Dr Roger Johnson

Interviewed by

Jonathan Sinfield

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Welcome to the Archives of Information Technology. It's the 12th of January 2018, and we're in London, at the Livery Hall, at the Worshipful Company of Information Technologists. I am Jonathan Sinfield, an IT professional, an interviewer with Archives of IT.

Today I'll be talking to Dr Roger Johnson. Roger's interest in computing began while studying pure mathematics and statistics at the University College of Wales. Following graduation from Aberystwyth in 1969 he moved to Birkbeck College, London University, where he obtained a PhD in rule-based extensions to programming languages. Post-PhD Roger worked for a large software house, before taking up a lecturing position at Thames Polytechnic. Roger then returned to Birkbeck in 1983, becoming a reader in computer science in 1993. He is a past President of both the British Computer Society, 1992 to 1993, and the Council of European Professional Informatics Societies, 1997 to '99, and was Honorary Secretary for the International Federation for Information Processing 1999 to 2010. In 2009 Roger became a Fellow of Birkbeck, after twenty-three years as Dean of the Faculty of Social Science, responsible for the departments of computer science, information systems, economics, mathematics and statistics, geography, management, and organisation psychology. Roger retired from Birkbeck in 2010. Welcome Roger.

[01:57]
Roger, perhaps if I can take you back and ask you to let our listeners know where you were born.

I was born in London, in 1947, and grew up at Woking in Surrey, and, had a conventional education, through primary school, and then went to the local grammar school, where I studied at A Level mathematics and physics, before going on to university.

[02:37]
Mhm. Thank you. And Roger, can you tell us a little bit about your, your parents, and their professions.

Yes. My father was a schoolteacher for twenty, thirty years, and decided when the schools were being, secondary schools were being merged, that he didn't want to join one of these new large comprehensives, and having had as one of his teaching subjects sport and physical education, he moved to the County Council, Surrey County Council, as their first Health Education Officer, and was responsible for the promotion of health education messages throughout the community. My mother didn't, in my childhood, work. She had worked previously and during the Second World War as a shop assistant and became a manager of several shoe shops as she followed my father around the UK, as he went from RAF station to RAF station as a physical training instructor.

[04:06]

It's perhaps worth saying just a word about both of my grandfathers, who I think had a, an influence on the family, and perhaps indirectly on me. My mother's grandfather was born into an agricultural family in the middle of the nineteenth century, and became a carpenter and joiner, moved to Sheffield in the 1870s, and then became active in the early trade union movement, and in, towards the end of the nineteenth century he became the General Secretary of the Union of Carpenters and Joiners. And eventually moved to London as their General Secretary. And he was a very committed trade unionist and reformer, and I discovered relatively recently that he was very committed to the education of the working man, which ties in very closely with my commitment at Birkbeck where many of our students were part-time.

[05:37]

The other, my other, my father's father was also, had, had similar, some similar characteristics, although not on a national level. He was a very committed individual, and went off in the First World War aged nearly 40 as a Red Cross volunteer to the Western Front, and, was invalided out, after, after being caught up in a gas attack. I think he may well have been a conscientious objector.

[06:19]

But, through both of these, my parents had a strong sense I think of, that, of commitment to causes, if there was something that you felt mattered to you, then it was up to you to become involved, and to become, to become an officer on a committee, and so on. And, although I was never directly taught the lesson, I think I followed their examples, since both of them were active, both my parents were active in various local, local bodies. My father was local secretary of the National Union of

Teachers and so on. And I, I think, those examples, my mother also in other local activities, I think those examples partly encouraged me in my work with BCS and other voluntary and professional bodies. But… So, so I come from a background of people who, who were active in a variety of causes that mattered to them.

[07:36]
Mhm. Thank you. And, and briefly, you talked about education. You mentioned you went to Woking Grammar School. And your A Level subjects, pure maths, applied maths and physics. In terms of, what would you say your favourite subject was when you were at school?

Certainly not physics. Physics, I, I never got very enthused. Mathematics generally, more pure mathematics I think at school, although, when I moved on to university reading pure mathematics, I, I discovered, as most people do, that mathematicians are very special, good mathematicians are very special people. It's, it's a rare gift. I, as, as we will come to much later, as I was Dean of the faculty, one of the departments I ran was mathematics and statistics, and, I, I knew a lot of mathematicians, also some very fine economists who were first-rate mathematicians as well. Ability of pure mathematics is something very special, and when I got to university I discovered I actually don't have that talent. Fortunately I had discovered both statistics, which I did have, at least measured by exam results, more ability at, and in particular computing, which I met for the first time in the second year of my undergraduate course, and took to like a duck to water. It seemed to me it was rather like Meccano, which I had enjoyed as a boy, it was rather like Meccano for grown-ups. And, so, computing, that fascination started at that point, and has never really left me.

[09:40]
Mhm. So you were at University College of Wales Aberystwyth.

Mhm.

Went there in '66 and was there for, 1966 and there for three years.

Mm.

In that period of education, are there any individuals that you would say influenced you during that period of time?

I was thinking about this before the, before coming to the interview. I, I think the person inevitably who had the biggest influence on me was the head of the computer unit who gave the lectures on computing, and who subsequently became my PhD supervisor, and when he moved to Birkbeck in January 1970, as his research student I came down to London with him, and computing in London was on a completely different scale from that in Aberystwyth. And, he and I also shared in those days a common interest in party politics, and so, he also taught me how to canvas and to charm half crowns out of old ladies on the, on the doorsteps in Aberystwyth. And, he, as I say, took me to Birkbeck, and then was largely responsible for my return to Birkbeck in 1983. And ultimately I became his boss when I was I was Dean of the faculty, but we'll come to those stories much later on.

Yes. Sorry, his name was…?

Oh, I'm sorry. He was Professor Peter – oh, well he is, Professor Peter King, who, as I say, was the head of the computer unit and then became Professor of Computer Science at Birkbeck.

[11:35]
Mhm. And, are there any particular events that shaped your education?

I don't know they shaped it. I, I met somebody the other day who had, was a student in economics at Aberystwyth exactly the same time I was, from '66 to '69, although we don't think we met one another, although we were in adjacent buildings. But, his memory, his overriding memory was the same as mine, which was the summer term of 1969 when the Prince of Wales, just before he was installed as Prince of Wales at Caernarvon Castle, spent a term in Aberystwyth trying to master the Welsh language. And, in the tiny little town, Aberystwyth's population is, in those days was about 10,000, the arrival for a term of the Prince of Wales living in the hall of residence, and moving through the town, caused a lot of fun amongst the local community, and, not

least the visiting farmers' wives who, who came for their summer outings. So, I, I didn't meet Prince Charles while he was there, although I knew people who were in the hall with him, and heard some of the stories of what happened. But, I think probably… Aberystwyth was a lovely place to be a student. It was a small community. I got involved in lots of societies. I was active in student politics to a degree. And, it was a, it was the classic three years away from home where one matured enormously, and met a whole variety of people. And it was an interesting time also in politics worlds, the development of Plaid Cymru and the Welsh nationalists. But it was a thoroughly enjoyable time.

Mhm. And you mentioned, you've mentioned politics several times. When you were canvassing at that age, may I ask who you were canvassing for?

Yes. We… I was… It was for the Liberal Party, who had held the seat, the Cardiganshire seat, from the Reform Bill in the 1860s, the end of the 1860s, until 1966 when they lost the seat to the Labour Party. So I, I went in the summer, so I went up, and the Liberals were smarting from having lost the seat after almost 100 years. And, in the 1970s they won the seat back again. But, it was, we were canvassing for the Liberal Party.

[14:44]
Mhm. And, in 1970, that's when you came, came to London.

Mm.

You mentioned you followed your professor who had moved there as well.

That's right.

And, and you chose to do, undertake a PhD. Perhaps you can take us through that thought process, and tell us a little about the PhD.

Right. Well, the PhD actually started in Aberystwyth. I was lucky enough to get a Science Research Council, as it was in those days, research grant, a PhD studentship,

which funded both the fees and provided a small stipend on which to live. And I had started in October in Aberystwyth, and, I knew already that Peter King would be moving to London. He had been appointed to the post in the summer, and, to take it up on the 1st of January 1970, and so, I knew that that first term in Aberystwyth was a preparatory term. And then, in January I moved to London, and began work. Peter King had been researching rule-based extensions to programming languages, and, it fitted well with the sort of interests that I had developed, and so, I began that work mainly, as I say, once I had reached London where the computing facilities were much better. The Control Data 6600 had just been installed in the University of London computer centre, and so we had a colossal computing power, access through remote job entry terminals, so we used decks of cards which were input over a communications link. And we had a, probably something like a 300 line per minute printer to receive the output from the machine. In Aberystwyth we had had an Elliott 4130, which is a rather nice machine, but, of quite limited capacity.

[17:14]
Mhm. And, once you were doing your PhD over the course of what, four years, three or four…

Yes, it was three years full-time, and then I started working. I got married in the summer of 1972, and spent about a year from then writing the thesis up. And in those days it was typed by hand, you had to find, and pay, a typist who was willing to put up with all the amendments that you have with thesis drafts. And, so, so it was quite a slow process in those days. And, the thesis was awarded in 1974.

[18:07]
Mhm. And thinking about over all your, your education to that point in time, were there any key lessons that you learnt from that time that you attribute your latter success?

[pause] I'm not sure that there were actually. I, I think I probably… The one thing that came out was acquiring a fascination with computing.

Mhm.

That was the main discovery I think that I made at that time. And, I decided I, I would have a career in computing, that seemed… I had thought in 1969 of having a career in computing. I said earlier, Peter King was quite influential in my career. He had suggested to me that I apply in 1969 to CAP, Computer Analysts and Programmers, which was a major UK software house, for a job, and I actually had a job in, starting in the summer of 1969, a job offer, had I not done well enough in my degree to be able to get the research studentship. And, Peter King knew the founders of Computer Analysts and Programmers, the principal people were Alex d'Agapeyeff and Barney Gibbens, who, well both, Alex played a significant part in the history of the British Computer Society and was a President, and Barney Gibbens was involved with the founding of the Worshipful Company. So, those people, there were sort of, there were links with them. But, I had had this job offer in 1969, and had declined it to do the PhD, and then in 1972 was able to persuade them, again with Peter's help, that, having turned them down once, that they would, this time I, I would go and work for them, which I did for four years.

