Capturing the Past
Inspiring the Future

Prof. Michael Mainelli

Interviewed by

Richard Sharpe

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By Zoom

Welcome to the Archives of Information Technology, where we capture the past and inspire the future. It's the 25th of January 2021, and normally I would say we are in London, or, at somebody's home, or in somebody's office, but we're not. We're in Zoom land. Because, making his contribution to the archives today is an alderman, a sheriff, and a professor, Professor Michael Raymond Mainelli, and he is in E1, London, and I am Richard Sharpe, and I am in SW20. And I have been covering the IT industry and researching and writing on it since the early 1970s.

[00:42]

It's a great pleasure to have Michael here, making his contribution today, because we seldom get anybody who has had a foot, and it is a big foot, in the two big engines that drive so much of change in our life today: information technology and finance. And he has a big foot in both. It's seldom we get anybody as well who has a big foot in both the private and the public sectors, and he has both. And it's seldom that we have someone who not only has a business acumen, but also a political acumen as well, and he has both, I think you would agree with me. He is also an author, which of course I like, being an author as well, an author not only of fiction but also research work. He has established organisations, and is the head and Chief Executive of Z/Yen, a major consultancy in the City of London. We'll come to that. But the real story starts in the year 1958, in fact on the 19th of December. Interestingly enough, as we walk through Michael's biography, we find that crucial years there light up certain things about the history of the information technology movement, because in that year a man called Jack Kilby at Texas Instruments integrated the first two transistors, and started a process which today we would understand to be Moore's law, and I'll question him on that and the impact of the perhaps slowing down of Moore's law on the world of IT. And he was born in the USA. Your parents were in the USA, Michael, yes?

That's right. Very much so.

Well they had to be.

[laughs] Point taken. Yes Richard, I was born, I was born in Seattle. Mum was Irish, Dad's Italian. I have, therefore, you know, an Italian passport, an Irish passport, and a

US passport where, I've been born there. I've taken a British passport, as I've lived in Britain for 40 years.

[02:48]
Your father was an engineer. What type of engineer?

He was originally a mechanical engineer. He came from quite a long engineering family, my grandfather was an engineer, and my great-grandfather was an engineer, and, that's on both sides, so, [laughs] it's a, it's a very strong engineering family. He was mechanical, and he had spent most of his time, believe it or not, in aerospace. As a claim to fame, a project manager for the Apollo capsule, working for Boeing down in Florida. But we were a very peripatetic family. I went to about eighteen schools, and, before I left the family, the family had moved forty times, in fact we had definitions of a move, you had to pack everything and unpack it, and we sort of, seven-year-olds would complain, that wasn't a full move. So staying in a guest house for a week or something didn't count. But, aerospace was very peripatetic in those days, you know, Dad would go to Italy, work on radar contracts, up to Maine to work on shipping contracts, to Seattle obviously where Boeing was located, and Florida where Martin Marietta was located. And we just kept circling around.

[03:49]
Despite this huge interruption in the continuity of your education, did you enjoy school, and what did you flourish in?

I very much enjoyed school. One of the, one of the funny things I think is, if you move a lot, you, you cope, you get used to it. You don't expect that you're going to be there, when you come home at dinner one night and the folks say, 'Guess what, we're moving,' OK, here we go again. But you do develop ways of staying in touch with people, and I very much believe that kids are lucky if they can stay in one home. My wife grew up in a village of 300 in Germany and didn't leave until she was in her late teens. I on the other hand was travelling. So I would constantly write to people, to some degree because Mum would force me, and my mother was extremely passionate about education. What was I good at? I was actually pretty good across

the board I guess. When I was in high school I took awards in social sciences, English studies, mathematics, sciences. I just enjoyed learning, and still do.

Yes, certainly your CV shows you as a polymath.

Perhaps, yeah. Although I, I wish I could play those guitars behind me a better. [laughs]

[05:02]
You moved to the UK eventually, did you?

[hesitates] Yes and no. Eventually of course, that's why we're here, but, it was in a very roundabout way, via some… I took a job in Switzerland which led me to running some establishments in Ireland, and, basically in the very early Eighties I needed to set up an establishment somewhere in the world to do a major project I had sold to the oil industry, a very large project called Geodat, and a subsidiary project called MundoCart. Geodat was to try and map the world at a scale of about one to 100,000, which was an enormous project. MundoCart was a, a smaller, although still gargantuan project, map the world at 1 to a million. This is sort of, Google Earth 1979. But in the early Eighties I needed to create a facility to do the digitisation. And I looked at eight countries. I was quite methodical about it; there was no passion about England, I wasn't a particular anglophile or anything. And I looked at Switzerland, which was too expensive, France had exchange controls. We looked at Ireland again because we had an establishment there, Australia, America, Germany. But the problem was in many of these cases, we boiled down to focusing on England, and then even within England, I think welooked at eight centres; couldn't afford central London.
[06:21]
So we located in Cambridge. And this is interesting, because, I had come over to Britain for the very first time in, I think it was October, November '79, sent out of the Swiss company to look at, what were the prospects in England because of Margaret Thatcher. And I came back and concluded it was interesting, but with exchange controls there, we probably wouldn't have done it. She had lifted them in October '79, but we weren't sure that they were permanent. But come the late, late '81, we

decided we'd have another look, and we decided to locate in Cambridge, England. So we set up a centre there with 30 people, doing laser line-following and other, hand digitisation of maps from around the world. It was an enormous processing centre for five years.

[07:08]
What drew you particularly to Cambridge? Was it the Cambridge phenomena?

[pause] I have very contrary views on the Cambridge phenomena. At the time that we got there, we, one, we weren't located on the Cambridge Science Park; there was only one other major company located there, which was oddly a partial competitor we didn't know about by the name of Laser-Scan. Laser-Scan was busy winning awards for an extremely expensive approach to digitising maps. We didn't, as I say, we didn't know about them. We on the other hand were kind of, rough and ready guys, really prepared to do hand digitisation, and we were setting quality standards and doing taxonomies of mapping. It was a huge, huge project. And in fact out of spite almost we built a laser line-following digitiser on the back of a cowboy boot sewing machine, and then went to Laser-Scan and said, 'This costs £15,000, and yours costs over £250,000.' [laughter] This is why we're not going to do it. But Laser-Scan continued to win Queen's Awards, and we didn't, but we finished the project and they went bust. [laughs] So, you know, that's, that's kind of the difference. No, the Science Park really blossomed later, no matter what people say. And the university wasn't a particular help. Remember, we were, we were a ruthless Swiss firm. As far as we were concerned this was outsourcing, it was no different to us than going to India. You get a Cambridge graduate in the early Eighties, particularly in geography, for about £1700 a year. And then we found a lot of problems. System X never worked; we'd been promised it. The Swiss PTT was in better shape than BT. We had problems with, you know, the staff wanted to form a union on the first day, and we were sort of, 'Why? Have we oppressed you?' [laughs] You know. 'We're just taking you out of unemployment. We've helped your…' Because we were paying about 25 per cent above average. You know, 'We're giving a good salary, and you want to form a union.' So we met a lot of interesting times there. I think many people in Britain forget what the country *was* like 40 years ago.

[08:58]

Mentioning Cambridge, there is a concern among many people in the UK that the UK, although it has some remarkable innovation, companies like ARM, it really can't get up there and create these big billion, billion-dollar companies. It has consistently failed to do so. Do you think there's a persistent reason for that?

I think there are several persistent reasons for it. Some of them are arguably cultural. I hate getting into cultural arguments, but I would stick with a few facts. I mean, one is the persistence across Europe of high levels of GPD taken by the State means that there's just less to go around in terms of entrepreneurship. Remember that innovation is a hugely wasteful process, and in fact, an American up in Cambridge, Bill Janeway, wrote an interesting book about ten years ago where he pointed out that innovation comes in two forms, one is a bubble, a financial bubble, and two is a war. And that's when you're prepared to throw anything at it. And, when you're prepared to throw anything at it, you will see huge amounts of innovation. But by definition, innovation has to be wasteful. If we knew where we were going, it's not innovation. So, this is the problem in Britain when, you hear in the radio every time somebody tries something that doesn't work, 'Oh you've wasted money.' Well, I never said it was a guaranteed thing, and this probabilistic view of the world that frankly investors have to take, is exactly contrary to what most European countries are like, which is, you know, determine direction and, and road paths. And I say that as somebody who's spent six years in the MoD working on innovation. It's very difficult to get people to understand that innovation, most of the time, doesn't work. And this is a fact.

