enormous. And while the opportunities are great as well, it's a really risky business, both financially and emotionally, particularly if it is a family business. I think the direction I wanted to take the business was also different to the one the family wanted to take. I wanted to build something for the future, while my father-in-law just wanted an enjoyable tax

efficient hobby. However if you have a chance, work in a family business, you'll learn a lot about yourself and other people, but, don't rock the boat, particularly if you are married to the owners daughter!

*But you were there about three years fulltime?*

Yeah. Oh god, I stayed a director for another, about seven years altogether, it must be something like that. Another fascinating experience both of engineering and of life.

*Yes, yeah. But in terms of fulltime employment you were there about three years.*

Oh yeah, yeah, yeah.

*And you achieved quite a lot of your intended targets?*

Yeah, all of them. It was fine. I had relationships with all the major suppliers, I visited various marine electronics developers, shared some great ideas and things were going really well. I had subcontractors working in other places around Devon area and, yeah, it was good. But, you know, I think I got conned. I conned myself by the notion that working in the leisure industry would be leisurely. But the reality was that friends would come down in the summer and wonder why I was not there - I'd typically be out on someone's else's boat, or I'd be in the Channel Isles with customers who used to pay for me to go out on sea trials with them or to advise them on aspects of their boat. You know, money was no object to them, so when I look back I think how amazing it was to meet people from the Sopwith and Foden families and for a short time see the sort of lives they led and the boats they owned, fantastic. But it was a job. And there's a difference between owning a boat and having leisure time and being an employee in an organisation working for the owners of boats, particularly luxurious yachts...

*To support them.*

... yes to support them, because you're there on call 24/7 and I was young, newly married, and we wanted a life together and you don't really appreciate what your life

is going to be like when you are on call 24/7. Particularly when you are young. Extended separations often at very short notice can easily destroy family relationships.

[0:50:37]

*And you went travelling?*

Yeah, too right.

*You were twenty- you were nearly twenty-eight, and went off for several months.*

Oh, nine months.

*Nine months.*

Yeah, yeah, yeah. Oh yeah.

*Lovely. Lovely.*

Yeah, it's been written about, it's in a book entitled *The Hippie Trail: A History*, by some academics from Cardiff University and published by Manchester University Press, errr... I think January this year, 2018. I have a website as well, describing some of the adventures. It was a fantastic experience. Yeah, it was like nothing I had experienced before. I think to experience different cultures is incredibly important. In terms of preparation there was the route planning, getting the vehicle ready and importantly ourselves in the right physical and mental shape for such a challenging and dangerous adventure. I bought a Dutch postal van, and in the dark winter evenings I converted it into a vehicle suitable for driving across the desert regions. We disappeared off for our Grand Tour across Europe, the Middle East and Asia in March '75.

[0:51:35]

*When you came back, you started looking around and you eventually arrived up in the City of London Polytechnic in the Animal Acoustics Research Group.*

[laughs]

*What's that?*

Well, sometimes you need to step into the unknown and do something a little bit wacky, these actions can sometimes bring unexpected rewards. But I think you've got to put this move into the context of the time I had in Nepal, when I had a chance to really think about what I'd done in my life and where I wanted to go. A part of the reason for going on this Grand Tour was to move to Australia. The UK had experienced power shortages, 3 day working weeks and huge political turmoil. I was completely disenchanted with the way UK society seemed to be moving. Working in Australia held many attractions for us, but in the end for a number of reasons, we decided not to go all the way to Australia, and we decided to turn back. My wife had become quite ill through exhaustion and possible food poisoning. And I thought, you know what, after climbing this beautiful mountain in Nepal, all I really want to do was to come back to the UK and be in the heart of things, I wanted to live in central London. I also wanted to get a PhD. Not following up on a PhD had niggled me for some time, so why not go back and do that, make a fresh start in the UK. I wanted to do something that was both interesting and stimulating. So, I came back and there were all sorts of roles being offered, Elliott Automation, hm, that sounded quite fun. And then I was approached by a number of government departments who were very circumspect about who they were, but I understood why they were interested in me, largely because of my engineering background, I'd also been to the Military College, Shrivenham and I knew how to conduct myself in difficult situations. I had also been to interesting parts of the world, like Iran, Turkey, Afghanistan, Pakistan, India, and I now knew their cultures reasonably well. But, you know, all these opportunities came with drawbacks. I couldn't see how I could use those opportunities as a way to complete PhD, even on a part time basis. So, this other role was about using my knowledge of acoustics and engineering to help control pests that were attacking cereal crops in Africa and in France. And this was going to be a way to control them without using insecticides. I joined a team where there were world class entomologists, a neurophysiologist, a taxonomist and a behaviourist. And my role was to be an acoustics expert to analyse the call signs of tettigoniidae, which are bush

crickets. They make a particular call when they're attracting virgin females. When the virgin females hear this call, they rush towards that sound source, hoping to mate. Unfortunately for the bush crickets there was no male bush cricket, only a loudspeaker inside a trap. The females would then be collected and disposed of in a humane way. So that's what it was all about in a nutshell. I couldn't imagine a more off the wall thing to do and I was in the mood for doing something a little wacky.