[20:35]
Mhm. And, what type of work did you undertake at CAP?

Right. CAP, I worked in CAP London. We were based, the head office was in Great James Street. And I was in the office in Lamb's Conduit Street, which they had in those days. Much of the CAP London work was concerned with writing software for the finance industry, banks, insurance companies particularly. My first project with CAP was for the Phoenix Insurance Company, who in those days had offices in King William Street in the City. I spent about six months working there, and, that was the first time I had anything to do with the City of London at all, and found it fascinating. And, it was very much the end of an era, it was an era still of largely insurance companies conducting their business on paper. They, the company had a modest computer system that really didn't do very much more than record keeping and issue renewals of, for insurance premiums. And they wanted to have what would now be recognisably a, as a computer system which went right across the whole of the business of the company. We, I went along, I joined that project to do the life insurance business. Phoenix were in the process at that time of also computerising

their general business. For, for their own reasons, they had decided to give that to a different software company, who basically made a mess of it, and since the life business was progressing well, the general business project was also then given to CAP to do. That stretched CAP's resources to the limit, and CAP struggled, anyone who was on that project will admit this, it really struggled to deliver it. It was delivered. It was all written in PL/1. I initially was working training PL/1 programmers. CAP had I think about six, when it got the contract it had six people who could write PL/1, and, it ultimately had about 120 professional staff working on that project, which was delivered in the new computer centre that Phoenix created at Bristol. So that, that was an interesting project. It was a batch system. In retrospect, by 1974 when it was being delivered, it was quite clear that it should have been an early online system, and many of the struggles in delivering it came about because it really was a system too big to be built as a batch system. And, it also, it needed machines. We started with one 370-145; I think if I remember rightly, it ended up on two 370-155s, which gives you some idea of the, the size of the project that was being undertaken. So that was the first CAP project. I then… Oh, sorry, can you just stop?

[pause in recording]

[24:32]
The… That project was followed by a very different project. This was for Decca. Decca in those days made a lot of money out of, out of recordings, not the sort of world of radar and so on, but, out of gramophones and records and so on. And we built an order processing system for them. This was an early online system. We used an early database management system. And, it was a neat project, written in COBOL, and, I think was generally regarded as a success. And, I, I think… I, I always felt satisfied with that project. On both of these projects I was a, I was basically writing software, I was a software engineer, I was programming. The Decca one was interesting. That was the first time I had seen something that was, used something that was a database management system, and later in my academic career I was interested in data management. So that was the first time I had met a database management system.
[25:55]

That project lasted about a year. And then, I became a poacher turned gamekeeper. There had been a major scandal in the insurance industry with a company called Vehicle and General, which built up a huge portfolio of car insurance policies, and did so by selling very cheap insurance. What it was actually doing was pyramid selling. It was pricing its premiums too low for the costs. I could talk for a very long time, and won't, about what I discovered about insurance and, and the underlying theory of insurance, which was surprisingly primitive. The result of the collapse of Vehicle and General was that the Government set up a royal commission, and the Department of Trade and the insurance division of the Department of Trade had to build a computer system to process the annual returns of insurance companies. These came, and the Prudential's was probably the best part of an inch thick on A4 paper, and had wonderful leather binding with gold tooling I remember. The tiny insurers literally sent in half a dozen sheets of paper, stapled together. And it was the job of the insurance division to ensure that these companies were behaving in a financially sound manner. We stared to design a system to implement that, and we worked on with that. And, what the civil servants wanted was a generalised inquiry system. I'm not sure, I think we concluded that this was beyond computing technology's ability to deliver by the point that there was a General Election at the end of 1974. My recollection is, a Conservative government was succeeded by a Labour government, and the Labour Party, Labour government, cancelled the contract, and so we were, we were relieved that didn't have to build the system we had designed, because we were far from confident that we were able to deliver it.

[28:27]

After that, I went on to a project for Barclays Bank, for their trust company, and that basically listed all the assets of various trusts that Barclays Bank administered for its customers, and we received, Barclays Bank received daily tapes of stock market prices, and these were run against the portfolios to value the portfolios and… It was an interesting project again, because it replaced a paper system. And, we, we built that from scratch. And, towards the end of that project I left CAP to go back to academia. But, so, all, well three of my projects were concerned with the finance industry.

[29:26]

Which would you say… You mentioned Decca as being a success.

Mm.

But, would you say that was the most successful project as far as you were concerned that you were involved with?

The Decca project, we were asked to design it, build it, install it. We did that. As far as I recollect it was on time and on budget. The Phoenix project was hopelessly over-ambitious, and was delivered, and it ran, but it was a hell of a struggle. As I say, the Department of Trade project, we weren't at all sure that, quite a lot of it, particularly the generalised inquiry facilities, were beyond the state of computing technology in those days. So I, I think Decca was probably the most satisfying, simply because it was a neat, tidy project. We went in to do a job, we did the job, and we left.

[30:26]
And thinking of your time at CAP, with the benefit of hindsight, is there something you could share with our listeners of, what you might do differently? Perhaps, if you could have your time again at CAP, with those type of projects that you were involved with.

It was right at the beginning of my career, so, I was learning as much as I was doing. I, I think, the one message I took away was from the, my team leader on the Phoenix project, and it's something I have said to many people who have worked for me, and I tried to apply it to myself as well. He said to me one day, shortly after we got, we started building the system, he said to me, 'Roger,' he said, 'computing projects are engineering.' He had worked at Rolls Royce, so he came with that background. He said, 'Computing projects are engineering.' And he said, 'Things will always go wrong.' He said, 'Don't worry if things go wrong,' he said, 'but just tell me that they've gone wrong.' He said, 'All I want is no surprises.' And I think that was probably the best piece of advice that I probably have ever had in my career. And, I have been able in, as a manager in the university, with hundreds of staff, and so on, I've been able to say to people, 'Things will go wrong, we're human, but no surprises.'

Mhm. That's interesting. I've heard CEOs use that, that phrase as well, both positive and negative, no surprises, almost for…

Mm.

Yeah. Particularly when it comes to financial matters I find as well.

Yes. Yes, I, I… We'll perhaps talk about university finance later. [laughs]

[32:42]
Yes. Well moving on. You've already alluded to, to this. You, after four years at CAP you decide to go back to academia.

Yes.

And, join Thames Polytechnic, and, which of course is now the University of Greenwich. So, I would be interested in what prompted you to make that change, from the commercial side of IT to academia.

I… I remember having a, an exit interview with the HR director at CAP who asked me the same question. It must have, probably have sounded rather arrogant to him. I, I said I, 'I find writing, designing and writing software,' and I'd got up to be a, a team leader by this stage, I said, 'I don't find it very challenging intellectually.' And it must have sounded, in retrospect, [laughs] terribly arrogant to say that. But actually, I do enjoy solving problems, mental problems and so on, and, writing software, and in particular designing software, I didn't find terribly challenging. There's a big challenge in writing and debugging software, and people who can do that, I have a huge respect for, because that is a real talent. But I had… My… I, I was finding that, we were writing software that was robust and reliable, and I was interested in, in more esoteric things, is this the best way to write software? This sort of question. And, Peter King, his name come up again, Peter King was a governor of Thames Polytechnic, because Thames Polytechnic was the successor to Woolwich Polytechnic, and Peter had studied at Woolwich Polytechnic, and he was, I think at that stage, a governor of Thames Polytechnic. And he said to me, 'They're looking

for someone with industrial experience who is interested in moving into academia.' And, I said, 'Well I'm interested, that's an interesting thing to do.' And, so he said, 'Well, why don't you go there, and basically learn your trade as a, an academic, and then, take it from there. See whether it's what you like.' He said, 'You can always go back to the commercial world of IT, because, you've done four years of PL/1 and COBOL, and so on.' So, I, I went to Thames Polytechnic. Joined quite a, a, quite an active department. Not a great deal of research being done, which was fairly typical of the polytechnics in those days. But it was a, it was an interesting experience, learning the skills you need to lecture, learning how to lecture. And, the industrial year, which was a feature of all of the polytechnic degree programmes, gave me contact with industry. I was teaching application design, and drawing on my experience from CAP. I started doing research on database management, again, partly encouraged by Peter King, who was working by then on database management. And, we started working on distributed databases, which was a topic that was coming along, and was not well understood, having multiple copies of databases on different machines. Communication links were relatively slow. So, there were challenges which in modern times don't impose technological challenges, because of the sheer power of the processor and speed of the communications links, but in those days, learning how to synchronise databases, the best ways of approaching it, this was a research topic, not, not simply part of a package that you bought from your supplier. [37:41]

And so, I spent seven years there. I went there as a lecturer. Fairly rapidly moved to senior lecturer, which was more or less automatic. And, then, was appointed a principal lecturer, which was the, the top academic grade in the polytechnic. And, had my first research student, research students there, started publishing research papers there. And, that lasted seven years. And they, they were generally happy years. But, the polytechnic, I can remember as a lecturer, polytechnic lecturers, you had to basically have 20 contact hours with students each week, and, probably, three-quarters of that was lecturing, and, if one recognises, say, you need perhaps twice as many hours' preparation, probably when you're young three times as many hours as the lectures you deliver, it's a huge load. And then, to try and do your, your research on top. So, they, they were happy years. And they were… They introduced me also to students in the polytechnic; they were not, some of them, not the best students academically, but by and large very committed, and the industrial year also gave them

access to first-hand experience of computing in those days. We were lucky we had several placements at IBM's research centre in Winchester, and, a variety of other, good, employers, Sainsbury's centre in Stamford Street, and so on. These were places where students got really good experience. And it was interesting when we did the term leavers, the contact with the companies, finding out what they were doing, and how things were developing was very helpful in keeping in contact with the developments in the industry.

[40:12]
Mhm. And as you, you mention, you were there for seven years.

Mm.

Rising to the position of principal lecturer. If I could ask you perhaps one, identify one success that perhaps sticks in your mind from that, from that period.