Well of course.. But Moore's law has only been achieved, has it not, by a massively complex and coordinated road path.

[pause] Moore's law?

Moore's law, yes.

I would… I would disagree. [laughs] I would say Moore's law was created very much by competition. I mean the learning curve in that has led to a huge number of people falling by the wayside. Sadly to the point that we're dependent, as you are

well aware, on two companies, one in Korea and one in Taiwan. But what you're forgetting I think is, all the people who fell by the wayside who were developing things that forced these two companies to respond. I don't believe competition is everything. There are many areas where one needs to cooperate, one needs to share information with others, where one needs to be open, and, I have frequently just published what we're doing all the time. So it's not like I believe this is competition red in tooth and claw. But competition will always get the best out of us. You know, we love to admire our Olympic athletes. Well they didn't get there by being nice people; they got there through hard work and looking at whether or not the person next to them was jumping higher or running faster or swimming, and swimming better you know. [laughs] It's… Competition is what makes people perform, in business as well as anywhere else.

[12:04]
Is it of concern to you that a company, particularly ARM, has now become a type of, a corporate football, kicked from one corporation to another?

Yeah. Yeah. I'm a big fan of ARM. In fact, I was, I was there the day they launched on the London Stock Exchange. I think, I think their model is fantastic. This idea that it's the intellect that's embedded in the, in the software, and what you do chip-wise is a kind of, a secondary issue. And I say that as somebody who in the Seventies was designing circuit cards, where we were, we were actually doing a guidance system. So, I know a little bit about it, and, and I think what they've done is super. But they have hit the, the kind of, the end of the maturity path. It was either going to be, dependence on the physical fabric, or it was going to be dependence on, on the intellect.. Then we moved into a kind of, and this is where I believe the ARM argument, and many other arguments miss[something, is the nationalistic element of it. Now we're clearly going through a nationalistic period, we have the debates on Huawei, we have the debates about ARM, we have the debates about TMSC. But what I've always said is, people do not want the best British technology. And when I came to Britain, that was a refrain I heard constantly. You want to use this. Why? It's not very good. Yes, but it's the best British technology. My clients don't want the best British technology; they want *the* best technology. And the same thing applies to people. I don't want British people working on my projects; I don't *not*

want British people working on my projects. I want the best people for the project. And that's one of the biggest changes over the last 40 years I've seen. And I think it's very unremarked by many of the commentators who put a nationalistic label on it. ARM is not a British company. ARM is a company that was incorporated in Britain, and that's a very different thing. Many of the skills, most of the need for it, was actually driven from abroad. So, it… No company is an islan, no man is an island, certainly not in commerce.

[14:07]
Let's just pursue this a little more if we may.

Sure.

You moved to Bishop Moore High School in 1973. This was you getting dumped into another type of learning process. 1973 was the year of the ethernet, was it not, the local area network.

It was indeed.

And yet, the National Physical Laboratory in Teddington, not a million miles away from where I'm sitting now, had done one of the first local area networks, a man called Donald Davies had done it.

Correct.

Again, UK missed out. Why?

Well, again, I think, UK missed out in many ways because a lack of competition in telecoms. [laughs] And, you know, you can see that in the course of the progress. So, hm, where do we start? Now remember, I, I am a teenager at this point, so I'm not an authority or a contemporary of the period. But I do recall getting into, I was first on the Internet in 1976 when I was working at Martin Marietta. And, one of the things you saw there was that the Internet was capable, because AT&T had *some* competition, and the Baby Bell period, I believe from memory was about'81. BT of

course is privatised in ’84, and it’s privatised with a, supposedly a competitor in the form of Mercury, but Mercury was never taken seriously, and we still see the legacy of BT’s monopoly even today with Open Reach, where it’s very difficult for people to get that last, you know, copper mile to the door and be able to compete on it. And this I think has affected Britain in a number of ways. So, I mentioned earlier System X. For those who don’t remember, System X was the great digital exchange to replace the Strowger exchanges that BT was definitely going to be bringing out, it was a guaranteed thing, it was a showcase in Cambridge. Only one small problem, it never worked. And BT didn’t work. BT also, a couple of points I recall, and, I was a chairman of something called the Real Time Club for a while, the Real Time Club was set up in the late Sixties, actually by an American, initially to lobby the Government to allow the real-time access to telephone networks for computing telecommunications. But the Government never, never encouraged that, or forced BT to do anything. BT even went at one point to Parliament and came fairly close to lying about the laws of physics, claiming that ADSL simply couldn’t work because it violated the laws of physics. [laughs] So when you’ve got an established monopolist like that, are you surprised that anybody who comes up with a good networking idea finds no place to deploy it.

[17:01]
You then went into accountancy and consultancy I believe.

Well I, I spent… I mean I would sort of divide my career as kind of, ten years of science, really, from ’76, ’77 till, you know, about ’86, and then, yes, in… I came into the City in ’84, largely, the mapping project was coming to a close, and I was picking up a couple of clients who were all interested in putting computers into finance. So that intrigued me. But as I came into the City in ’84 or 5, I began to realise I didn’t really understand finance. And that’s what was it was all about. So I thought I’d better get over and learn what that was doing. So I moved over, initially into Arthur Andersen, and then later became a partner at Binder Hamlyn, and began effectively Binder Hamlyn’s IT consulting. I later did strategy consulting, and some other consulting arms. As I did that, I thought, well, it would be kind of smart to qualify as an accountant, and so I, I decided I’d go up and get those qualifications as well as science qualifications.

You do pursue your qualifications, don't you?

[laughs] Yes and no. I'm good at tests, and I'm very lazy.

That's not a bad, not a bad thing.

So I, I kind of, I get to the point where I think I might as well sit the exam and see what it's like. But yeah, I've taken a few over my time.

[18:27]
A question I should have asked already. When did you see your first computer, and what did you do with it?

Ah. Well, this is where luck plays an enormous role, and, you mentioned Bishop Moore High School. So Bishop Moore High School was a high school with about 1,000 kids, maybe 900, in Orlando, Florida. I, it was the most stable period of my life, I got to spend four years at one school, which was really unusual. And, when I was there, there was a fellow by the name of Bill Joseph. Bill's still alive today, he lived in London for 30 years, just in fact moved back to the States a couple of years ago. Bill was an interesting fellow, or is an interesting fellow. He is a priest, and he taught religion. You can work out from Bishop Moore, it was a Catholic high school, one of the better high schools in Florida. And Bill lived near the school, and he was desperately into computing. And he wanted to buy a PDP-8, which in those days was the price of about a VW, but it also took up an entire room, and a bit more. And so Bill made a deal with the school, as I understand it, that they would put, and house, they had a lot of space, they would house the computer, and pay for the electricity, if he would run a computer science course. So I was, I think I was about thirteen when I first saw this machine. And I was a bit entranced, I think as many boys are, I mean you know, wow, that's a really great thing. I have no idea what it does, but it's pretty interesting isn't it. [laughs]
[19:58]
And, Bill's course was intriguing, because Bill was also, you know, a qualified physicist in engineering. So Bill's, Bill's test to you was, he said, 'OK kid, you want

to come on my course. Here's a soldering iron. Here's a telex terminal. And here's the manual for the telex terminal. Connect it to the PDP-8.' Well I think I was fourteen then. And that's a hell of a challenge, it's also a heck of a challenge because you're converting telex machines on a, on a 5-bit Baudot code, and of course the PDP is running on an ASCII 7/8. So you, you had to figure out how to, how to crosswire everything; you had to read the manual. And Bill frankly wasn't going to help you, because if you couldn't do that, there was no point in putting you on the course. [laughs] And so, the great thing was, really, really learning computing from the ground up, truly being, you know, everything from circuit boards, cards, patch boards, you know, we had to learn it all.

