Capturing the Past, Inspiring the Future

Ian Taylor MBE

Interviewed by

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Welcome to the Archives of Information Technology. It's the 19th of September 2019, and we're in the offices of the Worshipful Company of Information Technologists in Smithfield, London. I'm Ian Symonds, and I've been working in information technology and management consultancy since 1976, a period of enormous change in the industry.

[00:22]

Today I'm talking to Ian Taylor. Ian was Minister for Science, Space and Technology from 1994 to 1997 in the Conservative government under John Major. He has continued to take a strong interest in science and technology during the remainder of his parliamentary career. After standing down as an MP in 2010, he has pursued his business interests with a wide portfolio of directorships and advisory roles, mostly with science and technology companies and those who invest in them. We'll be talking about Ian's background, influences, and some key events that shaped his career, and also his views on the industry today. So Ian, where and when were you born?

Coventry. My parents had… My mother had survived the war, because she was an assistant air-raid warden of course during all the bombing, and my father was obviously in the Army, and was injured out, and I was conceived in '44 and therefore born in '45.

OK. And what were their, what did your parents do as, for occupations?

My father, after the Army, lost really his place in university, and impetus, and, times were hard. So he retrained as a chartered accountant, and, ultimately became the Chief Education Officer for Coventry. My mother did all sorts of, sort of, typical part-time roles including being a school secretary for a while.

OK. And you were brought up in Coventry as well?

Yes.

What was your family life like there?

Oh, we had a very, marvellous time really I suppose, looking back on it. But, sort of… I remember the rationing of course, until the early Fifties. And, school food was ghastly. But apart from… Our home life was, was fine, not comfortable, but my parents provided for us extremely well. And, my grandfather ran his own building contracting company, which gave me a marvellous opportunity to carry bricks for him, probably against all the health and safety rules, but nevertheless… So all sorts of interesting things. But mainly, as I grew up, it was sport, and I was, [laughs] in those days, looking back, rather good at sports.

Which… Anything in particular?

Well, I played for Coventry and Warwickshire at rugger at every level really up to senior. But I didn't play for the senior team. Coventry was *the* foremost rugger club in those days. So I played with all the greats who, one way and other, although I didn't play in the first team with them, Duckham, Peter Jackson, Frank Cotton, John Owen, Bill Gittings, you know, the list goes on and on, the Coventry players who played for England. So, it was, it was good. I also ran for Warwickshire in school, 440 yards, 220 yards, as it, yards in those days. [laughs] And, so I had a lot of fun with sports. Cricket I also took up, obviously, in the summer, and, actually kept cricket going until my late fifties, but obviously the other sports I gave up, fairly soon in my twenties.

[03:54]
OK. And, you went to Whitley Abbey School in Coventry, as I understand it, and, was that a state school?

Yes. My parents wanted me to go to boarding school. As I failed to get into the school my father had been at, which was Bablake, which was a direct, I suppose a grammar school, and… But times were hard, for me as the eldest son, and, actually I flourished in that school, Whitley Abbey. It was academically very strict and set, but it was a, what would now be called a comprehensive school, it wasn't actually, but, but in those days you were very heavily pushed academically, and I did my best. But if it clashed with rugger practice, that got in the way a bit.

And what did you study for A Levels?

A Levels, I took, the normal ones, English, history, French, general studies. And I took two what were then S Levels, which were higher level, in those days, of French and English. Sorry, French and history I took S Levels. But… And, by that stage I had become academic, and I got straight As. Actually I got a B for French, I admit that. [laughs] So university was obvious. The question was, where to go. And, my history mistress wanted me, wait a year… At first she wanted me to wait a year and go to Oxford, but, then she changed her mind. Because I was really frustrated that I hadn't studied maths and physics and chemistry. And, she had several of her boyfriends who all seemed to have been at Balliol who had escaped to Keele, because it was very claustrophobic at Balliol in the early Sixties, and she said, 'Right, you're going to Keele, and you can, there you can do,' what was then a foundation year. And I did maths and physics. You had to pass, and it was higher than A Level standard. So in one year I got through more than A Levels in maths and physics, and never regretted it. And I kept, kept…

[06:16]
Keele was regarded as quite an innovative university I think in the Sixties, wasn't it.

Well it was, yes. I mean it had been…

In terms of the way it structured its courses and so on.

Well it was one of the new wave, but it actually had this distinction of a foundation year, where they deliberately forced you to do subjects that you weren't going to study for your main degree. So I did maths and physics, and philosophy as a, as a subsidiary subject. And you really did have to pass. I had the benefit of having a girlfriend I met there at the time who was rather good at physics, and kept an eye on me as they say. She eventually got a First and a PhD, and, you know, we're, we vaguely stay in touch, but I, we parted company after university. But, it was, it was really, really stimulating.

Yes. And you… Well you did well enough, and you applied for a, a Ford Foundation – or, sorry, got a Ford Foundation research scholarship.

Yes I did.

How did that come about?

Well I was supposed to get a First to apply, and, in those days, it seems stupid now, but, there were four of us who were in the set for what was termed then international relations, modern history, economics, politics, and the other three all got Firsts and I got a, a First, but I had to be marked down, because they couldn't award three. Actually two, two of us were marked down to 2:1s. But my tutor wrote to LSE and said, 'Actually he got a First.' And, so, LSE waived that limitation on Ford Foundation applicants, and they only gave one, and against competition, I won it, on, on an oral examination. So…

[08:11]
Mm. So was the, is the Ford Found- I've just thought, could you explain what the Ford Foundation is and how you came to apply to that? Yeah.

They were grants that were designed to stimulate people who, financially stimulate and support interesting studies. And it wasn't subject-specific, it was a range of subjects. But I chose French foreign policy towards Eastern Europe either side of the Second World War. But I don't think that was the real determinant. I think I was just lucky. However, I, I offered to pay it back two years later, because… They refused. But I did offer, because I felt very guilty. It was, an amazing amount of money that I got in one way or another, sort of, £2,000 I think, which obviously went on tuition and other things, so it wasn't all in my pocket. But, when I joined a merchant bank in 1969 I, my starting salary was less than my Ford Foundation grant. [laughs] Can you believe.

Yes.

But I spent those two years really in politics, both national politics, I was National Chairman of the Conservative Students, and then European politics, I was the first ever Brit to be chairman of the European Christian Democrat Conservative Students. And so, if you, history recall, I, I was in the middle of student rebellions, particularly at LSE.

Well yes, I was going to, I was going to mention that, yeah. I mean you were at a time of, this was a time of radical left-wing politics actually, and sit-ins and so on at LSE.

Yes. Well, the students… We had 10,000 members approximately. We were the largest student organisation.

Yes.

Politics was very devious in those days. Isn't it always I suppose. But, the people who we collaborated most with were the traditional Labour students. Because they were offended by the Radical Student Alliance, and, much more left wing. So, good friends of mine who were presidents of the National Union of Students at the time and I collaborated on various things, and, obviously didn't draw too much attention to it. But, LSE was in upheaval of course. And so we had meetings of over 1,000 people, packed into the LSE library, arguing about whether we had a seat on the catering committee or something. Very important. And… [laughs] So… But… Tempers were short in student politics in those days, and they were quite dangerous actually.