[pause] I, I'm not sure that… I… Probably the thing that I learnt most from was a student that we had who made a success out of the most awful background. He had been… He was severely dyslexic, and, profoundly dyslexic, and, as was his sister, and, he had avoided being sent to a special school, in those days those with special educational needs were not integrated into the main system, but were sent, there were separate institutions that dealt with them. He had very narrowly avoided, at about twelve years old, being sent there, which would probably have ended any hope of progress. Anyway, he managed, it was GCE O Levels in those days, he managed to get I think four by the skin of his teeth, and, then got one, he managed to struggle and got one A Level, which enabled him to come to the polytechnic to do an HND. And so, he had literally managed to progress, but always at the, at the sort of, bottom. And, you know, he literally was just getting over, struggling, literally, over every hurdle. And, he got on to the HND course at Thames Polytechnic, and at the end of the first year he had shown, he discovered, that he had a real talent for programming. It was the most awful struggle, because he, he could not spell the, the commands in the programming languages.

Mm.

And, so, the first stage of his debugging was to correct the [laughs], words like begin and end, and I think we were in the world of ALGOL 60. He then, at the end of that first year, we realised he had a talent, and so we said to him, 'You have an option,' which all the students had, the top few students could change from our HND programme to our BSc programme. And we said to him, 'You've done well enough in your computing that you could transfer.' And, but we said, 'It will be a tremendous struggle for you, because, the HND programme will be two years, this will be four years, you would have an industrial year.' And, he said, 'No.' He said, 'I'm going to give it a go.' And, it transformed him as an individual. It didn't fix the dyslexia, but it… He said to, to a couple of us one day, he said, 'When I went from the HND to the BSc,' he said, 'it was the first time I had been a success.' And, he subsequently did an industrial year in one of the Government departments, I forget which. We had explained to them he was dyslexic. They said, 'Well, we…' They had a, for those days, a fairly enlightened policy on employment of people who had difficulties, physical and, and so on. And, so they took him on, and, after he got, he got an upper second class degree, and then he went back to the same Government department. And at that point I lost touch with him.

[44:49]

But, I think, it reinforced my belief in giving people, particularly people who are in some way disadvantaged, an opportunity to move on. Because, at least some of them actually when given that chance are able to actually take advantage of it. And, I went on subsequently at Birkbeck, as we'll talk about in a moment, I went on to see many students overcome all sorts of problems, health problems and, bad luck, and, and you know, incompetent organisation of their own lives in some cases, but, but actually, by providing educational opportunities for these people, see them be able to, to progress and indeed to be what society may in some cases regard as a success. So, I, I think that particular student is, is in a way the message I took way with me from Thames Polytechnic more than personal success.

Yes. Well thank you for sharing that with us. It's good to hear that, and, must be, as I say, very rewarding helping, helping others basically, and, and letting this gentleman hopefully achieve his true potential.

Mm.

[46:43]
You mentioned you still had contact with Peter King at that time.

Mm.

Presumably he was still at, was he still at Birkbeck then, or…?

Yes. Yes yes. Peter King was at Birkbeck right through until his retirement, and indeed he worked on, like many academics do, after he had retired, he continued to go in, unpaid, and to run research projects. Academics, mostly, most academic… The academic life is a very privileged one. To be paid by the Government, to be paid by the State, by the taxpayer, to pursue for your lifetime your own intellectual curiosity, to teach students who mostly want to know about the subject you're teaching, perhaps sometimes in contrast to, to the school environment, but you have students in front of you who are interested in what you are teaching, and to be able to do that year after year, very few of those students are the next generation of academics who will, in some cases, share your particular areas of curiosity, to do that for a working lifetime, which is what I was able to do, is a huge privilege. And I think the great majority of academics actually understand that, that that's a privilege, and it gives you an obligation to deliver and to contribute to knowledge, and, knowledge is a matter, you know, we're all pygmies standing on giants' shoulders. We only just, hopefully, just contribute a little bit, a little bit more, and then you, you train another generation of students who will then pick up the baton from you, and carry it forward again. So, becoming an academic is, is to enter a very privileged, is to achieve a very privileged position.

[49:22]
Mhm. And, in 1983 then, so you were saying, moved back to Birkbeck.

Yes, I went back to Birkbeck. Peter King, there was a, a lecturership available at Birkbeck, under a Government expansion scheme, the Government had decided in 1983/84, we had had the, '82 was the IT year which, Kenneth Baker I think it was,

had instituted. So, IT was seen as the, the skills that the country needed, and, universities needed to expand their computer science departments, and there was a programme of new lecturerships, so-called new blood lecturerships created, and, I was just young enough to, to still count as new blood. [laughs] By then I was into my, my thirties. The head of the college, head of Birkbeck College, said to me, 'You're rather old new blood, Roger,' but, there we are. But, I… So I went back to Birkbeck. The department had changed very little from when I had known it, there had only been I think one addition to the staff since 1972, and, I think… And it was small, there were, I think, six or seven staff. I think indeed there were six, and I think I became the seventh. And, so… And they were all people I knew, so it was very much going home. And I had to some extent kept in touch with these people as an alumni of the department.

[51:15]
Mm And Birkbeck itself, I mean again, for the benefit of our listeners, part of London University.

Mm.

But, has a different culture to…

Mission.

As you say, mission. So, I think it would be good perhaps if you could share that mission with…

Yes. OK. Yes, Birkbeck is a very special place. Its foundations was as a working man's institute, and it was founded in 1823. George Birkbeck, who was a medical doctor, had founded an institute in, a working men's institute, in Glasgow, which is now one of the constituent parts of the University of Strathclyde. And, he came down to London, and decided he would do the same again, and there was a, a vast public meeting in a public house in, on the corner of the Strand, and it was agreed that they would found a working men's institute in London. And, it then gradually developed, there were sort of high points and low points, through the next 50, 60 years. But

gradually its reputation grew. And, from memory, by the end of the nineteenth century it was preparing students for the University of London's external degree programme. The University of London to this day has both internal students, that's conventional three-year undergraduate programmes, run through its various colleges, and, but it also had external students, who went possibly to lectures at other colleges, at small colleges, away from London. It had also, right across what had been the British Empire and was the British Commonwealth, almost all of the overseas Commonwealth universities, the original ones were, gave ex-University of London external degrees. And so, the university had this very large external programme of degree, giving degrees, the university set the examinations but somebody else did the teaching. Birkbeck was doing that, it was preparing students. But Birkbeck was, in those days, in Fetter Lane, in the City of London, and, in 1923 there was a major, in 1920s there was a major reorganisation of the University of London, and in 1923 Birkbeck College moved from being an external institute preparing students, to an internal constituent college of the university. And, the… So, at that point, it became one of, around, in those days, as many as 50 institutions that were internal colleges. So, internal colleges, the staff of these were recognised as teachers by the University of London, and they took part in the governance of the university. So, the colleges had representatives on all of the committees, and you were on the inside, and your students were internal students of the university. And, it had various other benefits as well. But basically, Birkbeck became a college of the university alongside University College and Imperial College, Queen Mary, Royal Holloway. And, and also, all the medical schools and so on. All of these were part of the fabric of what was then one of the world's biggest universities in the form of the University of London.

Mhm.

[55:24]

And so, Birkbeck… Birkbeck had, throughout this whole period, taught in the, largely in the evening. Because of its origins, that it was there for the working man, originally, but, it never excluded women, women were always part of Birkbeck, indeed the University of London's first woman professor was a professor of botany at Birkbeck College, but Birkbeck, all its degrees, to this day, the college regulations say that all degree programmes will be taught part-time, and some programmes, master's

programmes and now some degree course, some undergraduate programmes, are taught partly or wholly during the day, but they, those courses are also taught part-time, so that, people working in London can do them, and, while it would take you three years to do those programmes as full-time undergraduate at one of the University of London colleges, the full-time colleges at Birkbeck, it would take you four years. And, many tens of thousands of students have taken advantage of that, and still do. And, Birkbeck has developed to offer a very wide range provision. The areas, it's never moved into medicine, nor has it had an engineering faculty, but, in the arts, the social sciences, the sciences, it has had some extremely distinguished academics on its staff.

[57:27]
Mhm. Thank you. And of course you were at Birkbeck for, over 23 years.

No. No, I was Dean for 23 years.

Oh I beg your pardon.

I was there for, twenty… sorry, eighty… I went there in '83. So 27, 27 years I was on the staff at Birkbeck.

Right, OK.

I just missed getting a, a carriage clock or whatever it was for 30 years. [laughs]

And, you undertook, obviously, a number of roles as, as you quite rightly corrected me, was Dean for 23 years, and subsequently became a College Fellow in 2010. How did your time at Birkbeck progress, would you say? Perhaps you can… Because I think passed some change points in that time.

Yes. OK. Well, I joined, as I said, a very small department of six, I, I'm fairly confident that I was the, became the seventh member of the staff at that time. And, I, I should say at this point that the computer science department, the Department of Computer Science, we actually believe was the very first department of computer

science in a university in the UK. Before that, at Birkbeck and at many other institutions, the teaching of computing had been done in computing laboratories. And, for various reasons to do with University of London regulations, in order to run a degree, which is what Donald Booth wanted to do, a master's degree, in computing, numerical automation as he called it, it had, a degree programme had by university regulations to be in a department. And so, the Department of Computer Science had been created at Birkbeck in 1957, and as I say, as far as we know, that's actually the first academic department of computer science.

[59:17]

I arrived there, and was appointed as a lecturer, and, after two years was promoted to senior lecturer in the department. There was then an internal reorganisation. One of the problems Birkbeck has had historically is, being overwhelmingly part-time, governments, depending on the state of the economy, governments favour part-time students, because, for example, you can retrain a workforce part-time. If you want to add skills, and adding IT skills to the workforce is something governments come back to regularly over the years, and then, part-time education is a good way of doing it, because people can continue to earn a living while improving their skills. So, Birkbeck… But then governments… At other times then they take their eye off the part-time ball, and, cease to see the benefit, and, education is always fairly political in terms of funding formulae and so on. And so Birkbeck go… still goes quite rapidly from feast to famine and back to feast according to the whim of the Department of Education. And, so, we had in, when I arrived, apart… There was an initiative to add, to increase computing as a university activity, but, the Government had changed the basis quite radically of the funding of postgraduate students, the amount that the university would, the Government rather, would contribute to the university. And so Birkbeck was in difficulty, serious financial difficulty, and, it was agreed there would be an internal reorganisation, and for the first time they created what, they didn't call them faculties, they called them centres in those days, but what subsequently became the faculty. And, I was asked if I would become the head of the faculty that was created, and, I agreed to do that. And that was in the, late 1980s.

'86. Yeah.

'86. Thank you. So I had been there for three years at that point.

Mm.