[20:54]

And so, it sounds really silly, but at sixteen I then go into aerospace research in the summers. And you're going to say, why? Well, older people are lazy. The Pentagon was moving effectively from analogue… When I went in there, these guys, 'You wouldn't understand this, this is an analogue computer, Michael.' I'm like, well, you know, I've done my calculus, I can work that out. I know the circuitry because Bill had taught it all to us. I can see why you're using a capacitor for that. I could do this digitally too. [laughs] And they go, 'Oh well you go in and do that.' And of course you would program these things up. Many of these were very small programs. I don't mean to make light of it, but certainly the ballistics of that day were pretty primitive, you were trying to squeeze, you know, parabolic guidance systems with 4K in some cases. So, you know, you couldn't be too complicated about it, and the wind speed, or, you know, it's fairly basic stuff in many regards today, but it was very challenging then. And the older staff would let you do it, which was super. I, I had, I had great times doing these things. It was huge amounts of fun. [inaud] rates on, on warheads and, all sorts of good stuff. And, you know, for a boy, this was just, this was just a dream world. But it wouldn't have happened if Bill hadn't forced us to go through this very rigorous course, which I, I must say, when I got to university, I thought most of the university courses were nothing compared to what, what Bill had taught a bunch of teenage kids.

[22:16]

And when you did program it, what did you program in, in assembler?

Oh, oh gosh, yeah. We programmed in everything. I think in those days there was not this… I think it's, it's waning as well, but, the strong language distinction didn't exist. And Bill was determined that you would do everything. So, PDPs, obviously you had assembler. To make a PDP work in those days, as a kid I'd memorise, obviously the bootstrap, you know, certain, whatever it was, about 25 or 30 bootstrap codes. There was a, kind of a funny story. I was at the Science Museum. Basically their warehouse out in Hammersmith, just before they moved a couple of years ago, assembling a collection of, well curating a collection for London's Science City, the permanent exhibition at the, at the Science Museum, about London from 1550 onwards. And, somebody showed me a Dada General computer and said, 'Do you know how this thing works?' I said, 'No I don't actually. I never did a Data General, but, looks pretty similar, and, somewhere around here there'll be the bootstrapping. [laughs] Personally, I'd have probably taped it inside.' So I sort of kicked the door open, [inaud], and there it is, there was the bootstrap of the programmer, and sort of pasted it up, so that he never forgot the thing. 'How do you know all this?' 'It's what we did in those days.'

[23:33]

So no, assembler. DEC, which was of course behind the 8s, and later the 9s, 10s, 20s that I worked on, and the 11 of course, the classic, was, was quite a FORTRAN-heavy system. We also had FOCAL, which was a, which was a DEC system. We had DIBOL, which was DEC COBOL, believe it or not. And Bill, Bill had us do all those. He was language-agnostic. Obviously had BASIC, the old Dartmouth system. So all of that was going on.

[24:04]

And then of course when I'm over at, at Martin Marietta, at a science house and all, there was really, huge amounts of assembler programming. If you're doing guidance systems, you, you don't want to be looking at that. Then we moved into areas… It was a big FORTRAN house, APL, you'll remember the old APL.

Oh. what a programming language.

Yeah. And then finally, PL/1. So, you know, that, that was round one with me. Then I got very much into Lisp, which I'm sort of a big fan of. And, on and on it goes. So I, by the time I got to C, that was, [laughs] that was pretty late.

[24:45]
Do you have any… Do you have any views on C? Some of my friends have views which are unprintable about C.

Yeah. I probably would tend towards them, but I don't, I don't get that emotional about it. There's a lovely, cartoon, which sort of says, [laughs] I fell asleep one night and I saw the universe in all of its totality, and there was God, you know, floating. And, it was all written in Lisp and beautifully done. The universe came together. And then, you know, I woke up with, God said, 'Oh no no, we just hacked it together in a Perl,' you know. [laughter] And, you know… And to me, that's it. I, I think we all, we all want the perfect language, and, and there certainly isn't one so far. And I, I'm pretty agnostic about what to use. At Z/Yen today, most of my team are mad about Python. Python's an absolutely fine language, I have no qualms. But, I'm very relaxed. I've been through what, oh gosh, Pascal, Forth, I've forgotten. I can really… Somewhere there's a list of languages. It's very long.

Jean Sammet produced a list, didn't she.

Yes.

She's a great historian of languages.
[25:56]
You moved to Harvard in 1997, is that right? 1977. Is that right?

That's right.

What was that about? What was that about?

Well, I wanted to go to… Frankly, you know, you want to go to university. [laughs] Like most, like most students, I wasn't 100 per cent sure why. But what I wanted most of all was variety. So I, I applied to, got accepted by MIT, Dartmouth, Harvard, et cetera. And I thought Harvard would be most interesting in terms of the breadth of the coursework that you could take. It might be difficult for a British audience to

understand the true meaning of liberal arts at Harvard, certainly in those days. I think it's changed in the last five years, but, Harvard had been through this concept in the Sixties of CORe. Which was almost the opposite of, of core. The idea was that you would take 32 courses. So, you had a, you know, effectively four courses a term, two terms. Again for a British audience, remember that, students at Harvard do twice as much time at Harvard as students at, at Cambridge and Oxford; instead of 24 weeks for three years, you're doing 36 weeks for four years. And you would take four courses at a block. That was broadly the system. And CORe was that you had to spread your courses around the humanities, the social studies and sciences. And… And this forced you to have to do a variety of courses. I loved it. Some people found it frustrating; they wanted to do just engineering or something. And the university said, 'No, you're not allowed to do that. You do have to spread your courses.' And I, of course I took this to extremes. [laughs] The… You know, my… My list of list of courses is pretty strange. It involves postgraduate Latin, combined with postgraduate physics, anthropology, linguistics, Russian literature, chemistry, advanced mathematics, applied mathematics. [laughs] So it was just, it was anything I felt like taking. And of course I had a bit of a panic towards the end, because, at the same time the university requires you to have achieved enough in one discipline to put a name to your degree. So, you know, could you put economics or physics or Russian literature or whatever to your degree? [laughs] I was desperate to find a department that would work. And I wound up, my, my actual first degree is in Government, not in science, and that's because the Government department required me to do only four Government courses, and the other 28 courses were anything I felt like. There were a few little twists in it. So by doing an economics course, that counted towards Government; by doing a, by doing a statistics course, that counted towards Government, because they wanted Government students to do it. So… And the four courses I did were super. You know, I had Kissinger, Hoffmann, Reischauer as my, [laughs] as my teachers. So I, I don't really regret doing those four Government courses. But when people say, 'What was your first degree?' and I go, 'Government,' and they sort of laugh, and, they don't believe me, but it's true. [laughter]

You've had some top tutors there. Were they very influential on you?

[hesitates] Strangely, not the named ones. I think, when you really got down to it, my favourite teacher at Harvard by, by a long mile, and it's not to denigrate the others, was Robert Nozick, the great philosopher. He really inspired me, and still does today, I still read Nozick's work, and, and constantly think about it.

[29:41]
You left there in '84. Is that right?

[hesitates] Yes. I was on what was called the '7-year program'. Unlike most students, I was paying my way. My, my father was technically too wealthy for me to get a, a subsidy from the university. My father, quite rightly, thought, well, I've got five after this one; I'm not going to let him take all the money. So, I had to pay my way through university. I was lucky enough that Martin Marietta paid for a quarter of that, so let's not, let's not over-egg it. But when you know that a Harvard degree course casts in real terms, I forget at the moment, something like $60,000, you know, and you're, you're sort of, eighteen, nineteen, twenty… That's very much why I started this mapping project in Switzerland, because it paid the bills. I was getting paid, I think from memory, about, £30,000, and sort of, tax-free from the Swiss perspective, a year, and that allowed me to pay for, as I recall, the Harvard, in, in contemporary terms, was then costing, and tuition, I think about £12,000, £14,000. So, you know, it was just hard graft, and I was honestly overworking. I, I had a, I had a job while I was at Harvard, which overlapped with the mapping project quite nicely. I was a researcher in the lab on computer graphics and spatial analysis. So, I was fortunate to be able to have a full-time paid postgraduate job while doing my undergraduate. Just, it was just luck. But, it meant that everything was meshing together and paying the bills.