[0:55:10]

*And you did it.*

And I did it, yes. And of course, this role was all about getting to know certain people who were able to help me start work on a PhD. When I was talking to them I would tell them that I would really like a chance to get on and study for a PhD research degree, but I could not afford to do it without working. So that's what I did and almost everyone then started opening doors and eventually supporting me, all the way along. So, I did what they wanted me to do and in return they all helped me reach my own goal.

*And instead of discrete logic you're now using microprocessors?*

No. That was interesting, not yet it was too early. I think if I'd have known what I knew later, I could probably have used a microprocessor if they had been more readily available. This acoustic stimulator was a combination of analogue and digital separate units. I still hadn't really got to grips with the microprocessor, but that was the next stage.

[0:56:15]

*Where you designed...*

A pulse height analyser, which was a device for detecting or measuring the spectrum from radioactive sources. So, whether it was uranium, caesium, whatever it was, you could detect it with a photomultiplier tube, process the signal and display the spectrum on an oscilloscope. And I did this with a microprocessor that was in effect a PDP-8 on a chip. So I designed this instrument and entered it in the first British

Microprocessor Competition. The competition was launched as if there was going to be a whole load of follow on competitions, but sadly there never was a second one, only the first one. I think it was in 1982, or something like that.

'79.

'79? Yeah, okay '82 was IT '82, that came later, yes, yes, I remember now. So I thought, you know, these microprocessors are just amazing. I managed to get myself on a course, I think I went up to somewhere in Bradford. Bradford University I think was running a course. It was an awful course. It was shabby, oh it was just terrible random notes and pieces of paper. But, it got me into microprocessors in a serious way. And as I started to look around for further training and various other opportunities, I found that there'd been a new initiative between an American company, you probably know them as, Integrated Computer Systems (ICS) or as Learning Tree International, the NCC and PCL. This was a joint venture supported by the UK's National Computing Centre (NCS). So, we created this facility called the Microcomputing Unit. So, somehow or other I managed to get myself a role – there were only a small number of us, about two initially, I think. Later on we probably got to three. The rest were from ICS. And we'd run these courses in microcomputers. How to repair them, how to design with them, how to program them. Fantastic, I mean you've got to give them their due, the Americans knew how to deliver a course. Comparing my experience up at Bradford University, with their ill prepared three-day course, the PCL/ICS training was very professional. We had beautiful rooms, beautifully lit, with well designed learning aids and teaching material. Although it was a PCL building it was all decked out as if you were entering a global computer company. We had reception area with coffee and very polite elegant women who would be from ICS, acting as receptionists, all hand-picked. The trainers would be experts in their field who would write the course material, and they would typically be from America and have very engaging ways of presenting. We'd use two overhead projectors - you may have even been on one of their courses - you also have all your printed notes in front of you, and the lecturer is talking you through each page. He would display one page on the left view graph, and then whilst you're making some additional notes from it on your own hard copy, he would move to the next page on the right hand view graph machine. This approach gave attendees time to make their

own specific notes on each page of the prepared training material. This approach to training was very clever and always very effective. They used all sorts of interesting psychology to maintain people's attention. One of my roles was to look for the difficult ones during the coffee break, because I could usually sense, or find the arrogant one who either knew it all, or who didn't really want to be there, and that person could be a really disruptive influence. So, what I did was identify them early, notify the presenter who would then make a point of bringing them out to be part of the training, rather than squash them. So, I learnt an awful lot through these courses. I was possibly learning as much if not more than anyone. It was a fantastic learning experience. Lord Baker was a political inspiration at the time, leading up to the IT82 initiative and championing microcomputers. It was such an invigorating and exciting time to be involved in computing. After I had delivered my side of the bargain I pursued my desire to register for a PhD. I was told that I could have one day a week for private consultancy, because a lot of people at academic institutions provide consultancy services and get paid quite well. Or I could study for a research degree. Well, I just wanted a research degree. So, that's when I started working and I started working on microprocessor-based computer speech recognition.

[1:00:30]

*So you're good at explaining things, you learnt that.*

Yeah.

*You knew that you could explain this technology, and along came IT '82, the initiative by Lord Ken Baker, who was our 60<sup>th</sup> contributor to the Archives.*

Oh really?

*Oh yes, yes.*

Oh god, I haven't read that. Oh, what a hoot.

*We've seen him, we've, I interviewed him.*

Oh, wonderful.

*And he went around the country talking about and demonstrating and championing the use of microprocessors.*

So, you know this, I don't know where it came from, but somebody said, look Michael, there's this initiative going on with the NCC, would you like to be a part of it... I said, yeah, would I! So, I get aboard this sort of battle bus where we had all sorts of equipment, and we would drive to places around the country. I mean, it was one hell of a roadshow, you'd stop in somewhere like Chichester and you'd have everyone from the Mothers' Union to the local doctor, to somebody from the local college just turning up to see what it was all about. You would take them round the demonstration vehicle and explain things about the various microprocessor exhibits. It was a great experience. You knew something amazing was happening, because in Parliament at the time, everyone was talking about how this chip was going to change your life. Unfortunately, there was an awful lot more that went with that chip to make it useful. There's a program, there's a printed circuit board, the IO devices and all these other support devices... It isn't just the chip. But it was a fantastic time ... probably similar to Kennedy kicking off the race to land a man on the moon. It was quite some initiative that had real substance which I thought the government and the NCC did a good job in pushing forward. Oh, it was great to be part of that adventure. Wonderful.