[1:02:42]
And, the appointment as head was for five years, and, at the end of five years the process for reappointing the head was that the master of the college, the head of the college, consulted with the academic staff, and then made a recommendation to the governors. Well, I'm not sure, having been a relative newcomer to the college, I wasn't sure my appointment initially as Dean was entirely welcome. But after five years I think colleagues operated on the fairly prudent basis of, better the devil we know than the devil we don't. And since the choice of dean was ultimately a recommendation by the Master, so the Master's decision, a recommendation to the governors, staff couldn't be entirely sure who the Master would choose. So I think when the Master went back and said to them, 'Roger Johnson's been Dean for five years; how would you regard his reappointment for a further five years?' I think they kind of voted for what they knew. So, I was reappointed, and, I suppose I should say, I'm just sort of, I was suitably humbled that staff continued to advise the Master that in their view my reappointment for further periods of five years was in the interests of the college. For, five times in fact, for the 23 years until retired. So… But the appointment as Dean, Dean was regarded as being a half-time activity, and so, I was very happy, alongside, in the other half of the time, to continue teaching. I did a, a sort of, a half load in terms of teaching, and I was able to maintain a research activity, not as big as I might have wished, but, nonetheless, I was able to have a succession of research students down the years, and research grants, and to publish, 50, 60 papers over the years.

[1:05:20]
Mhm. And, whilst you're talking about research, which principal areas were your research subjects?

Well, when I, when I joined Birkbeck in 1983, I continued initially the work that I had been doing at Thames Polytechnic on distributed database systems. We then moved into… Well we went back. Peter King and I saw an opportunity with the beginnings of expert systems to go back into rule-based programming work, and, which we had

done, I had done as a PhD, and Peter King had worked on. So, we had a flirtation with, in the days of the Alvey project and things like this, we had a flirtation with that, which led us back to Alex d'Agapeyeff, who by that time had left CAP and founded a company whose name now escapes me, but based at Slough, that was working on expert systems. And we did some research with Alex using the software that his company was marketing, and, worked with him. But, the, the link to expert systems, although I, I've maintained a watching interest in it, it was not one in the end that we pursued, but went on to various forms of database management system, knowledge manage… aspects of knowledge management, and, particular extensions to databases. [1:07:17]

The one that I worked on with a research student, who is now a professor in Athens, was the inclusion of time, what are called temporal databases. This is where the database maintains a history of the data that has gone through. So, you don't… Typically a database will, if you have a customer, will have a name and an address, and if the customer changes their address, you update the record. The idea of a temporal database is that, it actually has facilities built into the database management system which make it easy that you keep a historic record of all of the addresses that that customer has had, and the date on which that changed. And, essentially, with each field in the database, you have two fields alongside it, which is a date of from and to. So, if you have an address, X lived there, from that date to that date. And, there's a, there was, there *is* still, interesting research in how you best model data and extensions to databases to facilitate queries about who lives where, who knew who. We had a project, Peter King and I had a project with the police at one time, who are obviously interested in, for reasons that anyone listening to this can imagine, they're interested in who knows who, who lived in a particular location, who was living in that area at the same time. These sorts of things. We also looked, at one point the police were int… There were a series of country house burglaries, and the police knew that the criminals live predominantly in the city, and would drive out to the country house, and these were very professional burglary teams, and they would drive out with vehicles, because, if you're doing a country house burglary, you need to be able to take away furniture, paintings, all sorts of things. So you're looking at vans, quotes 'white vans'. And, they also knew, from criminals that they had caught, that they would sometimes travel quite considerable distances to go to these houses. And, automatic number plate recognition, AMPR, was happening. And so, records were

being taken of the, the movement of vehicles. And so, we were asked, from a temporal point of view, can you identify groups of vehicles travelling, for the sake of argument, up the M1, and, who as it were all leave, sometimes they would travel together, although, the criminal fraternity knew enough that driving one behind the other in a row was a little obvious. And so, the police were interested in the time at which a vehicle passed a camera and a record was created. And so, there were all sorts of interesting applications that we looked at and provided advice on. We provided advice but didn't do an implementation of any kind with one of these, the police forces, and one of the commercial providers of computer systems for the police. But it gives an idea of the kind of applications and why temporal data associating time with database records can actually give you all sorts of information when you start analysing that data.

[1:11:56]
Mhm. So, so this is known as temporal information management.

Yes.

And, and using the climatic sphere as well?

Yes. I mean you can… Almost everything actually, when you look, almost everything has temporal aspects to it. And yes, I mean, climatic data for example is another application. We also, my student, after he had left me and gone back to Athens, he worked on geological data. It was in the era of oil prospecting, and, instead of time, he was, he was working on layers in the ground. So, instead of, as it were, one o'clock to three o'clock, he was interested in, 100 feet to 300 feet, you have a layer which is of this pattern, and then at another location when you make the borehole, you would be able to see the same layer, but it might be deeper in the ground, and it may be actually shallower at that point because of the way that the ground has moved. And, from the point of view of a computer, there's not a lot of difference between, from one o'clock to two o'clock, from 100 feet to 200 feet, you… You know.

Yes.

So, we started to explore that which is, is often called spatial, spatial data, and, you can use many of the same techniques, and he, he worked successfully on projects in that way. There are very interesting medical applications.
[1:13:59]
I remember going, as an evaluator for the European Union, on a European-funded project, going to Madrid to visit a Spanish hospital where they did transplants, and, they were collecting large amounts of patient monitoring data where seriously ill patients who had, were either awaiting a transplant or had recently had a transplant. The monitoring equipment, every fifteen minutes would measure various vital data on that patient. And they were interested, again, in tracking, looking at, for example predicting whether a patient's condition, whether the, whether there were signs that the human clinicians currently didn't recognise, that that patient's condition might be about to dramatically fail, and whether there were, whether if you looked at these fifteen-minute datasets, and started analysing them, whether there were tell-tale indicators of that.
[1:15:16]
And we had an approach also which led to a very interesting project but in a different area. We were asked by British Airways whether we could analyse engine data from aircraft. There was a, a very unpleasant incident at Manchester Airport, where an engine on a British Airways Boeing 737, the engine exploded on the runway, and there was a serious fire. And, subsequently it was discovered that over a period of time, pilots were reporting that the, one of the engines, one particular engine, was slightly down on power. And, we understood from British Airways that this is not unusual, that air engines need sort of, fine-tuning. And what actually happened with this engine was, pilots would report, there was a slight weak, you know, loss of power. And so they continued to increase the fuel flow to the engine, until there was a catastrophic failure. And British Airways came to us and said, 'Would you be willing to look at the data and see whether you could predict a potential catastrophic failure before it happened?' And, I was working, I had a young colleague, a young Chinese colleague, who's now a professor, who was working in what today we would call artificial intelligence. And, he and I looked at this, and, we decided it was outside our, it was beyond our competence. We could understand the problem, but we weren't engineers. And we said to British Airways, 'We can give you some advice,

but we're not willing…' It's beyond our, it's beyond our level that we felt professionally it was appropriate for us to work on. But British Airways came back to us, and said, 'Well, we have a database problem, which might be nearer to what you can advise us on.' And, that led to a project, a fascinating project.
[1:17:50]
The problem they had got wasn't a database problem at all when we analysed it. But the problem they had got was, they had recently introduced a very simple form of self-service ticketing. They operated a shuttle from Heathrow to Newcastle, Glasgow, Edinburgh, Belfast, Manchester. And the deal was, that, if you bought a ticket, that BA would fly you, and if you had bought it at half-past two for the three o'clock shuttle, no matter how many people turned up, they would fly you. And they had a spare aircraft permanently on standby at Heathrow, so that if the first plane was full, the next one would fly, and occasionally did fly with literally one or two passengers in it. But the deal was, if you had bought your ticket in time. Anyway, part of that system was that, you had, companies could give their, their employees a, something that looked like a, a rather flimsy credit card. It had a magnetic stripe on the back. You went to the airport, you put this into a simple ticket machine, which gave you a boarding pass. And it was very simple. And, basically there was a box with a screen. In the bottom there was a, a, a sort of basic mark one IBM PC, which drove the screen, and then interacted with the British Airways booking system at the back. And this was, this had become the… This system, these systems will keep falling over. And it had become the second highest source of complaint to the BA chairman, and his secretary kept, as chief executives' secretaries do, they kept a record of all the complaints in groups. And after bad time-keeping, which was number one, number two were these, were these self-service ticketing machines. And so, they said to us, 'Could you redesign… We're going to redesign these systems, because it's clearly what people want, but, it's not delivering what we promised.' And so, the project they gave us was to design the user interface. And that turned out to be much harder than we or they had realised, and explained partly why they were having the problems they were. And, we, they gave us, they paid for a research assistant for us, and she, she worked on the design of the interface, so you could walk up and select the ticket that you wanted. And, she, she used to test this with customers. She had a laptop where she had the prototype interface, and she'd go into the business class lounge at Heathrow and sit down with tired businessmen in the afternoon waiting to fly home

on the shuttle, and she'd say, 'Excuse me, would you like to look at my laptop?' And she explained she was doing research for a future system.

Yes.

And, out of that we designed the interface for them, which they used. And, some people who used to use that system remember, instead of having a little wheel that went round while it was computing, there was an A320 Airbus, which flew very slowly across the screen, just to reassure the passenger the computer was working.

Was going on. Yes.

And, that A320 flying across the screen was used for many years after the system that we helped design the interface for. I used to go to Heathrow and would check myself in on the self-service machines there, and I would still see [laughs] the A320 flying slowly across the screen. So that, that was an interesting, not really a temporal one, it was, but, it gave me an insight into the, really the profound challenge of designing interfaces between untrained users and computer systems, and, when you look around public transport systems, you see some really good ones, but you see some really awful ones, even today. I have a particular problem with railway self-service ticketing systems, which are way behind the state of the art, but that's another story which we mustn't get into.

[1:23:01]
Well, I on a little lighter note for a few seconds here. You mentioned BA, you mentioned Madrid. Do I understand that you were the first person to book a flight on the World Wide Web with British Airways?

Yes. I… Yes I have a certificate to actually prove it. And indeed I have photographs too. I, maybe we should actually, there's a set of photographs that goes with the talk which I think there is…

Yes.