[10:47]
Yes. Yes. Well I mean, what attracted you to politics?

Debating. Ability to express myself. And, I had started a debating, society is rather grand. I started… A group of us at school who were interested in debating various subjects, not, not party political or anything like that, just subjects. So when I went up to university I joined the Debates Union, and, I thought I was a social democrat, if you had to put a label on me. I probably, probably was right actually. But, at the time became active in Conservative politics really through debating. And just then… If you get active in something, then you want to progress, and so… When I became

National Chairman of the Conservative Students, I was the first non-traditional university member to be there. Ken Clarke had been Chairman about three years earlier. And, otherwise, it was dominated by Oxford, Cambridge, and London universities, and, actually Glasgow. Andrew Neil became one of my vice-chairmen. So… So I was unusual in a sense at Keele, because Keele didn't have a, a big delegation and therefore not a big voting bloc. But nevertheless, I managed to beat candidates from Oxford, and actually LSE, who, a former president of the LSE Students, who, who became a friend of mine, but he had been at LSE as an undergraduate, and, and I only came as a postgraduate.

[12:32]
Mm. Of course…. And, the interesting thing, as I understand it, is that you were attracted to the Conservative Party, and this is going to be somewhat ironic given current events, for being pro-European, and in favour of joining what was then called the Common Market.

I had been, in July, just two of us, with Ken Clarke, who's a good friend, and he and I both regretted the fact that, where we had come in to politics, we were leaving at the antithesis really of, of our views. We, and John Gummer is another, we were all very active, David Hunt too, all attracted to the Conservative Party by the Macmillan initially push, in the early Sixties, to join this hugely important experiment in international collaboration after the Second World War. And it was inspiring. And we, each of us in our different ways continued that. Obviously, Ken went into Parliament, about three years, or four years older than me, but, he went into Parliament in 1970, and I didn't go in until '87, because I did other things. But, but the inspiration initially was, it was a one nation, open-minded, pro-European attitude that attracted us.

[14:03]
Mm. And, as you said, you, as you touched on earlier, you left LSE, and, you went into investment, corporate finance, and…

I felt I had to…

…advisory. We won't go…

Do something serious.

We won't go into that because it's…

No.

But it… You spent eighteen years I think doing that, is that right?

One way or another. Actually, it's relevant to technology, because, increasingly technology underpinned companies, and how they coped with it. I mean, I'm not being too specific. Actually, in the Eighties I backed a robotics company, which by the way lost money, and we folded it. No one, no shoulder really lost much money. It was on some tax-efficient scheme, issued by the Government. But, we made the mistake in that of something which you never forget later, which is that, brilliant technology, which it was, in robotics, isn't necessarily commercially exploitable. You, you've got to marry, both from the timing point of view and the attitude point of view, and the cultural point of view, the one with the other. Now this technology I remember distinctly was transformative for the motor industry, but the motor industry in those days wasn't interested in the… This was by then the Eighties, going through terrible turmoil.

Mm.

Now, Cowley for example, which is BMW, for I think every few skilled workers there are about 1,000 robots.

Mm.

But, but… And this company had developed a robot that was really effective. But, but…

Mm. I'm quite surprised to hear you say it was developing even then.

Well, I have long since lost touch with the people who were involved, but I remember distinctly the fact that, technology is not useful unless you can provide a cultural and human and, and commercial aspect to it.

Mm.

At the same time, you know, because otherwise you've got to wait for years for the breakthrough, and commercial application. And I've seen many examples of brilliant technology, either failing, or, in the case, even this week, technology which came out of the Rutherford Appleton Laboratories at Harwell, which they brought to me when I was still a Member of Parliament to look at, because I was involved in these things, has just been applied in London to try to detect knives at Tube stations, a company called Thruvision. And, that span out of that. And I think, the people who span it out, four of them lost money and packed up, and so the intellectual property was safeguarded but the commercial exploitation was not. And it's now, actually, I think it's only the AIM market as a company called Thruvision, but it's been through many iterations. And I'm talking now fifteen years for terahertz technology to be sufficiently attractive for deployment in the UK on, on, potentially of scale. So, there are many lessons in IT and technology, but that's a big one.

[17:41]
OK. We'll come back to some of your more recent engagement with technology companies later, because some of that's very interesting as well I think. So you, in 1987 you became an MP. You were elected for, as MP for Esher and, well it's called Esher and Walton now I think, but it certainly wasn't…

Yes, the boundary changes in '97. Yah.

And you, you were an MP for 23 years until 2010. And, you had a number of, you held a number of offices during that time.

Well yes, I, I was a Parliamentary Private Secretary in the Foreign Office, Health Department, Cabinet Office, and then I became a Minister, following really the

science portfolio, slightly after I arrived at the DTI, but that portfolio, where I had been PPS for the previous Science Minister, William Waldegrave, at the Cabinet Office, but Michael Heseltine transferred the whole department to come under me at the DTI. Which was a phenomenal opportunity really. And… So I was lucky, lucky enough to get that portfolio alongside technology. And I think it's interesting to note that… I didn't have universities, as, more recent science ministers normally have universities attached to them in one way or another, but, parts of university research came both under me and the Department of Education. But what I had was not only science, but the whole of telecommunications, Oftel, the whole of radio communications, as well as all the stimulus that was needed, and training and skills, for technology, as well as other areas like security, and, intellectual property and all the rest of it. Now a lot of that has gone to a different department. That was started by Blair, he broke it up. And so the Secretary of State for Digital Economy really, that was my old job responsibility.

[20:02]
Mm. Interesting you mention security, because I can remember from my own career, I think in the early Nineties, I got involved in doing… That was about, that was the first time that the Government started taking IT security very seriously outside, outside of course, national security type issues. But, it…

Yes, because I think the Government started… Well I, actually, banging my own drum, I persuaded Government that, the growing opportunities for interconnection through an admittedly very slow Internet raised important security issues. And we needed to tackle those. And that came under me. And in 1997, when Labour came in, it was transferred to the Home Office. But the, what became Interception Powers Act under Labour, actually started under me. So I eventually ended up privately briefing the Labour Home Office Minister, Charles Clarke at the time, about what this all meant. And my officials moved across. A very, very bright man called David Hendon moved from DTI to the Home Office. So security, online security, and surveillance, was beginning to be a big issue, and the interconnectivity of that information became quite an important issue in the mid-Nineties. And it's amazing now to think that, the sort of things I was talking about, about, you know, protection of individuals, and children online, and all that, now is, is still an agenda, or, you

know, we're still perfecting these things. But, but the, the national scheme for protecting children online was started by me, as Minister, with some private sector help from someone called Peter Dawe, and… So, yes, it was a big, it was a big, big consideration.