[1:02:28]

*And then you studied signal processing.*

Well yeah, it was not long before I was studying for the PhD and officially I only had this one day a week off to study, while I was working for the Microcomputer Unit, but my one day a week of studies was creeping over to two, or maybe even three days a week, because I was living computer speech recognition day and night. And it was clearly unsustainable. So, Professor Gerry Cain, who headed up the signal processing group at PCL, and was a lecturer on the masters lectures I had attended, was and is a very well-known signal processing expert, recognised my predicament. He said, I know what you can do and what you want to do, and I know it's tricky for you, why



not come and join my group. And I said, well, how am I going to do that? And he said, well, I've got some funding, just be yourself. And so, all I ask is, if I bring visitors round, you demonstrate what you're doing. Gerry, I'm yours. [laughs] So that was it, that was lovely surprise from an exceptional person. And what an environment. You had people working on all sorts of interesting developments there and, you know, we'd work long into the night with the old line printers going zig zig zig zig zig zig, at 11 o'clock at night and even 1 o'clock in the morning. But we had a ball and Gerry was such a bundle of energy, so different to any other sort of lecturer, you know, I liked him a lot. I guess that's the point. He was inspiring.

[1:03:56]

*You had to raise funds for research.*

Yeah, yeah. So how are you going to do that? Well, I didn't really have a track record, you know, in an academic sense that I could point to in my applications. So, I tried all sorts of things. I wrote to Margaret Thatcher. Actually, I wrote to Margaret Thatcher many times. One day I got a phone call from her office saying the Prime Minister is aware of what you're doing and she is sending someone to see you. So, she did. It was somebody from the DHSS, and they funded me. Then I went down to the Admiralty Research Establishment at Portsmouth where they were designing a new warship command and control centre. We got on really well there, and there was the promise of some big money coming in. Then they closed that department. The first I knew about the closure was when I phoned one day and asked where my funding was... the answer was, well there is nobody here anymore. What do you mean, there's nobody there? Just like that, the department had just disappeared. So, then I wrote to the Prince of Wales because he had created a wedding present fund that was being distributed to good causes. I explained that I was developing a computer speech recognition actuation system for disabled people amongst other systems, saying that I thought it was socially responsible, and how it could also be used in medical areas and that sort of thing. And so, they funded my work. I gained funding from the most unlikely places, and I've still got all the letters, like these here. When I look back, I think, god, I had a nerve to have done that. But I think it was desperation, I had nothing to lose, so why not? They can only say no. And if they say no, you try again and you try again, like I did with Margaret Thatcher, and I received

funding in the end. So, although I'm not the biggest fan of Margaret Thatcher, I'll tell you what [laughs], she funded part of my work, and it was her government that created IT82 and the Alvey Programme. That deserves admiration and acknowledgement as far as I am concerned.

[1:05:43]

*By this period in the mid, early to mid-1980s, of course we have Margaret Thatcher, we have this enormous sea change in politics, we have the break-up of the consensus, although there'd been Tories and Labour, consensus around the idea of an industrial policy, industrial policies were thrown out, organisations were privatised, the big one of course being BT being privatised, this huge, service operations for telecommunications. And we find that some very important companies who are feeding in to this process are now very vulnerable.*

Yeah.

*ICL is incredibly vulnerable.*

Yeah.

*Elliott Brothers becomes vulnerable.*

Yes.

*Ferranti becomes vulnerable.*

Yeah.

*Plessey becomes vulnerable.*

Oh yes, yes.

Yes?

Yes, absolutely. An extraordinary time and the company, Smiths Industries, that most people know as Smiths from their clocks and from instruments in their classic British cars, which was just one division of that great company, had read about what I was doing. Because one of the other things I did to gain exposure for my work, was to write articles for engineering journals, and the bottom line would be, if you're interested in this work, this is my telephone number, come and see me, and support my work financially. So, Smiths had seen an article I had written, and had sent somebody down to see me in the PCL Microcomputer Unit. They were starting up a new research group, a product technology group to get onboard with new generation technology. They came along and were very enthused about what I was doing, and I thought oh, the money's just going to come along. But I didn't hear anything more for a long time. So, I was really disappointed by that. But I won a contract with the DHSS to produce a number of machines and I thought, well, that's alright. I can live in London, doing worthwhile work. I'm happy, I've turned my life around, I've got a good relationship now and yeah, my life is looking pretty good. And then out of the blue, I have a phone call from a head hunter working for Smiths Industries. And they told me that Smiths were really interested in me, and they wanted me to start up a new section on computer speech recognition systems for aircraft. And [sighs], you know, it's like [sighs], really? And I said, well, why don't they just give me some funding and I'll develop it here in London? No, no, said the head hunter, they want you down in Cheltenham to build a team and all the rest of the smooth talk. So, they started – well, I had some more interviews and things – and then they started offering some really enticing incentives to join the company. And so, I asked my supervising Prof...