I'll find one. Yes, what happened was that, while this student was designing the self-service check-in, BA, she told me that BA were going to have a website which would sell tickets online. Now this was 1995 I think, from memory. And, I wasn't at all sure. I was doing a lot of travelling for CEPIS, for the, the Council of European Professional Informatics Societies, I was then a vice president, and the vice presidents met the board, which was the vice presidents and the president of CEPIS, were meeting about every six weeks. And, as a voluntary organisation I was booking all my own flights. And also, since CEPIS's funds were quite limited, I was also having to use fairly ingenious routes sometimes to get the cheapest ticket. Anyway. But I was booking tickets. And, so, the student had told me that this was going to come online. So, I booted up my link to the Internet, and, in those days… British Airways, British Airways had failed to secure BA.com. They, BA.com was owned by a company in Boston in the United States. And, eventually, I know, much later, BA purchased it from them, at a considerable price. But BA originally did not own the BA website. And they were British Airways.co.uk I think. Anyway, you booted it up, and, really pretty primitive, but, we don't have time, but, you will find, there are archives of very early websites, and, the information that for example is on the home page, and indeed was on that one, on the BA one, reassured you that this was a secure connection, and it gave you technical details that no person that needed reassuring was likely to understand, but nonetheless… So I, I logged in, and, yes, I, going very slowly, I mean the links in those days were quite slow. So I got through to the point where I had identified the flight to Madrid. And, I then was worried. It got to the point where I had to pay for it. And I had a credit card. But I was kind of nervous about putting my credit card into the machine – sorry, putting it in online. And I actually stopped, logged out, went away. And then after about half an hour, thought, well, hang on, what actually is the risk? You know, there isn't going to be somebody sitting outside with a pair of headphones who's going to listen to the clicks or whatever that went down the telephone line. So I went back, and, duly completed the transaction, put the number in, and it completed. And, it's worth saying for the sake of posterity that, of course what then happened was, four or five days later you got an old-fashioned paper airline ticket through the post from British Airways. There was nothing online. You had booked it, you had bought it online; you were then sent an old-fashioned paper ticket, which you had to present at the counter when you got to the airport. So that duly arrived. And, anyway, after, possibly actually before the

ticket arrived, a day or two after anyway, the phone rang at home, and a voice said, 'Good morning Dr Johnson. This is British Airways.' And I thought, I know what it is. The bloody computer system has gone wrong. So they said, 'I believe you bought a pair of tickets on our new…' and I think, I can't remember now what she said, but it was clear that she, certainly the word Internet was not used, but on our computer system, or something. It was a slightly odd sort of, expression.

Mm.

And I said, 'Yes, that's right.' And I'm thinking, and now you're going to tell me that it's gone wrong, et cetera. So she said, 'Well you may be interested to know that you were the first person to actually book a ticket.' So I said, 'Oh that's interesting.' She said, 'So what we'd like to do,' she said, 'we wondered whether we could take some photographs of you and your wife at the airport.' So I said, 'Yeah, that's all right.' They said… So she said, 'We'll send a car to pick you up,' and we were flying from Gatwick, and our home's at Sevenoaks. And so, on the appointed morning, it was an early morning flight, because I can remember it was dark, and it was winter, and there was snow on the ground. And, one of our neighbours actually saw it happen, and wondered what on earth was happening. So, at about seven o'clock in the morning an enormous stretch limo pulls up outside our house, and my wife and I have our small, we were only going for the weekend, because it was the CEPIS board meeting. So, we've got two small cases, a case each. And so, we, we walk out, lock the door. Go out to the car, and there's a man there. Because as I say, this very long stretch limo, with his chauffeur's uniform, and he says, 'Good morning sir, good morning madam.' Takes our cases, and he said… So, we get in. And, we had an early breakfast. And, so he said, 'Would you like me to open the champagne?' And, literally, I thought, well hang on, I've had breakfast. The last thing I want at seven o'clock or whatever it was in the morning is champagne. So I said, 'No, no no, it's, it's fine.' My wife said, 'Yes please.' So… [laughs] Anyway, the champagne was duly opened. So, by the time we reached Gatwick, in sort of half an hour or forty minutes, encouraged by my wife, we had consumed a number of the small British Airways miniatures of champagne, and are really feeling now quite relaxed about being photographed. And so, we were duly photographed, and presented with the certificate. And, flew out to Madrid. And, to this day at home I have the certificate framed, framed certificate, and

the, the photograph. So, I must provide one of those [laughs] to go with the photographs of the talk. [laughs]

[1:30:45]
Yes. Indeed. Well thank you for sharing that with us. And you mentioned that, past websites, you can access on the Internet, the different archive sites, and, I'm sure for any listeners who want to look at past BA sites, hopefully will be able to find them there. But when we're talking about archives, I understand one of your other research areas was in computer history. And, I know you, particularly Birkbeck were looking at the work of Donald and Kathleen Booth. So, perhaps you could tell us a little bit about that.

Yes. I… I had been working on researching data management, and there was a, a period when it wasn't clear what the next big challenge was in that area. And so I, I had some spare time, and, I knew a little about the work of Donald Booth, and, I was also… And, and so, I thought that it would be interesting to find out what he had done. I knew he had established the Department of Computer Science at Birkbeck. I knew his origins were in crystallography And that was about it. So, I began researching in the, in the college, and more widely. Donald Booth had… To give a very quick potted history of Donald Booth. Donald Booth was a crystallographer. He… Crystallography involves a lot of mathematical, arithmetical calculations, and, Donald Booth had been involved right at the end of the Second World War with the crystalline structure of certain explosives, and he had had groups of assistants who used mechanical calculators to solve the equations about the crystalline structure of the explosive. And he felt that the future had to be by building, first of all specialised devices, single-purpose devices to speed up the calculations, and he then became interested in very early calculators and automated calculators. Initially, some listeners may be familiar with a machine which is on display at the National Museum of Computing at Bletchley, called WITCH. WITCH basically is an automated calculator. You put a series of calculations, you punch them into a paper tape; you then have one or more streams of datasets basically, streams of data, which are on other paper tapes. Each paper tape goes through a different punch tape reader. And so, you read, the machine reads an instruction, reads a piece of data, if that's what it has to do. It then carries out a calculation on that piece of data, and, and it has a

simple memory, so other pieces of data, other numbers it's got stored. And, out eventually, very slowly, comes a result. And, Booth was interested in that. But Booth thought this was really rather slow. He built one of these. He was very lucky. He had been appointed to Birkbeck by J D Bernal. J D Bernal was a polymath, he was a very distinguished crystallographer. He had been part of Churchill's wartime panel of scientists. So he had a, a very high security clearance, and had looked at a whole variety of issues during the war. Towards the end of the war, he decided he was going to return to Birkbeck to the chair of crystallography that he held there, and he was going to have a team, a series, he was going to have four teams, to look at different aspects of crystallography. One of those was going to be a team devoted to the automation of crystallography. Booth, as a very young man, in his mid, mid-twenties, he was appointed to head this group, because he was probably the UK, the person who knew most about calculation and crystallography. So he joined the team at Birkbeck. And, Bernal arranged for him to go to the United States on a visit. He went for a short visit in 1946, when it was very difficult for people from the UK to travel, there were all sorts of currency restrictions, there were still many limitations on, essentially, you went by ship, there was no public, widespread access to airliners at that point, so you went by ship. And, Bernal was politically from the far left, and had friends, he had colossal numbers of friends, Picasso had visited his department at Birkbeck, and had stayed with Bernal. And another person from the political left, although the American lefts are not terribly far left, was John von Neumann who was a Hungarian, and, was, had radical sympathies. And, John von Neumann was a friend of J D Bernal. And of course John von Neumann is a name that all students of computing, those interested in computing, will recognise.

[1:37:13]

Well, in the United States in 1946 a great many computing, people involved in those early computing projects, were still very wary of talking to foreigners, even Britons, about what they were doing. So, what Andrew Booth found was that the only person who was willing to discuss face to, you know, to discuss in depth, what they were doing, and what their ideas were, was John von Neumann. And, so, Booth, in 1946, had probably the best access to John von Neumann and his thinking of anybody in the country. And, Booth went back in 1947 and spent six months in the States, again spending quite a lot of time with John von Neumann, and also visiting other computing pioneers.

[1:38:15]

The result was that, he was able to build… He, he, von Neumann told him about von Neumann's architecture and his ideas on architecture, and so, this meant that Booth moved very early from mechanical calculators to a computer, something that had a memory, and a processing unit, and the program stored in the memory. The von Neumann architecture as we call it, and it's not entirely due to John von Neumann but, history has given his name to it, the von Neumann architecture. So Booth came back, and by 1949 was building a computer called SEC, which was a von Neumann architecture machine. And, I started researching this. Booth then produced another machine, called APE(R)C, a-p-e-r-c, All Purpose Electronic Computer. And, that machine in turn was copied by BTM, the British Tabulating Machines Company. Went to Booth, and, basically did a deal with him that he would, Booth would give his computer's circuitry to BTM in exchange for punch card equipment, which Booth could connect to his computer And that machine became the HEC, Hollerith Electronic Computer, model 1, 2, and then ultimately the 4, which in turn became ICT's 1200 computer. The ICT 1200, it was very similar to IBM's 650, which was their first successful commercial computer. These were both small machines, they were relatively cheap machines. They didn't need air conditioning. And, so, Booth's machine, oh, the, the ICT 1200, derived directly from Booth's machine, was sold all round the Empire, and, India's first computer was an ICT 1200, East Africa's first computer was a 1200, and certainly one of the early machines in New Zealand, I'm not sure for certain whether it was first, I think it may have been, again was the 1200. So, this… And, around 100 of these machines were sold, mainly in the UK but also across the Commonwealth. So it was an important machine. And so, that was one of Booth's contributions.

[1:41:28]

Two things came out of his work, and which are the main reasons why Booth deserves to be remembered, and remembered by the computing community and not just by the historians. In the… A computer needs a hardware multiplier. Nobody had been able to produce a good hardware multiplier. Von Neumann actually thought that there was, that it was… Von Neumann wasn't… Von Neumann said to Booth he didn't actually think you could produce an elegant solution in terms of a multiplier. And Booth initially says he accepted what von Neumann said, because von Neumann was the world expert. And, Booth worked with his wife, who also became a professor

of computing, Kathleen Booth, and is one of the early, and largely unsung, pioneers of computing, woman pioneer. Basically, Andrew Booth built the machines and the hardware; Kathleen did most of the programming. Because she tested the machines. So she became the programmer, and she wrote a book in the later 1950s on programming, and programming her husband's machines.