[22:17]
But during this time, when you were Minister, I mean the, the Internet was beginning to emerge as a, as a consumer proposition. I know it existed in the military sphere before that, but, it was emerging as a consumer proposition. What was your, what was the Government's reaction to that at the time?

Confused. Even then, there were people in Government who thought this was very bad news, that people could talk to each other, and, not through channels that were established. You've got to understand that we're, we're talking, although it doesn't seem that long ago, it was a very long time ago in technology terms, how do we regulate BT and Cable & Wireless? Well, there were normal sort of, stipulations, but actually one of them was neither the chairman, neither the chairman or the chief executive could both be foreigners. And, Cable & Wireless made a mistake over appointing an American as chief executive without consulting. So I suddenly realised that this was a… It wasn't… Well let's call it a golden share issue, but, but not quite that, but… So I phoned Michael Heseltine, who was I think by then Deputy Prime Minister, and said, 'Michael, we have a problem here.' And he backed me. And I, I summoned them in for a reading of the riot act. Now, what is, the significance of that is, because it was the old boys' act. That was how we kept… If we wanted to tap into phones, we wanted to know that both the chairman and chief executive, or at least one of them, was a good chap. [laughs] So, it, it was… That was a transition, for phone tapping and all the rest of it, to, having to do it in different ways. And the Internet was opening up other opportunities which were less controllable, so that they had to be looked…
[24:38]
Another insight is that, I was the first minister ever to have an email address, and my permanent secretary refused. Why did he refuse? Because if you phoned a minister in those days, I've no idea quite what happens now, but in my day, if you phoned a minister, you had to go through the private office, and, the private office would listen

into the full call. Not if it was your wife, probably, but if it… You know, anyone else. And made notes. And this was for your safeguard as well as… So the caller effectively was being listened into. And the permanent secretary said, 'This will bypass the communications.' Now of course the mobile phone at the same… Now this is very important, just positioning. The mobile phone was not that common. I had a mobile phone as a minister, but, so that people could phone me, that it wasn't listened into. So… And eventually, I quickly got an email address, and I said, 'I'm the Minister of Technology, I want an email.' I think it was Ian.Taylor@govuk.demon.couk, or something, or, something. And of course Demon was the Internet service provider.

Yes.

It was rather strange on your ministerial card to have the word 'demon' there, but, Demon was one of those Internet service providers.

I remember that, yes. An ISP, yes.

So, the answer to your question was that, the Internet was becoming an encroachment that people were not really sure about.

[26:12]
And did you commission studies or whatever from…

Yes, yes, all sorts of, internal and external studies.

…to, to brief you on where things were going, so that you could have a policy response?

Well people like Charles Hughes had been, Charles Hughes was seconded to, from ICL for the, what became the Information Society Initiative, which was something I stimulated and… And also… Actually I've just remembered. I insisted on a change in the Civil Service structure in my, in DTI, which was regarded as being a bit, arrogant. But, I very quickly realised that every section head was siloed, and,

actually, the interconnectivity that was beginning to happen, both in industry but also beginning to happen through the Internet, made this obsolete. So, not only we changed the Civil Service arrangements, but I set up a multimedia industry advisory committee. And most of the people in those days had never met, unless they had been at Wimbledon by chance together. So, people like Dixons and WH Smith and Boots and, and you know, and, *FT*, and all the rest of it. And… Oh, and the music industry, EMI. And, now they own each other [laughs] in one way or another, but… But in those days it was all sort of, very new. And I tried to sort of, bounce ideas, and told EMI that dangers were happening, and they actually were very slow to listen to the changing in market patterns, which we anticipated. I mean I'm not trying to sound clever; I asked around and got advice. But then I tried to pass it on. It wasn't always successfully received.

[28:10]
Mm. OK. There's a, there's… I've seen a, a fascinating picture of you with John Major, sitting in front of a typical early Nineties, beige computer box. What was going on in that…?

Well this was really the combination of, of my ministerial efforts. And I Had asked not to be moved from the ministerial job, because I, so many things I had started in '94, '95 were starting, to fruition. We, by the way, knew that we were going to lose the '97 Election, so, that was the end of that ministerial period.

Mm.

So, alongside the Information Society Initiative, which was attempting to educate people on what the implications of the information society might be, we had this concept of IT For All, which, in those days, mainly meant schools. And Microsoft were brilliant at helping, I had several talks with Bill Gates personally about ways he could assist UK schools. Obviously, commercial factors were taken into consideration for non-conflict issue, but, but it was very important. And Microsoft were very, very good at bringing technology into schools, and training teachers by the way, very very important. Because teachers were very hesitant in many cases. And so we, we pulled all this together into something called IT For All, and we had a big,

February I think it was in '97, conference, in the extensive basement of DTI in Victoria Street. And I managed to persuade John Major, who hated technology by the way, and science, for, well, plenty of anecdotes on that too, but leave that aside. And he came. And as we were going down the steps, to the basement, he grabbed my arm, forcibly, and said, 'Ian, whatever you do, don't let me sit in front of a computer.' Well of course, computers were everywhere. But the press were there. And Martine McCutcheon had sort of agreed to be there, and, sort of, attracting a lot of interest. Anyway. John Major, separated from me, pushed towards a computer, and, I suddenly with horror noticed that he was sitting down, as seen in that photograph, in front of this computer. And I could see horror in his eyes at being embarrassed. And, I got on my knees, and pushed through. And, he was on a dais, or, like that, so, I was below. And the press were saying, 'What's your favourite website?' or, whatever the words in those days were for it. Probably was website. And, John Major sort of, looked. And I said, 'It's your own, Prime Minister, you've just launched Number 10's website.' And I was franticly getting this up, because I had actually made sure I knew where it was, not for this purpose but generally. And so, in some of the later photographs, the, or other other photographs, I think the website is, Number 10's website is sort of, vaguely on the screen, which I had got up. But… I'm never quite sure whether John Major thought that I had saved him from embarrassment or put him into a situation [laughs] by inviting him in the first place to this technology thing.

[31:30]
OK. Yes. Yes. Anyway, it's sort of redolent of its age anyway. And it…

Well I think it's important in the sense that, I got the Prime Minister, regardless of that incident, to attend an IT For All… This was still sort of, fairly early days. The penetration of, of IT…. I'll tell you another interesting anecdote, if, you can always cut these things out. Peter Bonfield, who was then Chief Executive of BT, and I went out to Adastral Park to look at the BT research, and we went out by helicopter, which obviously BT paid for. And we arranged to come back and land on the sports field of a school in Colchester. And so I got to talk to the headmistress there, and, she confided in me, she had a big problem with the county council. I said, 'What?' She, she had been accused of mistreating pupils by keeping them at school after hours, and had to go to all sorts of hearings, angry parents. And it wasn't… It was a school in a

bit of a difficult area of Colchester. And what had transpired was that, the parents thought that the children were being withheld, in detentions or whatever, but actually, the school had, with BT's help, which is why we were there, got a new set of computers. And, the children at four o'clock were rushing to get one of these computers in that room, to work on. And the parents didn't understand, a) why a child would spend more than two seconds beyond the four o'clock bell or whatever it was. So, they overcame this by bringing the parents in on Saturday mornings, led by the children, to show that the children were actually keen on using computers.