*Gerry Cain, yeah.*

[1:08:27]

Yeah. I said to Gerry, this is what's going on. He said, Michael, just take it, they're offering you more money than I get as a professor here, just do it. Get really high quality, global industrial experience, drop your PhD, get an MPhil instead, you can always do your PhD later. [sighs] Damn, that's not what I wanted to hear because, you know, I'd just bought a place, off Notting Hill, and you know, good grief, this wasn't my plan. But I could see the sense of it. Smiths had observed of course, that technology was moving on, they been terribly slow to embrace new technology, but

they had a good if somewhat staid reputation. But what they now wanted to create was this new dynamic department where they had people working in artificial intelligence, flat panel displays, human factors, and my own bit in computer speech recognition. And actually, I liked that, I liked the way they had analysed their situation, the board had seen something exciting, and they'd chosen me. So, I thought, this sounds really great. So, I went down to Cheltenham, but as you can imagine, I had a new girlfriend and suddenly my life was good in London. And here I was, once again being stretched apart. But it was fantastic working for them. I mean they weren't like some companies that pay you an awful lot of money, but they looked after their staff and they looked after me incredibly well. They sent me round the world, I travelled to Japan, all over America, all over Europe. They looked after me and I did what they wanted and I thought it was absolutely fantastic. We were demonstrating prototype products within eighteen months. The managing director of Smiths was Sir Roger Hurn, who later joined GEC was a very approachable and reasonable person. He was also the chairman of Smiths. So here I am, heading this unit and I'm having conversations with the head of the company and meeting all the Board members at various places. And I just thought, you know what, if a company's prepared to do this for its employees, it is a company that deserves success.

[1:10:52]

*And the object was direct voice input?*

Yeah.

*So that people in cockpits could say things and the plane would do things?*

Yeah. Because the thing was, aeronautical design had progressed to the point whereby pilots in agile supersonic aircraft, were so busy in the cockpit, they couldn't control everything and be looking where they were heading at the same time. So the challenge was to be able to control radio frequencies or the different head-up displays in a fighter aircraft using speech commands. You might want the bomb aiming, weapons, or navigation head up displays. And you can't manually select that kind of thing when you're flying at low altitudes and at supersonic speeds. So that's why we had to...

*You can't type. [laughs]*

Not if you want to survive. So, we had to develop DVI systems and of course a vital part of this, was developing DVI that would operate in a noisy, high stress environment. It had never been done before. Some colleagues of mine who were working in speech recognition - if you recall, from the Alvey programme, they were developing the voice operated typewriter - people used to say to me, god, I wouldn't want to do what you're doing. And I'd say, coming in and talking to a typewriter is a lot harder, at least I know the aerospace environment, I know the acoustic level at the microphone, also pilots are highly trained, they're very disciplined and believe me, if they think they're going to crash into that building they'll take avoiding action. So, yeah, it had its challenges, but I had a pretty good idea of how to do it, and how to overcome the challenges. And Smiths supported me one hundred per cent. And as a result of their support, I worked collaboratively with a part of GCHQ, which was the Joint Speech Research Unit and also with Logica.

*What did they need it for?*

I couldn't possibly comment.

*Speech recognition? Telephony? To spook us?*

Could be.

*You couldn't possibly...*

Comment.

*You couldn't possibly comment. So we move on, delicately of course, to the fact that you were seconded to the UK National Physical Laboratory for three years.*

Yeah.

'87 to '90.

[1:12:54]

Well, here's the challenge. I'm running this group in Cheltenham and I have experiments running at NASA, Ames in California, Wright-Patterson Air Force Base, US Navy, and I have other experiments running all over Europe, and I'm getting data – oh, and by the way, at night I'm writing my PhD. Because what I'm doing is great content for the PhD.

*Absolutely, cutting edge.*

Got to be. I obtained various patents for the company, and almost everyone was really happy. But then I've got to write up this thesis. Well, there isn't enough time in the day and I was a bit distraught running a team, supervising experiments in several countries and also trying to write up the thesis. I didn't know quite how to do this and I was also working in several consortium under Alvey and Esprit European funding, which again, was a fantastic scheme about learning about different European cultures and sharing technical ideas. It also demonstrated how as Europeans we could all work productively with each other. So, Dr Michael Delaney who headed up the acoustic side at NPL, spoke to his divisional director Dr Keith Shotton. I understand that he told Keith that there's this chap who's working in industry, and he's doing a good job and we'd like him working with us here at NPL. I mean, I couldn't believe this, but basically the deal was, I would be at NPL as a catalyst to inspire other people in the NPL, they were experiencing the same sort of thing as Smiths, they had realised they were a bit behind the curve and they needed to get on top of it. So, I said, well, what do you have in mind? NPL responded by saying that they would pay my industrial salary, give me a travel budget for America, a travel budget for Europe and one for everywhere else. My response was to ask what I was expected to do in return? Just be yourself was the reply. You know, I'm there sort of thinking, bloody hell... [laughs]

*So there's somebody walking around now without a hand because you bit their hand off.*

Yeah, yeah. But, you know, the thing is, look, the UK's National Physical Laboratory, what a fabulous history that place has.