[1:42:53]

Well, Booth needed a hardware multiplier for his machine, and, he went out one afternoon with Kathleen, and they went to a teashop in Southampton Row in Bloomsbury in London, and, an idea came to him, which he says he drew on the back of a paper napkin. And, this was a multiplier, a quite simple multiplier, but nonetheless a very neat multiplier. And this is, this was the first Booth multiplier, and the Booth multiplier has a minor adjustment which a colleague of Booth's proposed, and hence it's officially a modified Booth multiplier. The modified Booth multiplier is what is in almost every chip that is being manufactured today. The multiplier is a Booth multiplier. Not many people know this, not many people even need to know it. But nonetheless, the Booth multiplier is one of two ways of doing hardware multiplication, and by far the most popular. So literally, every year billions of these are produced because, these days, as everybody listening to this will know, chips don't have a single multiplier; they will have many multipliers on circuits across the chips, and, they are Booth multipliers, and they started in a teashop in Southampton Row in London in, around 1949, 1950.

[1:44:33]

So, Booth should be remembered for that. The other thing he needed was a memory for his computer. And, one of the things about Booth was, the Booths were in a very tiny department, and they had very little money. Most of the departments of computer science in those days, or computing laboratories as they all were, most of them had very little money, they lived pretty much hand to mouth. And so, Booth, when he was over in the United States, on his six-month visit, he encountered a recording machine that was intended for businessmen to dictate memos which their secretaries could then type up. And, I bought one of these machines, which I have at home, as a curiosity. And, if you think of an LP record and a, a record player, then you've got the right picture in your mind. It has connected to it, it has a loudspeaker to play, but it also has a microphone, which you could plug in. The only thing that would be odd, and is odd, is that, the recording surface is not the typical black, 33 rpm long-playing record

that older people will remember, your vinyl, it's paper, with a magnetic coating. And, so, basically, what the manager did was, he put the paper onto the recording device. There is a, a head, a simple head, which records his voice onto the paper. And the idea then was that he could record a letter or a memo, whatever, give it to his secretary, who had another one of these devices, and she could then type it up from the recording. And indeed, if you look at the adverts, it actually says, there is no problem with folding the paper up, putting it in a letter, sending it through the post. So even if you're travelling, you can still be in touch with your secretary. Or indeed presumably send it to a colleague.

Mhm.

[1:46:51]
Anyway, Booth bought one of these machines, and brought it back. And, he then experimented. His idea was that if you could record a voice, I could use this as a, a memory device for the computer, because it reads and it, it reads and writes. Well, the problem was that in order to store more data, and to make it suitable for a computer, he needed to basically do a digital rather than an analogue recording. This involved having to spin the device much faster. And quite literally, the paper flapped. And so, he… And he could not make the paper stay flat, and therefore, he couldn't reliably record. He had a floppy disk as it were, but it flopped in the wrong way.

Mhm.

And so, what he then… The idea that then came to him was that, he would make a cylinder. Booth's father was a retired marine engineer and part-time inventor. So he got his father to make a metal cylinder, and put a magnetic coating on the outside of it. And of course this was rigid, and he could then put a read/write head, very close to the surface, but because it was all metal, mostly it didn't touch, because if it did touch, it destroyed the magnetic coating. And so, Booth's father started manufacturing drums, computer drums. And, Booth successfully… In the Science Museum in London Booth's prototype drum, which is about the size of a cotton reel, a wooden cotton reel, was for many years on display. I think it's now in store, I don't think it's currently on display. And, pretty shortly afterwards, he produced a… That was a

proof of concept. He produced a working drum which had 21 tracks. And, it's about fifteen inches long, and that's, it's not in very god condition, but it's in the store of the Science Museum. And so he produced a drum, and successfully connected that to one of his prototype computers. And so, he was the first man to connect a rotating storage device, we can't say he connected a disk, because it wasn't a disk, it was a cylinder, but, electronically, it's a rotating device, and, he connected the drum to the computer, and he was the first man to successfully connect a rotating storage device to a computer.

Mm.

[1:49:43]
And, out of that obviously subsequently… I mean many machines, big machines, many of the early big computers, commercial computers, things, and scientific computers, Ferranti Pegasus and so on, these, many of these had drums as their storage device. The drum was relatively slow, but it was cheap, it was reliable. The ICT 1200 had a drum in it. And so, Booth's contribution was to, basically, solve the engineering problems of building a cheap early computer. Booth… BTM… BTM's market was in punch cards. And, so, what… When they got a computer, they needed a computer that would be an incremental step forward for their punch card customers.

Mhm.

So it was no good having a machine that cost quarter of a million pounds, which some of the very big machines coming from people like Ferranti for example, they were selling one machine to NPL or to, a big, one of the very big universities, or, or, these sort of people. What BTM had got was a mass market. And so, BTM were able to build, using Booth's technology, they built a machine that cost £25,000, and, as I said earlier, it didn't require any air-conditioning.

Mhm.

We have a photograph, a very rare photograph, that has somehow survived, of the East African Railways and Harbour Board computer in East Africa, and, it is in an un-

air-conditioned room. If it got hot, you opened the windows. And, it, it's a relatively small machine, and, the technician, or programmer or whatever he would have called himself's, jacket, is, is hanging on the handle of the computer. And there's a, the caption says, that they can only run the computer after the bakery, which is next door, and was an electric, used electric ovens, only when they had finished their baking for the day could they run the computer. Because the public power supply was not adequate for both of them to run at the same time.

Mhm.

[1:52:19]
So Booth basically enabled BTM to produce cheap, simple, low cost machines, and really to bring computing to a great many commercial customers for the first time. The sad thing in a way, because, one needs to think about the British computer industry, the telling thing was, the IBM 650 was functionally, and in terms of cost, they were competitors. BTM were very pleased about selling 100 of their machine; over almost the same period, from about 1956/57 to about 1963/4, IBM sold 2,000 IBM 650s worldwide.

Mhm.

And, in a way, that difference starts to point the finger at why the British computer industry in the end was arguably doomed to fail, in the same way that the Seven Dwarfs eventually disappeared in the United States compared to IBM. IBM rolls on, but Burroughs, NCR, et cetera et cetera, had gone the way of…

And by that you're talking about, because IBM had the momentum in terms of volume.

Yes.

Suggesting that that's why…

Although the first error that BTM made was in 1949. BTM… BTM was… BTM had a royalty agreement… B… Sorry. BTM's origins were, that they were IBM in Britain.

Mhm.

They paid a royalty to IBM to use the IBM patents. Whenever IBM produced a new machine, like a tabulator, a copy – a tabulator, an IBM tabulator, would come to the UK, where BTM would then adapt it to sterling currency, and re-badge it as BTM. Pay a royalty to IBM. In 1949 IBM and BTM fell out. BTM at that point didn't have a computer. IBM didn't have a computer in the market. And, BTM… BTM's agreement with IBM was that IBM… sorry, was that BTM could sell, under the royalty agreement, they could sell IBM equipment throughout the Commonwealth, except Canada.

Mhm.

They had that to themselves by, by agreement. And in 1949 the directors of BTM decided that they could go on their own. And, there had been some difficulty, partly related to the war, partly to the state of the British economy, over paying the royalties, and BTM had got behind in paying the royalties to IBM. But BTM decided they would give up the rights to the Empire. They had the Commonwealth market.

Yes.

And, IBM World Trade was established, I, from memory, four days after the end of the BTM agreement, and I think I'm right that within three months IBM World Trade had opened an office in Australia.

Mhm.

[1:56:27]
Now, the critical thing about BTM, and why it succeeded for a while after, was that, punch card equipment in particular, you had to make it specific to pounds, shillings

and pence, and that's why Canada was excluded from the agreement, because they had Canadian dollars. All the rest of the Commonwealth was in the sterling zone, [laughs] older listeners, they all used the pound. And therefore they needed punch card equipment, tabulators and punches and so on, that operated on sterling. So, 20 shillings in a pound, twelve pence in a shilling. And that meant that it needed modified circuity in the machines. And that was what BTM had been doing all down the years, and that was the original justification for it. BTM sadly, in hindsight, the directors picked exactly the wrong moment when the electronic computer industry was literally about to start, and they could have retained, at least for a significant period, their agreement giving them the rights in the Commonwealth, they decided to give it up. And although sterling currency protected them up into the 1960s, in my view the writing was on the wall, that the British market, even the Commonwealth market, was too small, and having given up the royalty agreement, IBM charged in, and, if you look at the development of IBM World Trade, and their opening of offices, they went right through, because of course, South Africa, Australia, New Zealand, into India, and so on. These were mature markets in terms of business. And so they were, they just sailed in. And, I believe that that decision, in terms of why the British computer industry in the end, the manufacturing industry, failed, I think, that was one of the critical points. I'm not saying it might not, that there weren't other important errors made or decisions made that in retrospect were probably not wise, but I'm quite certain in my own mind that that was a bad decision.

[1:59:08]
Mhm. And, you mentioned about royalties there.

Mm.

And, and the involvement of Donald Booth, and his innovations that are still in chips today.

Mm.

And as you say, should quite rightly be remembered. Was he able to financially benefit from, from his innovations?

No. Short answer.

I thought that might be the case. [laughs]

He was very sore. When I met him in 2005, when he came over to London, to become a… I should say, a college fellow at Birkbeck is the equivalent of an honorary doctorate. And, when he came over to get his honorary degree, and I was chatting to him, he visited the department and so on, and, he was still sore, because, with BTM, they had gone to a patent agent in order… Because, Booth had a number of patents, none of which were, I think, particularly valuable, I mean, but they were things that were patented. And, the patent agent basically completely fouled up patenting the Booth multiplier, which essentially was patenting an electronic circuit. Now, I'm not an expert on patents, and whether there was some issue around patenting a circuit, not a component, I don't know. But, they, they attempted but failed to patent the Booth multiplier. And so, Booth made no money at all out of… As far as I'm aware, he made no money out of any of his computing activities in those early days, and he, he ran, he was a sort of, inventor would be the wrong word, but he was a sort of problem-solver. He, he ran a company in his retirement where he would build applications and, and pieces of, specialist pieces of hardware. Not… I'm not sure he built them for… It was a business but I'm not sure it was… You know, he was a private…

Not financially rewarding in…

Yes. That's right. Nor I think, to be honest, did he want it necessarily to be.