[33:25]
Mm. Mm. OK. As you mentioned earlier, I mean, 1997, the Labour government was elected wasn't it. I've always assumed I suppose that, when it comes to matters like science and technology, I would have thought there was quite a lot of cross-partisan, cross-partisan agreement, about what, what should happen?

Broadly.

I can't see any reason why there shouldn't be, it's not really a very party political thing, is it?

No no.

Was that your experience?

Yes and no. Yes, in general. Gordon Brown, who became Chancellor, was much more open-minded to boosting some of this than my good friend Ken Clarke had been as Chancellor. And so, you got a boost to the science budget, actually quite deceptive, for reasons I'm happy to go into, but nevertheless it was a boost, and a sort of… So… Although there was a short period of someone called John Battle as Labour minister who took over from me in science and technology, but it was David Sainsbury mainly, whom I had very good relations with. But… So, if you like, basic research got a boost. But there were other, on the technology side, as I say, my departmental responsibilities were broken up, and, that was I think very unfortunate. I mean, we had just passed the 1996 Broadcasting Act, two-thirds of which was actually my

departmental responsibility; the front end, which was what I call the fluffy end, was Virginia Bottomley and National Heritage and all the rest of it, which became the digital department. And as I say, Home Office took some of the security side. So there was a sort of slight dysfunction. There were other factors that came in. Telecoms came under me, but we had already started preparations for something like Ofcom, which succeeded actually under the Labour government. We had actually started the beginnings of what became NESTA for example. And… So, there were elements of continuity and elements of, of change.
[35:55]
But the importance of science and technology was accepted by Labour, and, and they continued. For example, I had set up preparations for Y2K. It's much maligned at the moment, but, the Y2K exercise was terribly important, because, preparation… It's easy to say there were no real problems in Y2K. Well, there were some. But overall, we succeeded in doing it.

And that was a result of quite an intense amount of preparation for that.

Yes.

I mean, as I recall.

I was ridiculed in many quarters for it, even back in '96, well '95, '96 when I started to realise. It's very difficult for a minister to understand what the full implications of something are. I think this is one of the, the lessons that all technology and science ministers face. I didn't, I really had to battle hard to work out what the full implications of the BSE crisis was, which came under me. I, I rigorously tried to understand what the implications were of cloning Dolly the sheep which came under me. And, if you can understand the implications, then what should be the framework in which you should continue to do the work around it? So on Dolly the sheep, I had already set up, before the public announcement, the Human Genetics Advisory Commission for example. And, on Internet security, we, we had started something called Trusted Third Parties, which was a sort of, a bit debate, but, that later became, morphed into the Interception Powers and other things. But, even in my day,

encryption was worrying people, seriously, because, this was not controlled by the State, and should it be controlled by the State?

Mm.

And all those sort of questions.

The same issues still exist now.

So, but there were, there were… The reason for saying this is that those, those issues don't stop just because there's a change of government.

Mm.

These are, these are continuity of issues.

Mm.

And, there is very little political antagonism between science ministers. By science I mean science and technology. Because you're, you're facing very evident challenges. You are also learning from each other how best to persuade the more doubtful in government about the importance of skills, technology, science, to the national GDP.

Mm.

And, that communality of interest continues to this day really. Obviously there have been Conservative science ministers since 2010 when I left Parliament, but Labour had a very long period where he was charge.

[38:54]
Mm. Mm. But you continued to be involved in science and technology during that period didn't you…

Well I, I was…

… by, through being members of committees. You were on… Well tell us, tell us about some of the committees you were, you were on during that time.

Well, I… Once you've been bitten by the technology bug, and you realise its implications, and the importance of it, and the need to get the public on side, without scaring them. I mean, the public can get very scared. If… And that can push back. However brilliant an idea is, if the public don't buy into it, if they miss interpret risk… And one of the best examples of misinterpretation of risk is mobile phone masts. I got people even phoning me on their 1990s mobile phone to complain about a phone mast that might be put down the road from them. And, I actually was very brave with my constituency, in the sense that I, thankfully, didn't have a marginal seat, and I could do this. People wrote to me and said, 'But my house value is going down because there's a mobile mast being put on the,' sort of, street corner. I said, 'Actually, your house value will increase, because you've got better connectivity with mobile phones.' And it, it was just the beginning where companies like BT were beginning to sow Mickey Mouse type evidence of connectivity of mobile phones within the home. [laughs] And, so, I think the common challenge for ministers is this, this analysis of risk, and how that can totally obstruct. I mean I obviously, genetic modification, which is not really your subject, but genetic modification was a huge benefit.

Mm.

Huge benefit, which was stopped in its tracks by a misunderstanding of public risk. And it's only now becoming to be even talked about in sensible terms by deployment and all the rest of it. So, I mean we're talking, a lot time later, so…

[41:10]
Yes. Yeah. But then, I mean, you were obviously very successful in getting to grips with the, the scientific issues.

[hesitates] Yah. I mean, some of it was, quite hard.

Through… No, but through advisers and so on, but…

I remember Jim Norton at the Radiocommunications Agency being very patient at explaining to me about spectrum analysis, and, allocation of spectrum, but… Actually, it isn't important for the minister to be an expert in the consequences or the… Not the consequences, the technical aspects of spectrum analysis, and what hertz you are dealing at. It's what the significance of it is, and what, what the implications for release of more spectrum could be. And of course one of my triumphs that Gordon Brown had from me was that I was the minister that devised the fact that we should go to auction for the radio spectrum. In the 19… You can check this, but in the 1997 Conservative election manifesto, this was mentioned, as part of the ability to release more spectrum and, and commercialise it from government, releasing it. And the figure that we had in the calculations for the manifesto was 1.7 billion, which I persuaded Ken Clarke and Michael Heseltine was a reasonable number. They said, 'That's a bit excessive, but, but OK.' Michael was worried that all of this might affect taxi drivers, I said, 'Michael, it's actually a bit different.' Well of course 22 billion was the figure that Gordon Brown realised from that, which was picked up by…

Mm, I can remember that. That was the…

…Margaret Beckett and, and obviously Gordon Brown as the Chancellor.

Mm.

And I asked for some of that money to be put aside specifically to fund further progress of the Internet society really. But, it was a ludicrous amount of money. And of course, it was one of those areas where the Government benefits, but actually the industry didn't, because, so much money had been spent by those successful companies on the auction that they actually didn't roll out the technology as fast as it might have otherwise been. So there are pluses and minuses with all of this, which again, you can't be totally farsighted as a minister; you have to deal with the now and then, but you've also got to look at where it's going.
[43:45]

Now going back to your question. After I left, you don't… left office, you don't stop an interest. So I, one way or another I was chair or co-chair of the Parliamentary Information Technology group...

This is PITCOM.