[31:15]
Your period at Harvard is interesting time spent for IT. 1997[sic], when you first went there, Apple was formed. 1984, the Macintosh is launched, which is interesting. Shows you how Moore's law allowed us to develop more and more rich and user-friendly interfaces for that matter. You also spent a year in the early Eighties in Trinity College Dublin?

Mhm.

You were a visiting student.

That's right. Again, it goes back to, I was, we… The Swiss firm was about 500 people, 600 people in Geneva, and they had an operation of 45 and 50 people in Dublin. And that's where the bulk of the graphics and mapping were. And so I was located there for a year, and I realised there was an opportunity to do my coursework there… I could see that things were getting more serious, and even, even, if I can be frank, by the early Eighties you could tell that, computing which I had seen as largely a, self-taught, you know, an autodidactic thing, you know, that, given that experience with Bill sort of saying, 'Here's your soldering iron, here's your [laughs] telex machine,' this was not the way that things were going. Even at Harvard… Harvard didn't come out with a computer science course until the mid- or late-Eighties, it was still all considered to be applied mathematics. But you could tell that things were tightening up. And of course in Britain, things were getting very tight. You are not qualified. You did not look at somebody who frankly didn't have half of your skills and say, 'And what's the difference?' 'Well, I've got an MSc in computer science,' and you were sort of, ooh, I could see that if I wanted to continue working in the sector, I needed to have a bit more than sort of, 'I'm good at it.' I needed to have some sort of qualification.
[33:08]
So, Trinity was lovely. They, they said, 'Oh, we'll put you on our fourth-year mathematics, computer science and engineering course, because you clearly know what you're talking about.' So, they were very open to it. And Martin Marietta said, 'Well actually, we'll pay for another year over in Dublin,' no questions asked. And of course, Trinity costs were nowhere near [laughs] Harvard costs, so, you know, a quarter of the Harvard fee paid for my Trinity fees. And then, to top it all off, for those who know Dublin, the consultants business was on Fenian Street, so it was about, about an eight-minute walk to Trinity College, so I could work, you know, walk into a course, get up, walk back to my desk, and… And because you were working really, well, maybe not from 7.30 or 8, but certainly from 8.30 or so, often until 10 at night, usual programming all-nighters, it was a, you know, it was a, it was a nice relief.

[34:07]

1982, an interesting year. In this country certainly, politicians are getting very very interested in IT, and the now Lord Baker launches an awareness programme, IT82, trying to raise the awareness of information technology. And also, as well, focus on education itself. Were you aware of that programme, IT82?

I became aware of that programme in '84, because I had a, a major client in the form of British Leyland, their ISTEL section. I was running the research and development function for autonomous vehicles and PL… programmable logic controllers. And I became away that the Government had this programme. At the same time British Leyland was sponsoring some 75 or 80 research programmes, which fell into my purview, they were in the, in the IT area. There were other research programmes in manufacturing and economics that I had nothing to do with. But we were funding a lot of research at universities, and that brought me into contact with government policy at the time, and I maintained that they were missing a point, and that, both the awareness that they had, and later on the IT skills which drove this country in my opinion to have a far higher concentration of Microsoft kit than America, believe it not, was due to not focusing on basics. That's why I was so pleased to see Raspberry Pi. Raspberry Pi was much more my way of thinking. You know, give the kids a machine; let them understand the machine from the ground up. They don't need to be good programmers. This is not what it's about. They need to understand what a major discipline in life, i.e. computer [inaud], means, how does it work. And even today, at my firm, Z/Yen, if you don't come with a reasonable programming background, you have to take edX's, EDXs, CS50 now, and CS50 is actually the old applied mathematics course at Harvard updated and given away for free to people around the world. It takes anybody who does it about six weeks. My teams, who come from, all sorts of disciplines, but these tend to come from the social sciences and humanities, to go back to that old Harvard classification, those folks tend to baulk at this. 'Oh I don't need to learn how to program.' I say, 'I didn't say you need to learn how to program. You need to learn how programmers think. You need to understand this in the same way that I'd ask you to learn how to do addition and subtraction. I'm not asking you to be a arithmetician or a mathematician, but you need to understand the basics of it.' And I still think that that's the right, the right approach, to really get

into the guts of it, and I would encourage all children, all young people, to, to do that for a few months. And if you don't like it, that's fine, and nobody said you had to like it or be good at it, but now you go away with an appreciation of how the world, or a major portion of the world, works.

[37:16]

I mean your point earlier about innovation. There's an interesting way to look at it, which is, really since the 1950s, so we're talking 70 years, innovation has been at least half about sticking a computer onto something. [laughs] I stick a computer onto a guidance system. I stick a computer onto an automobile. I stick a computer onto a piece of healthcare. I stick a computer onto this and that. That's probably been half of innovation. And in this country we lament it, certainly I remember that in the early Eighties as much as I remember the IT skills and awareness debate, we've had this business/IT divide. Well if you're a businessman, the real way to advance the business is to innovate, and you almost deliberately don't want to understand half of the discipline of innovation over the last, more than half a century, what are you doing? So, all business people who are leaders, in my opinion, at some point in their career should have spent a few months just really getting to grips with what this all about.

[38:17]

How are you as a manager? You have a ferocious, brilliant intellect. You're a polymath. You're a very demanding man, I would have thought, as a manager, and as a director. How are you as a manager? Because some people in this industry, I remember one ex-CEO of ICL, would be told, 'Well you've hurt that man's feelings,' and he'd have to go back into the office and look up the word 'feelings' in a dictionary. How are you as a manager?

That's a, that's a very tough question Richard. I have got people who have worked with me, in fact, one of them sadly passed away in November, he worked with me since 1979. So, so clearly, there are a lot of people who will stick around with me. But I suspect I am a bit Marmite, I am a bit of an acquired taste as well. I've never been taken to a tribunal, I've never had any… So, I'm not at the terrible end of management. I do have a very loyal group of people who work with me, and I enjoy working with them. We tend not to go through people very fast though. Because my

selection process is to try, in any way possible, not to directly hire anyone; find a way to work with them casually on a project, catch them between jobs and give them something to do. I will do almost anything to trial them out. So, in one sense, we leave a lot of people who aren't angry with us, they, but I don't take it any further than… The ones I take on, do tend to stick around. So, I'm not pathetic, is probably [laughs] the best I can say, but I wouldn't hold out my management methods as any, any paragon of virtue.

Yes, I, I don't see any writing about the process of management in your enormous output.

Oh no, I… Au contraire. There's a, there is quite a bit in *Clean Business Cuisine* about managing people.

OK.

So no, there's quite a, quite a bit of writing about management. But… But I, I, I don't like to pontificate on it as if I've got the right answer. I think it's almost like asking people, you know, 'Are you a great lover?' Well, you know… [laughter] You know. You know, because it is about people and relationships with people. Charles Handy wrote a great book on the Four Gods of Management where he, he had the Apollonian project based manage… Sorry, no, the Temple based management; the Athenian project based management; and, and sort of, the Dionysian confusion of, like a barrister is to chambers; and finally the Zeus-like, I'm at the centre. And of those four, I've, the Dionysian is just not my business; I need to manage people. It's not a bunch of independent folks running on in Rome. The Apollonian top-down hierarchy thing always causes me problems. It's one of the reasons I didn't want to stick in the aerospace sector, was, the great thing about work experience is learning what you don't want to do, and after three years at Martin Marietta I was like, wow, this is very structured, and not very innovative. So the Athenian model of projects, which is sort of how most large consultancies work, is still very attractive to me, but because I run a small firm, it's a bit Zeus-like, I or a couple of the directors sit sort of at the centre and everybody else is, is connected directly to us. So, I'm somewhere between Zeus and Athena.

[41:43]
Does this account for the name, Z/Yen, which you formed in 1994?

Yeah. Well, zee yen was a, was a joke. [laughs]

Right.