[2:02:15]
No. And it's interesting, this, I mean, someone, as you say, that invented the multiplier, the… And the drum.

Yes.

You know, used by so many different manufacturers, not to financially benefit from it.

Yes.

Which I feared you may say.

Yes.

But… And… So… And, now turning back to yourself. But thank you for sharing that with us.

[2:02:43]
What would you say your proudest moment of your time at Birkbeck would have been?

[pause] Well, I… The moment I… I would have to be honest. The moment I probably enjoyed most was becoming a College Fellow. It's hard to say, you know, that after all, after all those years, to have the College Orator stand up and say lots of nice words about you, some of which were true. [pause] I… No, I, I think that, that probably was the proudest moment, partly because it was a public moment.

Mm.

But, I regarded it, I think, you know, at the end of one's carer… It, it was nice to be thanked.

Yes.

And I regard it very much as that. It wasn't so much a, this is what I had achieved in a specific sense, you know, I didn't invent a drum or whatever.

Mhm.

It, it… No, it was an acknowledgement of what I felt was a job done as well as I could, and hopefully a job well done.

[2:04:10]
And, I think as you corrected me before, I think it was 27 years you were there, were you?

Mm.

One success from that period of time, I mean, I'm sure you had many, but, one success that you, perhaps sticks in your mind, or, or something that you changed, you thought, really that's, round that particular…

Yes. I… [pause] I don't know whether I would identify particular, a particular thing. I mean we… I, I suppose, my… I'd look at the department, as I said when I joined it, it was seven people. I think when I became head of the faculty it was still seven or eight people. I think the way in which we grew the department, I think when I retired it was probably, twenty… I'll say 24, I don't remember the exact number. But around, between 20, 24 academic staff. In terms of research ratings, we were doing well. Our courses I think were, were well respected. Student enrolment generally was good. So, we had been able to build a, a department that was in good spirts, and, I, I think it, it would be a successful growth of the department, and a successful growth of the faculty. We had added a Department of Management in 1994, and that had grown. We had been able to take the Department of Mathematics and Statistics, which was in difficulty, it was a small department, it had some extremely distinguished professors previously to my becoming involved with it, and, it had drifted. Mathematics, as I said, university mathematics is a very hard subject, except for very gifted students. And so, Birkbeck, being part-time, it had, mathematics students of two sorts. There were those, many of them originally schoolteachers, who wanted a degree, taught mathematics, studied mathematics, worked steadily, and left with a degree. And then, every year there would be one or two people who sometimes knew very little about mathematics, but had a real obsession with studying mathematics, and these were people who had a real talent. I've long, I mean I think it's quite widely accepted that some people on the Asperger's spectrum have really quite unusual mathematical gifts.

Mhm.

And these people quite often, because of their other interpersonal skills…

Mm, their challenges.

…sort of challenges, they had not necessarily gone to university.

No.

Or they had had difficulty finding employment. And these people would drift to Birkbeck, and then suddenly, they would find, they'd suddenly find, they were in a world where they succeeded. And so, in, going back to the, 1970s, 1980s, up to that sort of point, the University of London, many of its subjects were examined across the whole of the university. So whichever college you were at, you did the same exam. And Birkbeck, almost every year in the mathematics degree there would be a student from Birkbeck in the top five of the whole university, and they would be these individuals with this talent, I don't think they were all Asperger's, but, but they were people who had that peculiar, not peculiar, strange, but special talent in pure mathematics.

Mhm.

And so you had a department which had every year one, occasionally two, outstanding students, and a small number of others. And, what we managed… And, and that was a real, in a world where you have to worry about balance sheets, that was a real problem. Because there weren't enough students to pay for the staff that you needed to teach them.

Yup.

And, you need a whole range, a minimum number of staff, because you have to cover a series of distinct topics. We managed to revive that department by linking it with the School of Economics. And I've always thought that was a service that we did for,

for students and for the college. Because in economics, you have the economic modellers who are always very high quality mathematicians. And so, we were able to link up the mathematicians with people who were using those skills, and together, basically build a new group of mathematicians that now are successful and, and happy, there's a community that they, they are pleased to be part of.

[2:10:21]
And, working with your, your colleagues, and looking at your, your style of management, how would you, how would you describe the way you work, and help, developed, say, key staff in, in Birkbeck?

Ah. That question… When you said key staff. A university I not a business.

Mhm.

OK? When you employ an academic, when you employ, when you first, when they get their first job, there's an element of, of talent-spotting. You are trying to pick winners. People who will go on to, it doesn't apply to, to computer science or mathematics, but, the equivalent of Nobel Prize winners now. Those are once in a, I was going to say, once in a century. I mean, those are very very rare. But, you are… Because, as I said much earlier on, you ask academics to teach particular subjects, but, an academic may teach, three hours a week?

Mhm.

Six hours, possibly. They'll then have meetings with research students and so on, there's administration to do around, well examinations obviously, but also admissions and so on. So, if I say, go on record and say, somebody may be teaching only, even three hours, a professor might be teaching three hours a week, I don't want anyone listening to, to think that they then spend the whole of the rest of their time, you know, not engaged on useful business. So, you recruit them. But then, they will pursue whatever their curiosity leads them to. And, you, you will always see in an academic CV, if you look at the list of papers, you will see one, two themes that roll forward.

Mhm.

We were once given, someone actually fabricated a CV, there was a well-known case 20 years ago, and they actually applied to us, to Birkbeck, for a job.

Mhm.

And… Thirty years ago. And, we looked at their CV. And what they had done was to get papers, other people's papers, from minor universities, working papers, things that hadn't gone into the literature, and had put their name on it. And, one of the reasons that they were caught was, that, when you looked at the CV, it didn't demonstrate progress. It was like a scattergun of interesting papers. Because they looked, they picked them up, from middle United States and, places in Europe. So you're looking for someone who will build on their research, and, but they're going to pursue what interests them. You can't say to them, 'Don't do that, do this.' Any more than you can tell a poet what you will write poetry about.

Mhm.

And, universities have had a real struggle with this. We had problems once with an HR director, who had come from outside the university sector, didn't understand that in many ways an academic is almost like a self-employed person who's on a salary. You really cannot control what they do. You can… And, so, in my view, you have to offer them, carrots; you've got to offer them incentives. And, the way I ran the faculty, was basically, I would agree with the other deans and the master of the college, the finance director of the college, we would sit down as the senior management team, we would work out, basically a balance sheet for the coming year. We'd say, this the number of students we need, because we know the fee income; this is our salaries; this is what the Government will give us, in terms of our block grant; this is research income. And so on. And, we would look at that, and, we would know then that we needed, this number of students. Birkbeck, because, as I said earlier on, its finances are very often on a knife edge and at the whim of the Government, we went very early to attributing income and costs to academic departments. We were

some of the first universities, we were one of the first universities in the UK to do that. And that meant that, although we didn't brandish it about, it meant that the senior management team knew where the cross-subsidies were.

Mhm.

[2:16:16]
And so, if you… In those days, people will laugh if they hear me say, but, we worked on staff:student ratios, academic staff:student ratios, of between sixteen and 20 to one.

Mhm.

And that was based, broadly, that was based on the costs against the income.

Mhm.

And, obviously some subjects, an arts subject where you have very little equipment, is relatively cheap. If you look at a big science department, very expensive, and also lots of support staff, technicians, equipment to be maintained and so on. And so, we would plan this out. And then, that would, having got a college model, it would then come to me. I mean this not different to the way you run a business. I mean Birkbeck survived a very bad period when we would, during my time as Dean, when we were close to being insolvent. And… But it was by attributing the costs and the income, and then saying, we, we made, as a senior management team, we made a pledge to the heads of department, we made a pledge to them that if they increased student numbers by, if they got an extra 20 students, then, we would do our absolute utmost to give them an extra member of staff, OK, on the 20 to 1 staff…

Yeah yeah.

OK. And, as best we could, we stuck to that. No written agreements [laughs], but… But also, we then would turn round to departments and say to them, if you're down at staff per student – sorry, ten students per member of staff, you're costing money, which other successful departments are generating, and those successful departments

want to grow, and invest, so they can have more students. And so, we would work with departments, I was talking about restructuring the maths department, we would work with those departments in order to basically reduce their overheads, increase student numbers. And, I mean I was involved, only once fortunately, because it's not pleasant, in closing a department. We closed the Department of Physics, which was very controversial. The physics community, which is a very expensive subject, and in the 1980s and Nineties was not a terribly popular subject. Things like nuclear physics were out of fashion, old, a lot of old physics wasn't really, you know, appealing to students. And so, there were things like material sciences and so on, some of, you know, which is a topic which in, in some areas is no very popular again, and very important, it was not really the place to be in an academic sense at that time. So we closed the physics department, because we could not make it pay, and it had reached a point where, my personal opinion was, its continuation was actually hurting success, the growth of successful departments. And so we arranged to transfer all of the staff to other university physics departments, which we pretty much manged to do. And, were then able, having taken, I can't remember. I mean it might have, it may have been costing us three, five per cent of our turnover, just as a subsidy every year. And when you have huge fixed costs, because, you can imagine your staff… I mean, sometimes 75 per cent of your budget in the university, 70 per cent, goes on staff, and that's fixed.

Mm.

Then you've got your buildings, and that's pretty much fixed, you have to maintain them, right?

Yup.

The froth, you know, the, the, your discretionary spend, is very small. Research grant income is very closely tied to particular research projects. You are given money to do that research. Now, you're allowed usually to retain an overhead as it's called which is seen as a contribution to, if you think of a science project, it's, it's seen as a, a general contribution towards the equipment that's used, the technician and so on, the, the incidental costs.

Mm.

So you, you do get a small contribution to your overheads. But, basically, a university is very heavily fixed income and fixed, fixed costs.

Mhm.