PITCOM. And…

And these… Yeah, PITCOM had engagement from, from the industry as well didn't it?

Oh very much so. Industry was very much part of it.

Yes.

And, people like David Brown, who, who eventually became, well, for a long period became Chair of Motorola. In those days Motorola employed about eleven, twelve thousand people. And Nokia were very important. Times change, technology changes, and companies shrink, but, but the technology lives on. And, they were very supportive, and, the cable industry was very supportive; obviously had a vested interest. So all interests were disclosed. And these were all-party committees. So I chaired the cable industry committee, and, there was the European Information Technology Group too, and, I later chaired the Parliamentary and Scientific Committee, which is the oldest of the parliamentary committees, and, and both the, well, the Parliamentary Space Committee. Which again was very technology driven. I mean, space is an application of technology. I haven't…. If I may inject, I haven't mentioned engineering, and I just don't want to lose engineering.

[45:29]
Well let's talk about space first of all.

OK.

Just for a short bit. Because I know, probably in the whole, in the whole, whole of your brief that you had as a minister, and afterwards, space was your special interest wasn't it, I think. Is that so?

Well I think… I'm a, I'm so old that I remember Dan Dare in the *Eagle* magazine, and, Radio Luxembourg had sort of… Things you could hardly hear on your crystal radio. But episodes of Dan Dare and Digby and the Mekon and… So space has always been exciting. And of course… And we had the Apollo missions. I mean, so, suddenly to become Space Minister was really, really, wonderful from my point of view. I'm not saying it was the most important part of my portfolio, it wasn't, but as a, a subject, it was, fascinating. And I managed to do the first National Space Review, which was launched in early '97. And there have been many since, and the space industry has grown astronomically. And of course it's now largely driven by the private sector. Government, which used to be the dominant player, is now a key player, particularly in stimulating new missions and ventures and applications, but of course it is, private sector has transformed with downstream activities.

Yes. Yes.

And so, I've taken an interest in that all the way through.

[47:07]
And what sort of, what sort of issues were coming up in terms of development of the space industry in the UK?

Back then?

Mm.

Well, it was… It was a question of, with our limited budget, as to where we concentrated. So the issues were, were communications important? Yes. Because it was a beginning, it was the beginning of communications via space. Real-time broadcasting was sort of, just coming in. The ability to get instant reports back from

places round the world. And, and feed them back through satellites from mobile cars and things. I mean it, these were quite important changes.

Mm.

And, earth observation was also beginning. You couldn't… As a nation we weren't interested in launch capacity. Access to space is critically important. It's interesting that we're now beginning to look at spacewalks, and looking at that, but at the time the French had a dominant interest in it. And so, the ESA organisation, which we were involved in, we didn't really participate in the launch capacity. But what we had started to develop was an interest in, in the embryonic downstream, what we could learn from space about the Earth, what we could do to improve communications, and security of course. And so those were the driving factors. And of course, the result of that was, that, I had taken, in the end not a difficult decision, not to participate in the International Space Station. And my French and German opposite numbers, who became good allies and friends, didn't want to either, because they could see what the crippling costs on budgets were. But Chancellor Kohl and President Chirac were insistent that it went ahead, because they didn't want to be left out of a Russia-American agreement on this. So we didn't participate in the International Space Station, and instead of taking all my space budget, which it would have done, of 200 million, we put a lot into the developments of an indigenous capability which led to the growth of Surrey Satellite Technology Limited; subsequently the ability, David Sainsbury, to launch the Mosaic programme of satellite support, which SSDL did very very well in. That wouldn't have… And Sainsbury will confirm this by the way. But that, that wouldn't have been possible if, if…

[49:58]
Sorry. This… So what capabilities did these satellites have, the…?

These were disaster monitoring constellations, these were Earth observation…

So it's all, it's all to do with Earth observation.

Yah.

So that…

That sort of thing.

That's really the UK's specialisation is it, when it comes, when it comes to space?

It's a big strength.

It's not… I don't think…

And of course, we've got the academic side of, of learning more about space, and interspace.

Yes. It's not widely known though is it really? I don't… I don't think I was aware of that until I, until I started researching for this interview actually.

I think it… Maybe not. But it is huge.

Yes,

And of course, generated vast numbers of, now smaller, satellite manufactures, Clyde Space, up in Glasgow with a whole… And this is very important. If you get a successful idea, you get a cluster around it of people who are feeding into it. So, in terms of technologists, the space industry is now, not only a big employer, but, indirectly a big employer, and this has pushed out the demand for skills for people who are going into space, which starts in schools of course.

Yes.

So for eight years after I left Parliament I chaired the National Space Academy, which trains teachers using science – space, as an exemplar to improve their confidence in teaching, maths, physics, even geology, and biology. Just so that you understand. Why was it Tim Peake went up into the International Space Station? Well, David

Willets, who was one of my excellent successors, had the brilliant idea at the right time that, we could buy a ticket to ride. And so Tim Peake was a ticket to ride, paid by the British taxpayer, £16 million. He was chosen, training, everything else. Brilliant. If that had been an option for me, I'd have hoped I would have taken it, but instead of which we had this vast infrastructure cost of 200-plus million, in 1996, pounds.

Yes. So it was, the sixteen million was very good value for money in terms of…

Fantastic value for money.

…in terms of promoting space. Yes.

And the National Space Academy, which I was then chair of, all these years later, actually did all the experiments for schools that Tim Peake demonstrated in space.

Mm.

So…

OK.

Sort of, the wheel came full circle in that context. And, space has also become much more accessible. My friend Brian Cox has done a brilliant job at getting messages across to audiences that would not normally be interested in solar winds, or the, the threats our planet, or, what is going on into the rest of the universe, or, what the effects on, on the Earth are of various changes that have taken place, and…

[52:57]
It's great, it's great that, you know, that Britain is so good at Earth observation and satellite technology, but, how did that come about originally? I mean, you say the French were good at the rocketry. Were we a bit… Would we have been good at, would we have been in the rocketry if we had taken a strategic decision earlier to… Well we had Blue…

But Streak.

Blue Streak, yes. Yes.

Yes. We mustn't forget that we were ahead of the game in the 1960s.

So when was, when did… What went wrong with that, and why did…

Well the same as, in a sense, Concorde. It… It became almost too expensive to keep Concorde going, for various reasons.

OK.

Just, actually, bits and parts for planes. But, there were a lot of politics behind it, in the 1960s, and, and different emphasis. And, one can be critical, and with hindsight one should be critical, but actually, if I had been minister, heaven forfend, in the Labour government, 1960s, I'd have been confronted with this choice, where do I spend my money? You know, you don't have a big pot. And people just don't realise how difficult it is for ministers to make assessments of what their priorities… It's not their priorities, but what priorities can be supported? There's nothing worse than salami slicing.

Mm.