*Alan Turing, packet switching.*

Yeah. There was an early computer speech recognition researcher at NPL called Brain Payne whom I had visited when I first started work on computer speech recognition. Sadly, he'd passed away by the time I got there, but it was a fabulous place to be and it was wonderful to have the opportunity to write up experiments and discuss them with interested scientists. So, it meant that I could process all the data, although I still travelled to the US quite a lot, collect the data from the experiments, crunch it up on NPL computers and write it up. I mean...

*What's not to like?*

Well, it's just... I'll tell you what the difficult part was. The difficult part was, I had to break from my team and someone else had to take over my role in Cheltenham. That was fine, but what's interesting is, when you see someone else using your words, making your presentations, that can be very difficult. But I kept on saying, Michael, you're getting your PhD, now just stop it and move on. [laughs]

[1:15:47]

*And you did get your PhD?*

Oh yeah.

*And then you decided to move to Ferranti. You were headhunted for Ferranti.*

Yeah. Ferranti, as you mentioned...

*For a new business unit with opportunity for developing innovative new products.*

Yeah. Well, as you said, Ferranti, much like Smiths, had a fantastic record of innovation in electronics and communications. Ferranti computers, for goodness

sake. And yet they somehow, they had lost their way and were behind this curve, this big wave of innovation was coming in and they were just not ready. So somewhat late in the day they said look, we're going to develop new innovative products. And so, this was the Business Development Unit in Moston, Manchester and Bracknell. They wanted me to head up this new group in Bracknell that was going to take the new signal processing technology and create new products. They also, if you remember at the time, were developing something called the Zonephone, which was a CT2 cellular phone that you could only use on street corners. Again, many other interesting products. But their fundamental flaw was, they wanted to preserve the military production line. In other words, the way military communication equipment had been made twenty years earlier, they wanted to use that production line process for new consumer items. Now, the experience that I'd had with Smiths, particularly visiting Japan, showed me you wouldn't do it that way, you would just subcontract a module to be built in China or Japan or Korea using entirely automated processes. But Ferranti could not accept that, no, we're going to maintain our existing production methods. So, anyway, I tried. We got prototypes up and running, but one day when I was in California, I had a phone call from my wife, she said, oh, it's on the news that Ferranti's got a bit of a problem, something about a \$20 million hole in their accounts. So, I phoned the chairman and I said, my wife has just told me that we've got a £20 million deficit. He said, we're a billion pound company, what's twenty, or £200 million. I said, well hang on, she told me it was twenty million on the news only a couple of hours ago. Suddenly on the phone it was now 200 million, and I'm thinking this is getting serious. Anyway, it was a meltdown. The Ferranti board had sanctioned a merger with a US company called International Signal and Control Group which was driven out of desperation and an appalling lack of due diligence by the Ferranti board. This merger coupled with the fraudulence of ISC, meant the end of the great company Ferranti. I managed to survive a year. I'd also had some patents of my own at the time.

[1:17:42]

*Did you have any emotional response to that or was that, okay, this is what happens in capitalism, Schumpeter and all of that?*



Yeah, I mean I felt angry at the way in which employees were being treated. Some of the people who'd been with the company for 30 years were going out the door without a pension, without even a goodbye. And there were some wonderful people there, you know, it was a privilege to work with them. Early one Friday afternoon I asked a colleague John, where he was going? He said, oh, it's my last day today. What? And nothing's arranged for you... no, the job has gone. And it was also the loss of the history of Ferranti, that was also so sad. In Moston there was this Ferranti museum and I love history and I love looking at historic electronic equipment, so I'd go up and look at all these computers and communications equipment. And the staff in Moston ran it so well, all items were indexed on cards and there was a curator. But it all just disappeared, and I have no idea where the contents have gone. I'd love to think it was grabbed by the Science Museum, but I've got a feeling it was just pillaged, I know some people just took bits and didn't care, it's gone. I felt angry about that. I also felt angry about the person that they employed, a Texan, to wind down the company. He got his million or a million and a half pounds, and it was quite clear, he was just winding it down – there was no attempt to try and create another company and save it. And while I agree, Ferranti was probably past saving in one sense, this would have been a candidate for what they now call pre pack, whereby you could get rid of the debts and just grab the bits that have value and sell these on as a going concern. But I'm afraid it was just meltdown and that was the end of that, which was a great shame.

[1:19:25]

*You then went to Domain Dynamics Ltd.*

Yes. Well, some...

*For a couple of years.*

Yeah.

*Again, developing ranges of smart sensors?*

Well, they were connected, you see, because the person who owned a lot of Ferranti's patents was a retired brigadier, at RMCS Shrivenham and he had licensed them to

Ferranti. So obviously, when you're in that circle and you see that the job's going down the toilet, you're going to sort of say, well, what else can I do with it? So, the retired Brigadier and I put together a consortium, approached various venture capitalists, and gained funding for an entirely new business. And at the same time, some of the patents that I had were becoming rather expensive to upkeep - you probably know that you can get a patent for an invention and initially it doesn't cost you much, but then when you start having to register the patent in various countries, it becomes a lot of money. By now I had a new wife, a new family, a new mortgage and I thought, no, I'll move my patents into a new holding company. And then the holding company was moved into Domain Dynamics, so it was a reasonable outcome... It was a bit incestuous in some ways, but we carried on, basically, with what we had originally wanted to do under Ferranti.

*Right. You were three years there.*

Yeah.