It's a… We… Basically, in 1994, Binder Hamlyn was acquired by Arthur Andersen. I was not particularly keen on it. I was at this point one of the six senior partners in the firm. And one of the problems I had was, I basically stood up at a meeting and said, 'This firm will go bust,' Arthur Andersen that is. And it wasn't a particularly good merger. Well that meant of course I burnt my bridges, but I wasn't too fussed, because the MoD had approached me. I had been working with the Ministry of Defence for six years from, roughly '89 until, until, five years, '94. And, they said, 'Well come on down,' you know, 'you're in your mid-thirties, be a two-star general,' [laughs] equivalent. And I thought, oh why not? You know, this, this sounds interesting. It was really playing into my finance and science combination. So I loved that. And then a group of my, my team, came to me and said, 'Oh boss, we want to set up a consultancy with you at the head.' And I said, 'Well that's, that's not very good. I thought I had taught you better than that,' you know, what I should… I don't want to know about it. I'm a partner in the firm still, and this isn't right. So I, I took it to the senior partner and said, 'I'm afraid, you know, there's a group here who want to go. And rather than, you know, start a legal battle with them, why don't you just let them go? You won't pay redundancy fees, you're not interested in the consultancy any more.' This, this was moving straight into the accounting. 'So, let them go.' So, he did. And off they went to set up their business, and they said would I chair it? And at this point I had now left the rim. I said, 'Yeah, I don't mind chairing it. As long as it's like, a half day a week or something.' And they then came back and said, 'Oh wow, you know, we're having trouble getting a name together.' And at that time, with the team with me, it's a sign of my management style, and Ian who joined me I think in late '88, from memory, they, you know, I'm writing a book, which was provisionally entitled 'Zen things you wanted to know about business but were afraid to ask', which was really just a pastiche on that Woody Allen film. And

so we, we had that. And I said, 'What are you going to call the firm?' And they said, 'Oh we're, we're really struggling here. `So we thought we'd called it like, Mainelli and Co.' And I said, 'No, that's terrible!' [laughter] You know, you don't focus the whole firm to the person, and I'm only going to be chairman.

Sounds like something from a Marx Brothers film. [laughs]

Yeah. I said, 'Well why don't you call it like, I don't know, Zen In Yen or something? You know, because that was the book that we were working on. And they said, 'What do you mean?' I said, 'Well Zen, you know, desire, philosophy, and Yen, desire. So a philosophical desire, I don't know, to improve, to make money. Don't worry about it.' And when I came back they had decided to call the firm Z/Yen. Which is, [laughs] is in many ways a bit of a mistake. Because… We then decided to put slash in it to represent the ratio, it, begin with the answer, Z, and go back to A, the ratio of Zen to Yen, basically thinking over desire. All sorts of things. But, of course by putting a slash in the name, and we should have known, of all people we should have known, meant that as the Web took off, it became quite awkward, so we should never have put that in there. And, you know, as you exemplified, we, you know, people say, zed yen, they say zee, and they say zy-yen. And the great thing is, with a name like that, you deserve what you get. [laughs] So I'm pretty relaxed about what we're called.

[45:28]
So you did work for the UK Ministry of Defence for quite some time.

Yes.

Some of the stuff obviously is covered by the Official Secrets Act, and you can't tell me a lot about it. But you can tell me about the characteristics of the Ministry of Defence and its handling of technology. Is it good?

Well, a loaded question in many ways. Well the first thing is, I was there at an interesting time. So just to put the context in. You know, the Wall has come down in '89; '90, '91, the Russians are coming. And I am there advising them in that period,

but, really on how to organise and manage and stuff like that. Come '94 as I joined them, we were really in what we thought might be a swords into ploughshares period. We genuinely thought that that might be the case. And we were therefore very interested in defence technology commercialisation, could we make this stuff more useful to the nation, could we get it out? The, the two organisations, which still continue, whose antecedent was where I was working, which was the Defence Evaluation and Research Agency, are QuintiQ and DSTL, the Defence Science and Technology Laboratories. So DERA was an enormous entity. It had pulled together everything bar the nuclear. So it had the chemical and biological research; it had the materials sciences and all that; it had all of the electronics; it had the Centre for Human Studies; and it even had some of the deeper strategic think tank stuff where war games went on inside computers. It was a really fascinating thing. 14,000 people, about 9,000 were qualified engineers or scientists, and huge facilities.

14,000? Sorry.

14,000.

Let me just check that. 14,000?

Yes, one four thousand, yeah that's correct.

Crikey. Crikey.

Now, it was all consolidated, so all the establishments of people who are older will remember, like RAE, were all part of that now. And into this, you are sort of thrown. So, is it good or not good? Well, I think… I, I had come out with a view quite similar to the sadly deceased Terence Kealey. Terence Kealey was a vice-chancellor of Buckingham University for a while, a fairly famous researcher in his own right up in Cambridge. He wrote a book in the mid-Nineties called *The Economic Laws of Scientific Research*. And he pointed out, as I said earlier, competition matters, it really does matter. Even in science and research, you need a bit of, a bit of friction. You know, a good example of this is the Human Genome Project. The private sector Human Genome Project trounced the public sector one, because they were out to get

the job done. And I know that there are many bruised egos over Craig Venter and all that, but I think without Craig Venter, the Human Genome Project would still be running now. You needed that type of competition. So centralising MoD R&D, I began to realise might not be the best thing. That was the first element. The second element is, when you think about all the people that I consider to be creative, they tend to fall into two wildly different camps, and I'll call them the old English system, you know, firsts and thirds. So the first is somebody, very rare as you know, who could get out of university and frankly turn their hand to anything, you know. And it's… You know, you could tell them to, you know, run the Royal Shakespeare Company, and you could tell me that that they need to design plumbing systems for Thailand and, neither one of these would faze them.

OK.

Thirds are even more interesting, because of course, anybody who can get drunk every single day of the year and still get a degree, [laughs] surely deserves some form of credit, you know, and has probably got a lot of coping mechanisms to, to get past. So… But… And of course MoD won't hire them; MoD will hire the 2:2s and the 2:1s. And they come in and they kind of go, 'Oh Mum, Dad, I just got a job at the MoD, and the great thing is, the pension.' Now, if that's the sort of person you're hiring at 21 and 22, you're not going to see a lot of innovation.

Mm.

[49:47]
Now, this is not to describe what those people do in an way, but I became aware that what MoD is particularly good at, most government R&D is particularly good at, is effectively a technology evaluation, not research. So, we need technology critics in government, or government… and we might well be taken by charlatans. There are many ways of being a charlatan in science, as we know. And so these critics are very very very very helpful, and so don't knock it. But that is what government R&D mostly does, because most of these people are there to either run a facility, which is very helpful, this is a facility, it's open to people, or open-ish to people who want to experiment, that they couldn't afford to keep on their own. Here is a centre of

information where we, we actually pair people up; that's very very very helpful. And it's certainly a good area where you can get a critique. So, I've decided to move from a classic radar to a carbon fibre radar. 'Why?' Because I think it's a great idea. 'Well, hang on a minute. We want to check out what it's going to be like when there's a bird strike, what does that do to the signature? What does happen…' All good critical stuff, no question about it, but it's not where the innovation comes from, by and large. And as I dug into many of the innovation stories, carbon fibre was one; turns out it was invented in many places simultaneously. Thermal imaging; Britain dd do some amazing stuff there that other countries hadn't done, on room temperature thermal imaging. But you find it mostly in your alarm system, and not actually on the, the heat sensor. And so there were these various areas that you would look at, and you begin to realise that government R&D, certainly in terms of input to output, is not about strictly technical innovation, but it is about managing technology, and that's a very important role.

[51:40]
And about managing technology, particularly in the public sector, we have some well-documented and horrendous public sector screw-ups in IT, a very long list of them.

Mm.

Why does that happen?