And you end up with nothing, really. Well, because it's a very competitive world, inadequate. So, what did we… We built up… Surrey Satellite Technology was, was… I turned the first sod in their new building on the campus at Surrey University. Actually the Queen topped out the building. So, you can see how important that suddenly became, [laughs] between my, my efforts and the Queen's. But, but Martin Sweeting did a brilliant job in building that up, but that was done largely because we had supported that activity. And also, never underestimate the importance of the defence industry, in the same way that DARPA and the Internet, you've got space technologies which were, obviously had a military implication, very important, but

those skills could be read across increasingly. So, what is now Airbus Space and Defence, previously Astrium, which was part of Airbus of course, but previously Matra Marconi, and British Aerospace, and they, they had defence technologies which were increasingly exploited out into the wider world. And of course as, increasing dual purpose applications in space too now, which mean the MOD is better at better at cooperating and, and that inspires more people to be innovative in the ways that they apply dual purpose technologies in space.

[56:15]
Mm. I must just ask you about GPS as well.

Yes.

GPS side of things. Because I noticed you are currently advising Inmarsat, and this is to do with the…

Yes. I…

An alternative to Galileo, which of course we don't think we can participate…

Well I advised Inmarsat for several years on, and actually British Government-funded schemes in developing countries, to show how satellites can improve, disaster monitoring and, and reaction to disasters, to illegal fishing, and, and health issues in Nigeria, and, and agricultural issues in Kenya. But, with Brexit, we are suddenly faced with this, in my view, very unfortunate exclusion from Galileo, which is a project which we've put a lot of money into over the years, and, it's very technical as to why we're excluded, because it's almost self-exclusion. And we had defined the status over what's called a third nation on the Galileo project, which would have access to the global navigation side of it, but not to the encrypted public regulated signal side of it, which was the sort of stuff used by the Home Office and, Defence, and NATO and all the rest of it. And, at the heart of Galileo, the PRS was developed actually by CGI in the UK, a Canadian company, but, taking over Logica. But when we announced that we were leaving the European Union, which is still not done yet but, we were leaving, the French pretty well turned to us and said, 'Well you'll be a

third nation, so you can't be part of the PRS development.' And the British government said, 'Oh we must, have to be. Unless we are part of the development of the PRS, then, we are going to have to set our own system up.' So, Inmarsat is one of the companies, bearing in mind it's the largest operator of, of satellites, thirteen, another two on their way, global communications, ability to manage and operate satellites as well design them, is a big player in any potential venture.

Bit is it really feasible for a country like our own, you know, the size of the UK, to be running its own global positioning system?

Well, I'm an adviser to Inmarsat, so I'm not going to sort of, say too many things. But, it is not plausible for our system to be like for like. It will also have to integrate with Galileo, and the American GPS. But… And therefore there's a lot of innovation that might be deployed in what we might do. And also, whether we would collaborate with Five Eyes' security partners like Canada and, and Australia, New Zealand. So, the preparatory studies that have been funded by the British government are looking at all of these factors, and I don't want to say anything more about that.

Fair enough. I'm sure it's…

But, it… I think it is important to understand, forget my role in Inmarsat, that there is a huge threat to the UK, for what I might call denial of service now of satellites. Now this could come from solar wind, which knocks out communications through the ionosphere and magnetosphere; or it could be by state actions, to knock a satellite slightly out of orbit, if it doesn't have enough manoeuvrability to get out of the way; or it could be by cyber threats; or it could be by catastrophic failure. Whatever those things are. And, therefore, space is now part of critical national infrastructure. The National Grid depends upon it, the Stock Exchange depends upon timing, Health Service, our atomic clocks in Galileo and GPS. But there is another factor which is, if… The Americans during the second Gulf War threatened to degrade the signal to the French, which meant that they couldn't comply in NATO, they didn't have all… All sort of issues. Because the French were being difficult over the Iraq War. That's a national security threat. And so you, you have to evaluate what your interest is in terms of critical national infrastructure including space.

Mm.

And, and how far you need to go to protect it, and what systems you need of your own that you will never be denied access to in circumstances you can foresee. And, this applies to systems like the National Grid, not only because of its space connectivity. But so often there is a lag of understanding between technologists and what they can do, and the implications of what they can do. For example, solar wind is… Sorry. Wind, and solar power, are both very, very important environmentally. But they're a damn nuisance for the Grid, because of intermittent power, and hugely costly. And I'm not privy to whether the Grid has yet made, despite billions a year of investment, a sufficiency of protection against adverse sudden reverse flows of energy. We've had a, an outage recently. I haven't analysed it in any depth, as an expert, but, but… The national debate is, is very superficial, but you can't afford to be superficial if you are thinking as a minister of what the implications of these things are.

Mm.

So, gung-ho, let's have more wind power. But, but actually, another minister in another department's going to have to deal with the problems of that.

[1:02:55]
Mm. Well you must have a lot of connections still into, into Government…

Well, I talk to people. But do very much, do bear in mind, since 2010, virtually everybody has changed face.

Yes. Are you confident the issues are being addressed?

Well I hope so. I hope so. And I hope that… There are interdepartmental committees of course, and there's supposedly now going to be a national space council, which would be cross-departmental. On technology, we still haven't really worked out how we're going to deal with the need for more people in technology. The apprenticeship schemes, the, the… Actually, I regret the passing of polytechnics,

not because I'm in any way, in principle, against universities who were polytechnics, but, but it is vital that we do provide avenues which people can access to make sure that we've got the skills that we need in the future. And there has to be a diversity of ways of doing that. And, I don't know that we're doing it well enough.

[1:04:17]
You've been involved in this yourself, haven't you, promoting education around schools?

Well, through the National Space Academy, yes. Which, which… Largely funded not by Government but by… I mean it did have some government help, from the Science and Technology Facilities Council, which I was a member of after leaving Parliament for seven years, and which has lead research responsibility for space, and, and also some help from the UK Space Agency and things. But, but it had quite a lot of voluntary, charitable, interest from specialist charities, and, and one or two businesses, and, Lloyds Foundation for example, of funds, independent funds. So… But it's, it's terribly important that we, we never lose sight of the fact, and we don't have enough people coming forward with the skills.

Mm. Mm.

And, technology skills of all sorts are critical to, to the sustainability of, of the things that we're going to be doing and need to do in the future, in, in a global market. Which goes beyond Brexit, and whether Brexit happens or not, these skills are going to be necessary.

[1:05:37]
Can I just move you on to, more towards the present day. I mean one of your, one of your major roles, as I understand it, at the moment, is to do with investment in innovation and, and technology, through the UK Innovation and Science Seed Fund. Can you tell us a little bit about that, and how that works, and…?