[1:20:41]

*Then a very big move. I want to be able to spend some time on this and on your next major Cabinet Office job.*

Yeah.

*This was into the Metropolitan Police.*

Yeah.

*They found you?*

Er... I think this was one of the few jobs that I actually applied for.

*Okay. And they wanted help with turning the IT department from an inward looking department into one that focussed on helping the needs of the operating police.*

Yeah.

*Instead of wages and payroll and that type of thing, asset management, they wanted some systems there, to develop some systems that were going to help the bobbies on the beat, the detectives who were actually doing the investigations, yes?*

That's part of it, but I think they also wanted a change in attitude, There was a Chartered Engineer in the Met called Nick Boothman. Nick had been their chief engineer and he had merged the department of computing with the engineers' department, into a new department, called the department of technology. And he had tried to bring it together but he needed additional help and support in doing this. Having recently come from industry where I had gained experience developing and delivering systems and services to meet end user requirements,, I was seen as having the skills urgently needed by the Met. The perception in the Met at the time was that support departments had grown and become rather self-serving, rather than looking to see what they could achieve for front line policing. One of the key things I did at Smiths was, to engage with front line pilots, because I'm not a qualified pilot with air combat experience but I could listen. So, we used to get these experienced pilots into our lab at Smiths and ask them to help us design systems from the perspective of the end user. It was this process that we hoped to replicate in the Met. In reality it was an early form of, well, maybe I can call it agile engineering, but really, it's just good engineering. We develop a little bit, try it and then we'd come back optimise and develop a little bit more. So, it was the same sort of thing. And yeah, I had various roles within the Met.

[1:22:50]

*This is the Centre for Applied Research in Technology?*

Ah, that was one of the groups that I created, yeah, a small group similar to a 'Skunk Works'.

*Again, twelve technologists and so on?*

Yeah, twelve. The Centre for Applied Research and Technology (CARAT). In an organisation with a two-billion-pound budget overall. Tens of thousands of employees needed to be supported with technology, yet just twelve people recruited from open competition were able to work miracles.

*And you also went round proselytising...*

Absolutely.

*... as it is now called, as you had done in '82, telling the Met internally, look, you could do some things here.*

Yeah. Yeah.

*And one of the things you did was that you built systems that helped people share information, sensitive information.*

Yes.

*But securely.*

Yeah. Yes, because it almost defies belief if you think about it now, but the Metropolitan Police District in 1992, was everywhere more or less inside the M25. At that stage these areas were broken into smaller sub-units and there would be a local intelligence officer who would have information on objects of interest, such as people, activities, or things that were of interest in that area. But, so did everyone else in all these disjointed disparate groups. Very occasionally if they knew someone, they would possibly talk to someone from another unit, or even share some hard information, although somewhat reluctantly. But this was...

*Oh, I know Bobby in Brixton, but I don't know anyone in Tottenham.*

Oh, exactly, exactly. And no one had made the connection that the information you had on your criminals in your unit may also be of interest to another unit over there

and in fact they may even be meeting people of interest the other side of London. They tended to take a very parochial view. So, what we did with our network and our ability to connect up disparate systems, was to give a live demonstration of a connected intelligence network, and it sounds easy to do, but it took a long time to get to this position. But when the great day arrived, we had all the key people in the Met present, the Commissioner Sir Paul Condon, ACSO David Veness and the charismatic detective Commander John Grieve – plus all the other great and the good. We gave this demonstration and they observed rather cynically, yeah, yeah, yeah, we've seen it all before, but what's it like on a live system. We said, this is live. Do you want to give it a try... so they gave some queries, and by the end of that day we'd had three hits, we'd pulled in a Yardie suspect, an IRA suspect and then an organised crime syndicate. And it wasn't that we found anything new, we had just made the connections between various objects from disparate previously unconnected systems in near real time. We had then joined them up in like a spider's web and said, well, something's going down here, and we think that, if this, then that. The whole thing was just like, veils coming off the Met's eyes. Now, the Commissioner at the time was Sir Paul Condon and the Met were in the middle of the Stephen Lawrence Inquiry and the Met had been labelled institutionally racist, and it was believed that we didn't have control over our information. So the Commissioner did not hesitate to give us his full support and that's just what he did. So...

[1:25:47]

*How did you overcome these silos, because, you know, here's Bob in Brixton, yeah? And he's got his card index, or he's even terribly innovative and he's got this little microcomputer he brought in and he's put it on there and he's got an Amstrad, and he's got it all on there. And so how did you, you know?*

It was horrible. Everyone was doing their own thing. We had devolved bodge... budgets. Bodge, I was going to say, that's probably it. We had devolved budgets, and local officers would make their own system or application. The problems came when the operational units couldn't do without their local DIY solution, and the creators had moved onto another part of the Met. The people remaining had no idea how the local system had been created and centrally we were unable to support it, because often we didn't know it even existed and we certainly didn't know how the

local network was configured. It was a disaster, so it was a time of short-term unsustainable innovation. So, what we were trying to do was bring some rigour and structure back to the Met's IT. We approached this challenge not as rivals but professional engineers working with end users wanting specific outcomes. We would say, you identify what you need and we will work with you to engineer the solution properly. That approach worked extremely well. But do you know, the biggest problem in my whole IT career has not really been technical stuff, it's been about people. People's attitudes to not wanting to change, even for the better, or it's been a power thing. I want to control the largest budget because it gives me power. Or I want to hold on to that piece of information because it gives me power over others.