Well, I had to turn one around, which was the London Ambulance Service. [laughs] So, you may recall in 1992 London Ambulance Service collapsed. It was an IT failure. I still laugh to this day. Paul Williams, one of my fellow partners in Binder Hamlyn wrote the report, and Chris Webb worked for both us at one point on this. I was [inaud], Paul wrote the analysis and I helped him a little bit. And then it was my job to turn London Ambulance Service around. And it's not absurd to say that, we took 85 people working on the project and pretty much got rid of them and replaced them with two, Chris and one programmer. Now, [laughs] this is the untold bit of LAS, but, you can go back and look at it. I often laugh at the London Ambulance Service [laughs], because, I'll go to conferences, less, less so these days, but there was a point certainly in the 2000s when I'd go to a conference and some consultant would

brandish the report and say, ‘This is the London Ambulance Service report, and what it shows is, that, IT projects fail when you fail to get the staff on board.’ And then the next consultant would say, ‘When you don’t have the right methodology.’ And the next consultant would say, [laughter], ‘When you, when you use untried systems.’ The next consultant would say… So, they, they took out of it whatever they wanted somewhere towards the back of the report. One of the things I added to it was the idea that we had to have a causality diagram, and it really is a huge spaghetti diagram, the staff was anti the system, the trades union was anti the system, but it wasn’t necessarily their fault. In addition the programmers hadn’t taken account of the notification needs. And what happened was, broadly, the ambulances were spread around London and got further and further from their base, and the system was trying to reschedule and it just kind of collapsed, sadly resulting in a number of deaths of people who were unable to be collected in time during that golden hour.
[53:41]
So, what you can see there is, is this notion that these top-down government projects, particularly in IT, do tend to fail. And they tend to fail, in my opinion, and particularly in Britain, and when you compare it with the private sector in Britain which does have a, of course it’s got its failures, but it does pull off some pretty amazing large projects, and that’s because government manages it too much. One of the things I, I frequently said is, you know, I’ve never seen an IT system work where more than three people are involved in the core. Now people find that absurd, certainly the projects bigger than… Yes, it is. There’s a need to go to management meetings; there’s a need to talk to the customers; there’s a need to train people; there’s a need frequently to design lots and lots of screens that are accessing the core system. The core system has always been three people. You know, go back to my mapping system. Why did 30 people in Cambridge beat the Ordnance Survey by some 35 years? [laughs] Why did they beat, you know, the US Defense Mapping Agency? We had three people working on the core software. And all the rest were actually on the periphery. So we never, we never tried to manage the project. And that’s heresy. Remember that Britain is the home of, you know, Jackson structured programming; you know, [laughs] Britain’s the home of method, what’s it, Jackson and SSADM you know, it’s a, it’s crazy. But we try and pretend, even today, that it’s about engineering. And when you talk to people, for example, at a very successful firm such as Google, you’ll find that their management methods are not, not all what the

British Government likes to get from either Accenture or Deloitte, KPMG, PwC, IBM, Capita, which is this guaranteed programme of direction, Google for example sets up very very strict series of gates to get something into the general population of the system, but it's done by an extremely small group of people. Nobody is trying to manufacture an overarching Google system. So it's a much more competitive workplace and environment. And that's what leads to that kind of innovation.

[55:53]
That's what was written by the, Univac engineers. They suggested it was a, a point of a pencil, and they compared themselves with IBM. And there's IBM with its massive structure and so on. They were a much smaller, OK, [laughs] not ultimately successful company, but their engineering was much more pointed, they said. It's a, it's a, a very important point I think to make. You…

Ted Brooks at IBM of course had this mythical man mont where, having done the OS/360, you know, he comes out and goes, 'This is crazy. I mean this, this just doesn't work.'

Mm.

And he, he proposed I think seven-man surgical teams with some commonality between them where you knew who each of the seven members were but sometimes particular members could work from all teams. But, you know, this idea of small. And I, and I genuinely think that that's true. And in fact, it's even more true today. If you think about it in a really weird way, when I started beginning to realise… I've got a couple of pages written on my management style for IT projects, which I, I frequently show to people, particularly in financial services who are managing large IT arms, I keep saying… Well here's a good example. It happened twice within about six months, oddly. It's bit old, it's about ten years ago. I got called by a major investment bank, and I went to their offices in Broadgate. And I said, 'What is it?' And I brought one of my guys with me. And they said, 'Well we, we're a bit perplexed. You've got 25 people, and you run rings around us in IT development. You know, we've got 50 on the same project, and yet you're doing more work than we are. Could you explain to us why?' And I said, 'Well I, funnily enough, I have

brought with me my two sheets of paper on how to manage.' And they, they really hated it. And so we're standing there, two floors, and you could see about 500 people. 'I manage 500 people, and a large budget.' 'Well, I've got news for you. I've got two on the project against your 50, not 25. We're a 25-man firm. I'd be bust if I had 25 people on just this project.' 'Yeah.' I said, 'Well, look, look out there and tell me, you know, who are your best programmers?' 'Well, I, I don't know exactly who my best programmers are.' I said, 'Well look, would you agree that, the best programmer is better than the worst programmer by a factor of ten?' 'Well, yeah, I guess I would.' I said, 'Well, I think it's closer to 100. In fact I think most programmers detract from the project. [RS laughs] So, what I would do is, I would fire 495 people; keep the five best; and try and find five more like them.' 'You're mad, you're insane,' they said. [laughter] I know I, I know I need 30 or 35 other people to kind of hang round. I'm not an idiot, you know. But, but that's the problem, find the right people in the subject area. And he… And, and the same thing happened six months later, almost identically. The bank next door in fact, [laughs] it was quite, quite funny to see them really resisting this. They didn't want to get to the idea that they were out there to do something; they were there to manage it. That's very different. And, when you, when you take that sort of attitude, you would also argue that, the people you are getting rid of are the ones who are most automatable. So, as we're seeing this AI development in all these sectors, what I'm saying now makes a lot more sense I think to people, that, if it's really such a low level task that it can be managed in IT, then it probably isn't a task for humans any longer.

[59:45]
I want to ask you four final questions. Thank you for your time so far by the way.

Oh, delighted Richard.

We've done a lot of work in the archives on asking people, so, Y2K, a great waste of money, or absolutely essential? But nothing fell down. Ah, yes, people say, that's because we did the work so well. Where do you stand on this?

Well, in 1996, in the MoD, I had a session, we had Rob Wirszycz, I've known Rob for a long time, Rob is a, probably on your archive interview list as well I suspect

somewhere. Rob was then, from memory, the head of the CSSA, the Computer Software and Services Association; I think it later transited to something called Intellect. And I had known Rob, and he introduced me to a man by the name of Robin Guenier, who was a barrister. And the three of us sat down, and they said, 'Well what about Y2K?' And I said, 'Well, it's obvious we've got a problem coming ahead. I'm part of the problem, I was one of the guys in the Seventies, Eighties, who was doing two-digit numbers you know.' Well… And Robin I remember got rather uppity and quite, quite irate. 'Well somebody needs to pay for this.' And I said, 'Well, probably the accounts, you know.' [laughs] 'No, somebody ought to be sued.' Well that's, that's a lawyer for you. [laughs] And I was like, 'Robin, honestly, at the time we were told the system would be thrown away in a year or two, so, we were just doing it to make the systems efficient.' The cost of those extra digits was, was really really quite high. And it can be cured; it's just a question of spending money.' And I've often said that, and this is despite being qualified as an accountant [laughs], I've often said that if you had to look at it, is it the IT community who's guilty, or the accountants who are guilty, it's very much the accountants. If these systems were so vital and crucial, why weren't they on the books? And they frequently weren't on the books at all. And so, you know, if the system's worth 100 million to you, then you would expect to be spending, I don't know, 10 million a year in maintenance, wouldn't you? You know, five year life in a straight line accountants would have depreciated it. So, where was that money? And it was never spent. So… So there's a guilt factor there about, where do you put IT on the books? And that's not a simple question actually; it falls into, to some degree, many of the intangible arguments that we face in accountancy to do with value and staff quality and management quality, but, let's not go there. Anyway, that was the origin of what then became Taskforce 2000. And Taskforce 2000 was in fact run by Z/Yen, for three and a half years, and Robin was the figurehead for it. Rob and others put, put the things in. The Government, I think it was Ian Taylor at the time, you know, was moderately supportive. And then we got into the Labour changeover in '97, which started to cause some problems. But, broadly speaking, I believe that it was an issue, OK. Now, Robin was, of course a man who was, is a man who is very good at getting press. I still remember when I thought… He used every story that he could possibly use, he turned it into a, a Christian issue. [laughs] Because, it's about Jesus. And I

thought… And that, that went into the press. I thought, this man is so creative, on anything to do with, with the subject, to keep it up and raise awareness.
[01:03:10]
Now, Taskforce 2000, I think in its lifetime, of three and a half years, spent, from memory, £600,000, £700,000. Something like that. Well the Government then launched it and came up with Action 2000, which managed to go through tens of millions in eighteen months or something. And this is when it started to get out of control. Planes are going to fall out of the sky, and things et cetera. And there were real issues. And my feature was very much in the City, and that's where I could help, as well as coming with MoD support. Because MoD wanted to make sure this wasn't a security issue And I will genuinely say that speaking with major financial firms, the way the scenario went was like this. So you, you're a major firm, you're doing people's pensions, you're doing their insurances, you're doing their mortgages, but stick to pensions. OK, it's the morning of January the 6th 2000 and my pension statement arrives, and it's wrong. I'm a pensioner, I'm going to get pretty upset. And you say, 'Well, there was a bit of a date change issue. I just need to fix it. And I'll get a new statement to you by the end of the month.' Right, that's good. If you can pull that off, no problem. But if you blow the second statement, then you get into real issues. Now, that sounds very easy. Well, no it's not. Because remember, your pension statement is dependent on the asset management firms that, that have the information with the information that I used to give you your pension statement, you see.