Yes. It's… It's a very unusual beast, and it's too small. I'm trying to make it bigger, to increase its impact. But it was, it was started, oh, in the late part of the decade, the

previous decade. And, I had spent a time chairing the Conservative Party policy review under David Cameron when we were in opposition, looking at all aspects of science, technology and, and, STEM if you like, for a very detailed study. And one of the things that came out, well, many things came out of it, and I'm glad to say, virtually all of our recommendations have been applied one way or another, but, piecemeal, sort of, the impact on it all, as one led to the other. But, one of the things that I was aware of was the lack of patient capital for genuine start-ups. And bear in mind in the 1980s, before I came into Parliament, I had been involved in what we would now call venture capital, and I realised then the difficulties of, if you, if the company's too soon, you don't really know, and you don't know when you're going to get your reward from the, from the investment, return on capital. So, I was intrigued by something called the Rainbow Seed Fund, and, out of the blue they approached me as it happened, and asked if I would become chair, in 2013 I think it was. And, I accepted. And, and we've got a really powerful, experienced advisory board around me, who have made money out of scientific and technological projects themselves, but they mainly, have science and technology backgrounds as well. And then there's a professional management team. And what we do is, out of the Research and Innovation Campuses, which are basically the public research establishments, we take ideas that we think can be commercialised, and possibly put in the first £50,000 to help business plan and, really get the idea together, and then we keep putting money in as we mentored the companies through the first difficult stages.

And whose money is it that you're investing?

Government money, ultimately. Actually, for many years it's come in through the Science and Technology Facilities Council, the British, the BBSRC, science and, council, the Defence Science and Technology Laboratory, and the National Environment Research Council. But, the first two are the big backers. But those are the core partners. And then you've got all the other research organisations which are part of us who haven't necessarily put the funds in, but we have access to. So the National Physical Laboratory, Column, AA Technology, all of those sort of, bodies. And then of course the science parks, like Harwell, Daresbury, Norwich science park. And, they can put up ideas that they're beginning to see for our professional fund managers to review. And, we would by and large take those ideas into a corporate

form through to the point at which really early stage private investors' funds would be prepared to, to back them, and will be patient, will mentor, until we get to that stage. So, we have levered in 30 times what we have invested from the private sector over the lifetime of our fund. And we could do more if we have more money. So I'm trying to persuade Government to put more money in, and various other ideas that I've got.

[1:09:54]
And are the key focuses, which areas are you investing in? I think synthetic biology was a big one wasn't it?

Well, synthetic biology is one particular area which the BBSRC has given specific funds for. Although… If you can define synthetic biology, then you are a brighter man than me, and I suspect, as we go on, it'll leach itself into so many different areas of engineering and, and skills.

Is there anything, I suppose, given that we're Archives of IT, anything in the…

Well, we've got…

…in the information technology area?

Yes, we've got investments in data companies. Fintech company. And a crossover company, which is very very successful, which is, is data mining for research ideas. And so, you know, a lot of research projects are hampered by the fact that they have a vast number of things that they might take into consideration.

Mm.

So, this is a sort of, Microsoft Google for the research industry, medical research industry, and, other things. So, there's a wide variety. And then, we've got one company in the space industry. We've got companies involved in detecting gases in wide areas, rather than specific to particularly industrial processes. So I mean, all sorts of interesting things. And, and of course are areas that you're not specifically

involved in, but, the, the potential to improve treatment of prostate cancer, better understanding of why antibiotics are no longer effective, and can they be made re-effective? All sorts of issues like that.

[1:11:52]
Mm. I must say, I mean, reading up some of this stuff before this interview, I mean I, I've been very impressed by the kind of, Government and peripheral to Government sort of infrastructure that's there now to, to sponsor and develop innovation. That's a…

Yes, it's, of course it's very controversial, still, in some quarters. The Industrial Strategy, many people dismiss as sort of, picking winners. Actually it's not picking winners. It's… It's picking sectors which are going to be critical to the future of the British economy.

Mm.

Or, where we, we have a vested interest in being successful. So battery technology, which I don't personally have much interest in, but, and battery technology… The ability of batteries to store energy, the ability of, or replenish what it's sort of, discharging at the same time. I mean, the materials used in batteries, the longevity of a battery. Of course it's, the inability to capture energy from wind farms, and store it, it's not just cars that we're talking about. So, I just, off the top of my head, mention batteries. So there's quite a bit of Government money going in to batteries. There's quite a bit of money going into artificial intelligence. Not saying, that company's going to win, but this sector needs to win.

Yes.

And that's been behind the catapult.

Yeah, the idea that you pick the winners is discredited isn't it basically.

Yeah yeah. Yah.

And that's what used to happen. And…

So the catapults as they are called have been set up by Innovate UK to try to stimulate collaboration between people who would not normally necessarily collaborate in a series of sector skills, and industrial challenge competitions to boost participation, but also innovation within particular sectors, right across a whole range of areas. And… But start-ups from science is very critical. The Government has backed, the British Business Bank is regarded as being the main player in this, and it's got most of the money, but the British Business Bank doesn't really invest in start-ups, it says it does but it doesn't.

No. Mm.

[1:14:13]
So our role in UKI2S is, is a critical interface between the scientific laboratory and, and the beginnings of commercial exploitation of ideas, which is, which is critical for the UK. We're brilliant at research. But, we've got to be also brilliant when ideas emerge that might be commercialised, at commercialising them.

Mm.

And that's a role for Government by the way. I, I absolutely refute the idea that Government should stay out of this, both in terms of importance of sectors which we need to move forward, and importance of stimulating science to the point at which the private sector is prepared to take a risk. And, and that is, that is a genuine public private partnership.

[1:15:06]
Right. Since you stood down as an MP, you've built up quite, a very impressive portfolio of chairmanships and advisory roles, and non-executive directorships, mostly in science, technology and engineering. I just wanted to ask you about a couple of those. There's far too many for us to talk about today, but, a couple of

them sort of interested me. One was, you are a director of Living, I think it's Living PlanIT. Is that the way it's pronounced?

Yes. Yes.

Which is, developing open standards software for urban areas.

Yes, it's, it's…

I wonder… Tell us a little bit about that, and what applications have actually been, are being implemented.

It's best understood as being a sort of, massive data cruncher and analyser, and, key point distributor of real-time information, to processes and applications within urban areas, smart cities if you like to call it that. And, our telemetry system is based on McLaren Formula One, where, we own rights outside Formula One and NASCAR. And, we have obviously developed that. And there are a lot of other applications, which are involved in making better use of available information to improve health outcomes, environmental monitoring of, of air conditions. There are a lot of independent companies that do bits of this, but, they are if you like in need of a connecting platform.

It's an integration problem is it?

So we integrate data. And we are agnostic about who is providing that data. Obviously, they've got to dovetail with our platform. And so we work collaboratively with universities, with companies, and, and scientific institutes, in… We've done a huge amount of work on water quality, real-time water quality monitoring, air quality in buildings, heating controls, business management systems. So, there's a huge amount of skills. We've not necessarily been as commercially successful as I would have liked, although we're now reorganising, and, and things are beginning to come together very successfully. But, it's taken a bit longer than we might have wished. That's one of the problems of technology. We're brighter, we think we're brighter than, than other people are prepared to accept. [laughs] So, you get hesitations, you

get turf wars, you get people who may think you actually can do it better but don't want to admit that, because it encroaches into your market.