*Right.*

You know, we had to tackle so many issues like that. It was very, very tough. But, as long as we had a few champions that were well respected, Commander John Grieve, for instance, you've probably heard about him. Any high profile unsolved crime and he would be called in. He was known to visit crime scene that might be three or four years old and he would find something that other people had missed. It was incredible. So, we had great police advocates who supported us as we developed our well engineered solutions. The next stage was to develop and implement an overarching Information Strategy for the Met Police. The strategy was developed and funds were secured to implement it, but events leading up to 9/11 saw me move to the Cabinet Office to work for the Joint Intelligence Committee. In the end the majority of funds allocated to the implementation of the Met's much needed information strategy were spent on police overtime. Many of my Met activities remain known to only a small number of Met police officers and are classified but I believe the part I played in helping make London a safer place to live, is what has made my career in IT so meaningful and personally rewarding.

[1:27:29]

*Eight years there. You're really on the radar now.*

Yeah.

*Of central government. Not only central government, but the Cabinet Office. Not only the Cabinet Office, but the Joint Intelligence Organisation.*

Yeah.

*And in early 2001 you're appointed IT champion to the UK's Joint Intelligence Committee within the Cabinet Office. Now, if you told the Archives what you really did there, you'd have to kill everybody who'd watched or listened to this, of course.*

Absolutely.

*But you can tell us a little bit about it, can't you? You developed business plans, you raised funds. Again, you overcame silos of information, but what would you say is the main thing that you did there that you can tell us?*

Um, okay, let's put it into context. There was a great deal of information existing in the Whitehall environment, the same as in law enforcement. The information was labour intensive and expensive to obtain. But the information was not always reaching the people who needed it to make operational decisions. So, the challenge I was given was to come up with a way in which we could join together this community of users of sensitive information in a way that both protected the content, but also enabled the people who were authorised to access it, access with an appropriate and secure audit trail. Up until that point there were all sorts of processes and procedures that were in place to safeguard the sensitive information. Simply by disclosing where it had come from could put people at risk. You look back at the Enigma in World War Two, for instance. Many times, the allies knew what the Germans or the Japanese were planning but the Allies couldn't act on it because it would make the Germans or the Japanese suspicious. So, it's the same sort of thing here, you have to protect your sources and how you've obtained this information. So, this was part of the challenge and the best way of describing why this was so important is to look back in time and see what happened to PC Yvonne Fletcher, who was shot outside the Libyan Embassy.

Yeah.

It is in the public domain that unknown to the Metropolitan Police, there were armed people inside the Libyan Embassy. However, it was known to certain government agencies. But they had no way of getting the sensitive information to the appropriate people in the Met. And you could say, well, of course there was, you just phone up. But, at the time you could not just phone up Scotland Yard and say, hello, I'd like to talk to the bobby who's just going to go secure the demonstration outside the Libyan Embassy. This is because if you don't know who you're talking to or you are unable to validate their security clearance, then the message would never be sent. So, that is just one small example of where vital, highly sensitive information was known, but not used. So the JIC had rightly recognised that information sharing was really very, very important. But of course, when you share information you also increase vulnerabilities and the probability of something going wrong. And that's the dilemma that you've got. And so, I had to come up with a mechanism that was acceptable to all 10 government users of highly classified information, whereby all the authorised users of highly sensitive information could access it, and access it in a way that's safe and that would provide an audit trail. So it's not an easy task at all. It is tricky and it is demanding, but to be honest, I don't think the technical challenges were as great as the human challenges. And by that, I mean, sensitive information is guarded, quite rightly, but sometimes the process is counter-productive. It does depend where you sit, of course. If you're the person that might be being exposed, then it's the most important thing to you, but if you're trying to succeed in some activity, then of course you want all the information that you can obtain. And it's trying to get that balance right and when you're in the Whitehall environment you find Whitehall departments don't always work as a cohesive team. They have even been known to run their own agendas.

[1:31:46]

*From that experience and also experience of working in the Met, your sixteen or so years of very heavy work there, how far has the issue of the need for security blocked the need for open government, do you think?*

[sighs] There are many people who hide behind national security. You may ask a very reasonable question, either as a civil servant or as a member of the public in a



freedom of information request and the response might be that I can't tell you that, because of national security. So, that approach has stopped open and transparent government in some ways. The whole point about information security is that it is so vitally important, yet we seem to have encouraged the creation of information systems where the security is frequently bolted on as an afterthought, whereas it should be part of the fundamental design. Unfortunately, security breaches will always occur, either deliberately by enemies of the state, rogue authorised users, or even by irresponsible software suppliers failing to update vulnerabilities in their code.

*What was the programme called?*

Sorry, I am unable to tell you that.

*Okay.*

[1:33:18]

But, if we look at other parts of government where they've rushed headfirst in, and they've put in a part designed system and then things have gone wrong, it should not be surprising that they've gone wrong, it's not surprising they've been hacked and data has leaked out.