Yes. Yes.

So there's an interconnected system there. And we were far more concerned about public confidence and things like that than we were particularly concerned about nuclear reactors and trains and traffic lights and things. All of those were very important. So that was the bit. And in the City, most people got that very quickly and said, 'Ah, I get it,' and off they went. And they spent quite a bit of money in the City replacing systems, or, you know, upgrading them. Most of it was upgrades. The IT department was complicit in it, they wanted the upgrade, because they'd been putting it off for so long. The management were sort of, hey, here's an excuse to have a swish new computer system, and, I don't have to justify it because it's essential. So it

was a, there was a lot of that going on. But it was also, going back to my earlier argument about lack of maintenance, well this was the catch-up of fifteen years' worth of maintenance that was finally, let's get it onto the right sort of system.
[01:05:31]
So, did it avoid things? Definitely. I don't think… Well I think I know, at the time, around 2000, 2001, if you had gone and actually talked to CIOs, most of them would say, 'Yeah, we avoided a few issues, and we've got a better system.' That was the, that was the point that they would say. Then you move into sort of, the safety critical areas. Martin Thomas professor, did a great study on this about three years ago, taking Michael Gove's comments about experts seriously. And he came away, bluntly having felt, it was probably, better to say no. And real people did die, we had genuine problems with the testing of pregnant mothers up in the Midlands where, where the dates problem definitely in IT system in the sector. There was something like thirteen reactors, something, around the world who, who had problems. It doesn't mean they would have gone critical, but they were shut down. So, it was, it was serious enough to shut the reactor down. And that means that hopefully many of the others had been, had been sort of, Y2K-proof.
[01:06:38]
So, I'm kind of a mixed mode. Definitely some money was wasted, but was there a crisis? Yeah, there was a looming crisis. And, some money was wasted delivering it. I find it interesting to compare it with sort of, the quantum computing issue today, which is, will quantum computing break current encryption methods? Now that's a, a rich debate, but it, it has some resemblance to the Y2K, but without quite the fixed date. And I, and I think that's going to be one that will be rising in importance as people begin to realise that just about everything we do in finance, and therefore all the commerce that occurs on the Web, relies on effectively, a public encryption.

[01:07:24]
You've just made a comment there. Can I have a quick answer from you on this one. It's not one of my four questions, OK. Quantum computing. A long time coming, and probably will never come. Comment?

Yeah. Well, back in the, back around '97, Charles Ross, one of the leading lights in the Real Time Club, came to see me about quantum computing, and, we also had

David Deutsch and a few others involved who, who are all part of that. And I convinced the Bank of England to conduct a trial of quantum encryption, which is really not that hard. Quantum encryption and quantum computing are, are actually only sort of tangentially related. Of course in the quantum world, everything's related, but let's not go there. [laughs] Quantum encryption is, is basically, the use of quantum effects to encrypt in such a way that you can't intercept messages. Quantum computing is a, is a means of calculating effectively large-scale probabilities all at once. We set up the European Institute for Quantum Computing, I think it was in '98. It only lasted for a few years. So, I believe quantum computing is worth looking at. I believe it will come. There are certain scientists who, who I respect, who argue that it's possible, that's it's theoretically impossible to, to actually have a quantum computer come close but you'll never quite get there. But we are beginning to see the, the effects of it coming out. And in particular, it's increasing rapidly, last year, in July, some good acquaintances of mine in the States began working with a Canadian company, and they are genuinely in finance using quantum computing as a third way of balancing portfolios, and it works. So it's getting there, but we, we knew there was a critical mass requirement; we had a had a critical mass requirement in computing, otherwise, you know, Babbage would have ruled the world and we wouldn't have had Moore's law. [laughs] So… So, it is getting there. Will it ever do anything amazing? Well I think there are a few problems with people's views of it coming The first is, the history of computing as, as exemplified by Moore's law, is, smaller, cheaper, faster. And quantum computing is oddly not about smaller, cheaper and faster. It's about solving classes of problems we've never been able to solve before. So the travelling salesman problem and things like that. So it could make an enormous difference, say, for example in linguistics, where better usage of the existing logistics framework, because you can solve this problem in real time or close to real time, means that you're routing all the Amazon vans intelligently, could make, you know, five, ten, 25 per cent difference in efficiency. It could be very very useful there, but I don't think general public is likely to see it. That said, I'll probably, you know, wind up like IBM or DEC, when it turns out that actually there's a quantum computer on every desk in ten years from now. But, I believe it's meant to be an algorithmic advantage to everyone, not an on-the-desk advantage to everyone. And most people will, will probably not see it.

[01:10:40]
Your company has helped build the Global Financial Centre Index. I believe you run it as well, don't you?

That's… Yeah, we run the Global Financial Centres Index, the Global Green Finance Index, and the Smart Centres Index.

And the Global IT Index, Intellectual Property Index.

Yeah we set that up for Taylor Wessing. And they've stopped doing that now. But yeah, we ran that for eight or nine years.

[01:11:05]
Oh OK. OK, so, so that's stopped. That allows me to get another question in. Bitcoin.

Hah. [pause]

Have you got skin in the game?

I have a .00001 of a bitcoin, because I thought it was important to have gone through the process and known how it worked, you know. [laughs] Yeah, bitcoin. Where do we go here? Well, quite interestingly, I mentioned Professor Mike Smith. Back in 1995, '96, we were trying to build a system for three charities to share very very sensitive child abuse data, and we built it using what people would today call a blockchain. We called it stacking and sleaving. And I first saw blockchain thinking back in '78 at Harvard, we were talking about, we have an internet of connectivity, TCP/IP. How do we have an internet of record? How could I prove to you that I had sent you a message? And if you have people from Harvard and MIT and Dartmouth all sitting together, I think within five minutes, and it certainly wasn't me, somebody said, 'Oh well, it's obvious, you just hash it.' Of course we called that checksum, but don't worry about that. Just a long checksum, it's a hash. And we would say, well we take the checksum, we'd store it somewhere, and, then we'd have evidence that the transaction occurred. Now the problem though is, if you think about hashes,

they're about 256 bytes, so, it's… [laughs] And I'm trying to stick, as I said earlier, a guidance system into 4K. So sixteen hashes uses up all my memory. So, we, we knew what the problem was, but we couldn't do it. And that wasn't surprising at that time. It's the same thing with AI. Most AI techniques date back to the mid-Seventies. Why has it taken off now? Because we couldn't do it, we didn't have the scale of data handling, and we didn't have the processing power to do it in anything like a useful period of time. So, that's not unusual. So Mike and I in the mid-Nineties, I go, oh well, you know, we, we could just hash this together, and then we would have indelible records, and the three organisations could trust each other knowing that they wouldn't be able to cheat. That element of what I call a smart ledger, or some people call blockchain or distributive ledger technology, I've got loads of publications that are freely available on our website, some 45 or 50, all focus on that element of smart ledger.

[01:13:25]

Bitcoin comes out in 2009, towards the end of 2009, and the genius there is a consensus mechanism put on top of it. But I do see it personally as a bit of a failed experiment. Firstly, bitcoin is currently constituted, uses far too much energy, it's far too slow, 350,000 transactions a day. You know, you'd, you'd bring the entire global network down if it was using bitcoin just, just running a single football match. You know, by the time people bought beers and their, and their hotdogs, all, the whole thing would collapse. So I don't see that as sensible, personally. And then you move into the economics of it, and people who study this seem to think that, trading numbers in the dark with each other is, is a useful thing to do, and forget what real money is. Well real money, fait money, currency is really about tax credits. We should have tax credits with each other. So I believe, bitcoin? Well, we have gold bugs; we'll continue to have crypto cockroaches. Every time that the dollar drops down, somebody will say, 'Well what about bitcoin?' And I don't think it will play a role analogous to gold per se.