Mm. But, I mean the examples you gave just now were about, maybe, applications within specific organisations, specific companies. Is the aim to do stuff on the sort of, city-wide level?

Yes.

It looked like that was aspiration I think, from…

If, if you said, do we have a smart city example, no.

So, so improving the public realm, you know.

Well, the company's in negotiation to being the common platform for a vast new city, which I won't name, not in the UK of course. But that… The alternative is what you might call one of the great West Coast American companies. And, it's quite difficult for a smaller company to say, 'Actually, we're the platform of choice.' We are the platform of choice of the project development team in that particular project. But the old adage that you never get sacked if you buy IBM is still, is still around. [laughs] It may not be IBM now of course. So I don't want to go into that any more, but, no… What's hugely exciting for me is that these people are half my age and twice as bright, and it's, it's… So, I, I interface with them, sometimes with bewilderment, but, but I'm there to add a little bit of judgement, and, open a few doors.

[1:19:30]
OK. I suspect that's going to be true of the other one I picked out as well, which was, I think this is something you are, this is another company you're working with through your consultancy firm, which is the TPX Property Exchange.

Yes. That's… That's an idea whose time has yet to come. Although we've actually now got a potential investor. My, my view about that…

Perhaps you ought to explain just, what it, what it's going to do.

Yes, that' right. One of the great assets, which is not really easy to take advantage of, is property. And, if you could turn a property into something you can fractionalise, then you could trade, let's say 49 per cent of the property, and, if you could do that, then, you could get buyers and sellers on market exchange. This would free up vast amounts of capital which is at the moment just locked in, including debt capital of course, because, mortgage companies are involved. And with negative interest rates around at the moment almost, you… This… Property is going to change. The current idea of a, owning a property during a lifetime and never being able to release equity from it, apart from at the margin, is over. Now, distributed ledger technology, and other assets such as blockchain, internationalise the whole process. So, TPX is attempting to provide a platform for fractionalised properties, buying and selling 49 per cent, with all the safeguards that go into properties, but nevertheless…

Mm.

And it's an idea whose time I think is coming, and the role that I play is to insist that each new idea that they get to test the governance of it, the regulatory reaction to it, because you, you don't want to launch something and then have people immediately saying, 'Well, that's flawed.' So the…

And they've got the Land Registry on board for example.

FSA and all the others, all, are being closely consulted.

Yes.

Why am I involved in that? Because I think it's stimulating. And, I'm an adviser to it, and I'm not a shareholder at this moment, but I am an adviser to it. And, I, I, it's an idea I'd like to see actually realised, as long as it can be done properly.

[1:22:20]

Mm. OK. So, just to start drawing our interview to a close, just looking back and reflecting on your work in science, technology and space, what do you think your, what would you regard as your key successes?

[pause] I mean, you're never quite sure really. I think, in my latter period of life, my third career if you like, as an adviser or director, I think I've brought a context to help very bright people understand the world in which they are operating, and, and think beyond just the technical applications of what they're doing. And that comes through experience, and, and network, and, and all the other benefits you get from a career like mine. And passing those on. And I've just been appointed an adviser to a company in the biomass sector. Am I expert in turning biomass into very interesting fuel and other byproducts? No. But I, do I understand the context in which they're going to have to work? Yes. And so, they are prepared to retain me as an adviser for that. And I think what they are doing is very important, for the economy generally, and for them as a, as a firm. Obviously I want them to be successful. So, I'm still involved in new things.

[1:23:54]

I think politically, I've, I've managed to raise in my own way the profile of information technology and science, to people who seem to listen to me and, and pay attention. And I've managed to keep those contacts and encourage others to do that. And I think that, that's important ultimately to be delivered by other people, other governments, other companies. But, whether it be through things like the Parliamentary and Scientific Committee, or whether it through the National Space Academy, or from my involvement with the Science and Technology Facilities Council, trying to provide a political context to boost the relevance and importance of engineers and scientists, technologists, I think has been very important. And I, I mention engineering again because, it does often get forgotten, but, but engineering in some ways is the appliance of science. And, engineers are very important. I've worked closely over the many years with both the Royal Society and the Royal Academy of Engineering, and they're both important influencers and, and profilers of their respective organisations. Because we need, we need as a nation more engineers, more technologists, to tackle the endless problems that we're facing, that global warming is going to throw up, that our security as a nation, the increasing influence of

communications has for people, but also the threats that it might create where you, you need to protect them from the worst of those.

So…

So I, I just think that it's, improving the context in which all these things happen.

[1:26:12]
Mm. So, you've just identified some of the biggest challenges and opportunities for, well, for science and, and IT as well over the next few years. How do you think IT in particular will impact society over that time?

Well I think the… People who go into IT are going to be… Their knowledge is necessary, even if they're not working for an IT company, because actually, the ability to be IT literate can often help you do things that are not specifically day to day information technology. So, I don't want to silo it completely. Obviously, technologists have increasingly specialised skills and they will develop those if that's what, the career that they're working towards. I think we need more women too. This, by the way, I was behind the Women in Engineering campaign back in 1996, under Mary Harris, who we pulled in from British Gas at the time. Brilliant woman. So, increasing the, the confidence of people in information technology, not only to do what they do themselves, but to help perhaps explain what they're doing to a wider audience, who in many cases, as I said earlier in the interview, you can move from acceptance to, to resistance very quickly, and, CCTV cameras are a classic case, where there was big resistance to CCTV, and there's just beginning to be the same process going through facial recognition.

Mm. Mm.

So, those are political, become political issues, but actually the roll-out of the technology is, is potentially very important, and, and if you can, technologists can understand that, what they can do may not necessarily by itself be successful, so what can they do to make it successful, and acceptable?

[1:28:39]
So, my final question was going to be, what advice would you give to someone entering the industry today? And I think, you'll probably say…

Go for it.

…look, go for it. But, look more broadly at the…

Well, never try to lose… I mean…

Don't lose sight of the social implications of it.

However developed your plan…

Yes.

All activity has a social context. I'm not talking about party political or political, necessarily, but political with a small p. And, and there's virtually no activity in technology that doesn't have somewhere a human interface. And it's not just necessarily the end user. A mobile phone… But of course, the technology behind the mobile phone is by itself exciting, and… And do you know, one of the real benefits of this which we've not touched on, and we haven't got time to touch it, but, design becomes critical to the user interface.

Mm.

And so that, I work closely with the Design Council, John Sorrell, and Frances Sorrell, and others. Because you have to build design right in at the beginning. And Apple have done that brilliantly of course, with a British designer.

Mm. Jony Ive, yes.

Yah. Who, Jony Ive started in, by educational standards, a school not dissimilar from where I started, he went to Newcastle, and, and university, and then, and… Then

became head designer. But, Apple's success is, is a combination of *design* and technology. So, there's, there's a context for technologists that they need to understand if they're really going to be successful.

Mm. Ian, it's been fascinating hearing about your life and your busy career. On behalf of Archives of IT, thank you very much for taking the time to talk to us.

Thank you.

Thank you.

[End of Interview]