*Are you talking about NHS patient details?*

Well, that's an example. In some ways that's an example of cutting funds, or not allowing sufficient funds to upgrade key operating systems in one particular part of the NHS where you know there are vulnerabilities. It's also irresponsible that suppliers, Microsoft in particular, fail to support operating system still in use. There's much that could have been done to protect a lot of what's gone wrong in the NHS and other areas. The issue is that when you're working in the really sensitive areas, you've got some fantastically capable people who really know the importance of securing information, but these people aren't always the people who are consulted. It may not be national security, but my goodness, it might be about your life, the wellbeing of your family, or the integrity of your finances. A whole load of things that are equally important to you as an individual or as a family system.

[1:34:38]

*Couple more questions for you, if you don't mind. I know you've had a long interview already, but I think I want to ask you these because you were- I know you can't give us the detail, but your reflection upon it is very important. There was an article in The Times today by a columnist which ends up, 'It may seem blasphemous to say it in the age of technical worship - technology worship' and it may well seem blasphemous to say it in the headquarters of the Worshipful Company of Information Technologists, but we will say it, 'But not all technology equals progress and not all technology is necessary'. How do you respond to that?*

I totally agree. And I think some technology is developed and pushed out on the market for consumption by both citizens and government when it's just totally irresponsible to do so. I suppose one area where I really got cross, is when government decided it was acceptable to share or sell the data it had on the public. So here we are, under GDPR, trying to regain control of the data people send us. I believe the government was complicit in allowing that data to be sold or shared in the first place without consulting the public. There is a tendency to rewrite history after some pretty bad events, even within government. The thing about technology, I'm being caught in a difficult place here, I suppose, is that in the last twenty years or so, IT has not always been a good thing. There have of course been many fantastic benefits delivered by IT, for example what computing does for medicine and general healthcare, in scientific research, in air traffic control, you couldn't travel like we do without IT, but there's a headlong rush to create digital technology everywhere without thinking it through, or funding it appropriately. And if government funds a project, they quite often fund it under the assumption that the skilled and qualified staff will just appear to make it all happen as if by magic. Then, six months, nine months, a year, two years later there'll be a realisation that they do not have sufficient staff with the necessary skills, or they decide to arbitrarily decide to cut key staff. This often results in the project staff with the necessary user experience no longer being involved in the project, but the external service provider or developer still carries on believing they know what is required. They may be doing the best they can but they rarely understand the end user needs or expectations. And so, in some ways it's a crazy situation when an IT contract is let to a technology supplier but then fails

to support it all the way through with sufficient client-side support. IT project delivery is a two-sided activity, you can't just let an IT contractor in and expect them to deliver something that is perfect without engaging with them all through the design process to roll out and final sign off.

[1:37:25]

*Fifteen years or so ago, certainly at the turn of the century, the internet and its applications were lauded as a liberating force by most people, not everybody, but by most people, liberating for the individual, liberating for entrepreneurship. What happened?*

[laughs]

*What happened? We have four monolithic companies of enormous staggering wealth who control a tremendous amount of not only the information, but also the applications and our access to them, who are, some have argued, laying waste to the innovation around them because as soon as they see anything that is likely to challenge them, they just buy it, they've got so much money. And at the same time we have enormous blow-ups of personal information. It doesn't look very liberating, does it?*

Well, I don't disagree with you. I am as concerned as anyone. It seems that the mantra that you must be allowed to do anything on the internet is flawed. I think some sort of control would be good, but I think we've all seen how governments can try and control information and even distort it. And that can be just as unhealthy. It's almost as if we've let this information genie out of the bottle and we're now all struggling to see how we can manage it. I don't think we should be afraid to face up to the challenge, it's also quite right that there are government departments that need to manage information for the purposes of national security, I have no doubt about that and I fully accept it. But, there are other areas whereby information shouldn't be controlled. The ability to look up any information on any topic is absolutely stimulating and extraordinarily liberating. But, what about when it's wrong, when it's deliberately false, when it is misinformation created by a malicious UK citizen or by a mischievous foreign power. We haven't really thought this through, and we are

starting to see a generation of people who are being led astray thinking everything they see is honest and true, when it most certainly isn't. Undue control of information whether by governments or by monolithic companies, is as dangerous as no control at all. It leads to situations where information can no longer be taken at face value and decisions are made on misinformation rather than evidence and factual accuracy.

These are challenges of epic proportion.

*Well, the thing about you, Dr Michael Taylor, is that they'll hardly find anything about you when they google you, but they will find a lot about you when they listen to these Archives. Thank you very much for your contribution.*

Thank you, Richard.

[recording ends at 1:39:46]

### **Voluntary Work**

Since leaving his full-time employment in the Cabinet Office, Michael has used his passion for digital technology to improve the quality of life for disabled people. He has been a Trustee/Chairman of several IT charities and was the Chairman of AbilityNet (2009-2017), the leading global authority on the use of digital technology to help disabled people from 2009-2017. In 2014 he completed the design and build of a digitally controlled e-Trike for the rehabilitation of injured and disabled people. The e-Trike was demonstrated at the 6<sup>th</sup> International Work-Conference on Ambient Assisted Living and Daily Activities, Belfast in December 2014. Going forward, Michael believes there is scope for more consolidation in the 3<sup>rd</sup> sector.