[01:14:35]

But when it comes to digital currencies, that's clearly the way to go, and the central banks are very strongly looking at it, so-called CBDC, Central Bank Digital Currencies. The Chinese are deep into a widespread experiment on it already. So, those, those will emerge over time, but they're not actually, bitcoin is a completely different approach. The only commonality to them is that they use a blockchain, and

a blockchain frankly is just a data structure. So, there's a, a weekly newsletter that comes out on blockchain, and everybody goes, 'Oh, oh, it's exciting. Look at where blockchain's being used.' I say, but, take blockchain out, and put database in. [RS laughs] Yeah. Maersk is using a database to track ships around the world. How else would it do it? And this is just a database that's indelible, that's all. And the technique is very very old. And on our website, I actually went to the point of digging around with a researcher from Imperial, and Henry has come up with, believe it or not, a 1976 IBM parent for a blockchain, which is a blockchain, if you know how to read them patent.

[01:15:41]
We ask, we are speaking, interacting, full video, a little delay, but that's OK. I am not paying horrendously for my link; you aren't paying horrendously for yours. Our software is free. And, we are in a pandemic. And yet we can interact. You are going to be working hard today, I'm sure, on your reams and reams of jobs that you've got, some of them executive, some of them advisory, et cetera. And you are very very active. What happens to the place we call the city, small c, or the town, after COVID, with this type of technology having been so, not universally but so widely used?

Wow. [laughs] Well, as you know, I'm Sheriff of the City of London at the moment, and an alderman. In fact I've been extended by another year, the first, two sheriffs to be extended since 1228 I believe. So, we're there to provide continuity. So I am a booster for London. And I don't mind being that. I run the Global Financial Centres Index, but we do it impartially, but I will boost London, I think London is fantastic. I've made it my home because I love it, I love the people, I love the culture, the whole thing. So, that's us. But we do face change, and that's without a question, and I would point to two things that… One is, this great experiment that we've had in video conferencing doesn't prove that video conferencing works. We knew video conferencing worked. I've had video conferencing in Z/Yen since the late Nineties. Skype is 2003. Jitsi, which I think more IT people should pay attention to, effectively the open source Unix – sorry, Linux version of video conferencing, has been around since 2003 as well. There's another couple. Shareware Package is out there. Zoom is relatively recent at 2011. Of course Microsoft, you know, very swift to the game, Teams is 2017. [laughs] So, you know, what we learnt is not that they work; they'll

work, and they'll all practically about the same. What we learn is that if everybody does it, it works much, much better. It's, the mixed mode doesn't work very very well. And it would be without question that there were two sectors that were good for it, one was certainly technology, and the other was finance. And the City of London is, is, by the way is about as much a technology centre as it is a finance centre, in terms of jobs, believe it not. 125,000 people working in the City. I think the numbers are about 250,000 are in all areas of finance, and about 130,000 are in, just pure science and technology jobs, believe it not. And many of the people in the 250,000 finance jobs are doing computing jobs. But I mean 130,000 scientists. So it's, it's really quite a, a diverse community in many ways.

[01:18:32]

We have taken a heck of a hit. I was quoted in September saying something along the lines of, the geographic city of London has had a torrid COVID-19 year. The south-east of England financial services cluster has had a boom year. And so we've seen this enormous change to the way that we work. Is it going to be permanent? Well I'm in Wapping, and out that balcony I see the City, and it's been empty most evenings. You know, we're down to, about five per cent of the breadwinning workers, and about 20 per cent total workers. Out of my other balcony I can see all of Canary Wharf, and that's pretty dark too. I don't think people who are looking at their property bills, which are typically fifteen, 20 per cent of your overhead, are going to go back to that. I just don't. That doesn't mean they won't go back to the City; it doesn't mean they don't need to meet people. But it does mean that, there's a great temptation to continue like, as, certainly in technology and finance.

[01:19:34]

The other thing that I think is interesting is, my team have done some work, because of our Smart Centres and Financial Centres Indices, on consumer intensity. Consumer intensity is not easy to measure. I thought it would be, and I'm, I mean I got my head around that, oh my gosh, that's, that's kind of difficult. But if you look at things like, the amount of installed metro lines per capita, and things like that, you begin to, you begin to see that the cities most likely to be affected/effective are, financial centres with a high community intensity. And that's not a surprise. Cities are based on power laws. The only reason a city works, it gets bigger, it's the power law factor. So, a city four times the size of one, is, you know, is four times better than one half the size. I mean, you can get these sorts of power laws where, in my opinion,

London coming in at nine million or so, well 700,000 this year supposedly, London coming in at nine million is four times the size of the next European city. So it's taken the hardest hit. I think we can really renovate in new ways. I'd like to see more of a business campus approach, a lot more flexibility in space usage. And I'm actually quite excited about the future. I think London could emerge from this as a better, a global coffee house for the world. If you really want to meet people, come to London. You can say, well why? How's that possible? Well there was a very very unremarked upon fact in 2019. During 2019 Scandinavian air travel dropped by eight per cent. Yeah. Sorry. Scandinavian business air travel, and I'm not sure about the holidays, but the business air travel dropped by eight per cent. And it dropped because of something called *flygskam*, flight shame, *skam*. And, during 2010, when they had the volcano, Scandinavian air travel dropped by four per cent. So, so this is a real effect, OK, of people dropping their air travel requirements for business. Now, of course, COVID-19 dropped it by, you know, 85 per cent [laughs]. But I don't think it's going to be easy to go back up to those levels afterwards. It's not that there won't be business air travel, but you're going to have a hard time, and your boss is going to say, 'Why is it, Richard, that you're off on your sixth trip this year?' 'Well you know Mike, every, every two months I go and see our clients around the world.' 'Well, you know, for nearly two years, Richard, you were able to do it, like this. Why, why do you need to do it twelve times in the next two years? Maybe you could get away with two.' And I think we're going to be seeing this type of change coming on. And I'm not sure it's a bad thing. I think, it's going to force a lot of us to improve our management techniques. We're going to have to learn how to manage, you know, by action rather than managed by attendance. So there's going to be a lot of work I think, that's probably mostly to the good. All technology cuts two ways.

[01:22:46]
Management by action, not by attendance. I do like that. One last question. This is for those who are watching, and are going to be watching this. You've made mistakes in your life, I'm sure. What was the biggest one, and what would those who are watching this learn from it?

Wow. That's an extremely good question. [laughs] I have bumbled around everywhere. My biggest thing is never to have had a plan for, for most of my

personal life. And I've always done things sort of, backwards. I, I got my doctorate very late in life; I should have gotten it earlier. I married very late in life. Maybe, maybe that was a good thing, [laughs] because, I met the right person. So, I've got a… I think the biggest thing is that there is a tendency to have a bit of a plandemic. [laughs] People planning and planning and planning. And I don't see that as, as very good. But I do wish I had laid down perhaps a stronger roadmap for myself. And, I must say, it doesn't matter what it is, whether it's getting properly serious about relationships, whether it's about studies or qualifications, whether it's about the guitar, which I play terribly; I play other instruments better. Whatever it's been, it's, get started doing something right away. Just do it now. And if you can't do it now, figure out a way to do, take a baby step towards it. And I, and I have been very bad at that. It's a form of procrastination probably. I like to excuse myself by saying, I'm so busy I don't have time for it. But I think the biggest thing is, try and do things today; don't put off, you know, till tomorrow, what you can do today.

[01:24:31]
I did promise in the introduction that you would give an extremely good contribution to the archive. You have. It has been very, wonderful listening to you, and asking you difficult questions, which you have answered very completely. So I really want to thank you very much. You're an Alderman and Sheriff of the City of London, you're a Professor. Thank you very much Professor Michael Mainelli.

Thank you very much Richard. It's been kind of fun. I really enjoyed it.

Good.

[End of Interview]