[2:21:48]
So it's, it's a very difficult thing to manage in my view if you don't attribute income and costs to departments, and then say to departments, OK. And that's basically what I used to do. I would say at the beginning of the year to the five or six heads of department that I had at the time, I'd say, well, this is basically what the college has got coming in, this is pretty much what's going to go out. Here's your student numbers. We need you to recruit that number. If you exceed that, then, we can look to increase the staffing. If you undershoot, and somebody leaves, it will be difficult to replace that post. Even then, one of the difficulties in a university is, very often members of staff are special… you have one specialist in a, on a topic, particularly in smaller departments, and if that person goes, all of a sudden, a section of a degree programme may have nobody to teach it. Now, you can sometimes get a part-time lecturer, they can be very good, but equally, they owe you no loyalty, and so, you could very easily find at the end of the year they walk away, they're not necessarily keen on, [laughs] marking examinations and so on. Or you have to pay them extra for doing this. So part-time lecturers are, are not a good idea. So, sometimes… So it's not… Slimming a department is, takes longer than you would wish. Growing it is, is much easier. But I found, basically, by sticking to that pledge, of growing the staff if you grow your student numbers.
[2:23:54]
The other little local device we used at Birkbeck, and I'm not sure whether it was used by other universities, but it worked very well at Birkbeck in my time, was, we had course… The Government set a minimum fee… In the part-time area we had quite a lot of freedom of pricing. And, we had some courses, I remember economics… Around, around 2000 there was a huge burst of interest in e-commerce, and our economics department came to us and said, 'We reckon we could run a self-funding

course on e-commerce,' and they did. And, they said to us, 'But, if we take… We're willing to run it, and basically, we will cover the costs, individual members of staff will do extra teaching and so on, but the fee income that comes, we want to have in the department.' And so, we said, OK. And, we actually, what was agreed with them was, in all, because their students were going to going to use the library and so on, we charged to department the standard college fee, but we said, 'If you want to charge them more, then you can have the surplus.'

Mhm.

And, that spread quite widely through Birkbeck where departments would charge what we called a premium fee, and at one point the Department of Economics had over half a million pounds, effectively, in cash, to its credit from these premium fees. And they would use that to hire in extra staff, they would use it to, to pay for sabbatical visits abroad and so on. If you have a university that's willing to give staff a degree of freedom, and then you, you would then have to watch quite carefully, because there are, very intelligent people can come up with some undesirable wheezes But generally, that wasn't a problem. So you can offer significant incentives to good behaviour, recruit more students, you get more staff. Premium fees, you then get money that you can spend in computer science, we could spend it on better equipment, new computers, additional technicians and so on.

Mhm.

[2:26:46]
So my management strategy was basically, first of all, complete openness.

Mm. Transparency.

Transparency, with heads of department. And indeed, I would be quite happy, subject to confidentiality, to talk to ordinary lecturers. I'd have lunch sometimes with lecturers, and, if they started asking about things, I would happily tell them about why things are the way they are. Sometimes it's good news, sometimes it's bad news. But basically, with the heads of department, I would say, that's what you're going, that's

what we can give you as a college for the coming year, and these are the ways you can make your life better, if you can exceed our expectations of you.

Mm. So they learnt about financial accountability.

Oh yes. Absolutely.

And, and they had…

Yes.

…incentives, or carrots as you said.

Yes. Yes. Even, interestingly, the most resistant part was the faculty of arts, who had a passionate belief that you should not, you should only have one fee, which was true of all subjects, eventually even they began to charge a premium, variable fees.

Right.

They… So… Anyway. But, that, that was how, that was management, that got me reappointed five times, so, maybe it was popular.

Brilliant. And a successful career there.

[laughs]

[2:28:24]
Well thank you for sharing that with us. Thank you, Roger, for that insight. Perhaps now, I'd like to take you to your involvement with the British Computer Society. So, do you recall when you joined the BCS?

Yes. I joined the BCS, as best I remember, in 1970. And, once again, I owe that to Professor Peter King, who encouraged me to join, and encouraged me to go to meetings of the Advanced Programming Specialist Group, and, I used to attend each

month, and met many of the leading experts in software engineering at those meetings when they were speaking. And, in 1976 the then Chairman of the Advanced Programming Group, Ewart Willey, became BCS President, Peter King became Chairman, and, Peter had previously been Treasurer. And so, he said to me, 'Why don't you become Treasurer?' And since, he said there's no very much work involved in it, and, so, I said yes, fine, OK, I'll, I'll become Treasurer. So that was my first official appointment in the BCS. And, as Treasurer, I used to go along to the Specialist Group board meetings in the BCS, representing the Advanced Programming Specialist Group, and somebody spotted, I think, probably a young man with, with some time on his hands, and so, I ended up on the, on the finance, the technical board, the Specialist Group Board Finance Committee, administering the finances of the Specialist Groups. And that really was the beginning of a process that led by 1987 to my being the Chairman of the Technical Board in the BCS, with the title of Vice President, Technical. The Technical Board was responsible for the Specialist Groups, and the public lectures, the publishing activities of the BCS, the journal, and the bulletin, and, it was a, generally an interesting post to have, and, I held that. It also, as Vice President, I was a member of the, I think it was probably called the Executive Board in those days at the BCS, but certainly the senior management board. And, so, I, I got to know the BCS at a high level.

[2:31:35]

In around 1990 there were some financial storm clouds building up over the society, and people who knew much more about finance than I did as an academic were concerned about the BCS's finances, that all was not right with them. And, in nineteen, I think probably late 1990, it became, it started to become apparent that there were some serious problems. Alan Roussel was President, and he was very unhappy about the finances, and then, he was succeeded by Steve Matheson, and during Steve Matheson's year it became apparent that, that the BCS had been spending significantly more money than it had coming in, although that hadn't immediately been apparent to the executive.

[2:32:40]

So, it was probably not a, a particularly appealing time for people to come forward to be President. Anyway, one afternoon I got a phone call in my office from Alan Roussel, who was then President, who said, 'Wouldn't you consider becoming Deputy President, with a view to being President in the BCS year 1992/3?' And I

said, 'Well I'm very honoured to be asked,' and, subject to my employer agreeing, which the Master did, I would be happy to be President. And so, 1991, Steve Matheson's year, was a very difficult one. We parted company with two senior members of the BCS staff, and, there were some fairly difficult discussions with Lloyds Bank, who were our bankers. Anyway, my year as President was mostly concerned with going out to branches and to specialist groups, to reassure them that the society was a viable activity, and that we had ambitions for the future. And, I had a, an enjoyable year as President, but, it was against a very, very difficult back, financial background. Can we pause?

Mm.

[pause in recording]

[2:34:33]
Roger, against that, as you say, very difficult backdrop, I'm conscious that a lot of presidents had themes for their year.

Mm.

Did you have a specific theme in, or themes, in your year?

Yes. I, I had a theme which I certainly used, I'm not sure, I think later presidents had, almost like a strapline. I, I think during my year I made fairly regular reference to software developers as being invisible engineers. The BCS was in the process of being accepted by the Engineering Council as an engineering institution. Sir John Fairclough, who was President I think in '86/87, had forced the Engineering Council to accept the BCS as an engineering institution. I have always believed that what we do is engineering. I do believe that we are engineers, and, I, as an academic who has thought about the implications of that, I do beehive very firmly that we are engineers. Oh, sorry, can you…

[pause in recording]

[2:36:07]

Yes. So the theme I took for my year was that, software developers were invisible engineers. I had been struck on a, a trip for the BCS to Europe by plane that, we, the whole activity was controlled by computer systems, everything from the, the booking of the, the seat, the handling, and so on, all of this was, involved computers. In those days much more manual intervention, and, it wasn't joined up in the way that became possible when the Internet came. But nonetheless, I remember standing at check-in, and then, getting my boarding pass, going through to the aircraft, and thinking to myself, the only time I've seen a computer is actually at that check-in desk, where there was a relatively simple application running on the screen, and yet, everything from the planning of the food that's to be loaded, the, the weighing of baggage so you know how much baggage you've got on board, the whole thing, the air traffic control, all of this is computerised. And as a profession of software engineers, we get no credit for it. Nobody realises how much computing is going on behind the scenes. And, I, I realised that, that when we are successful we are invisible. I, I had had an inkling of this, I think the first time I became, started to become conscious of it, was possibly even ten years earlier, a little more, when I had visited a computer installation somewhere in connection with a student placement, and, I had become conscious that, in talking to various employees in the company, that when computer applications work well, they would talk about their stock control system. They'd look at the scree and say, 'the stock control system'. When things work badly, they talk about 'the computer'. And, I realised that, when you have a successful system, then it is a stock control system and the computer becomes invisible. And I, I feel, and it's as true today as it was then, that people have no idea the extent to which our lives, literally, depend on successful computer applications. I don't think we get the credit as a profession for the immense contribution that we make, the fact that our systems are highly reliable. I was reminded of this the other day when for the first time in I know not how long I went up to a cash dispenser which was out of order. In the early days cash dispensers, you could look at, you'd look at one and it would be empty, or it wasn't working, and you'd go to another one, and occasionally you'd even go to a third before you got some money. We are, as a profession, hugely successful, and only very rarely is the public aware. Y2K, year 2000, all of a sudden, people suddenly were worried about whether the computers would go off at midnight on the

1st of January 2000. By and large they didn't, and, a lot can be said about the way the industry prepared and so on for that, some of it good, some of it not so good.
[2:40:32]
But, my theme was that we were invisible engineers. And I think we, we still are. But I think it is absolutely critical that we explain to the public what we are doing. The public is… There are so many, today there are so many public policy issues that Parliament and others, other bodies, have to discuss, and, the public is so ill-prepared to take part in the debate about issues around cyber security, privacy and so on, and, we are terribly poor in my view at explaining what we are, who we are, and indeed why careers in computing are exciting, and why they are valuable because thy contribute to the wellbeing of society. And, some of the work, I've been Secretary for five years of the Worshipful Company's Education and Training Committee, and working closely with the two schools that the Company is linked to at Lilian Baylis and at the Hammersmith Academy, and providing careers information, you realise when you talk to younger students, thirteen, fourteen years old perhaps, they have very little idea about what a career in computing actually means. And so, this theme of invisible engineering, invisible engineers, and the need for us to explain ourselves, explain our role, to society at large, is something that has motivated a great deal of my activities on the professional side of computing.

[2:42:46]
Mm. One would assume that, as computer literacy improves, that the understanding will become greater, one would hope.

I think we thought that, but… One of the things that has completely changed in my working lifetime is public access to computing. When I started, I prepared decks of cards, and there were operators who fed them into the machine, and tore off output, printed output, and gave it back to me. We talked about the Internet. The Internet suddenly made… Well perhaps it's better if we, we say, online systems removed the punch cards and the line printer paper, so in an office you were directly connected via a coms link to the, to the company's computer, and then with the coming of the Internet, we suddenly had direct access to computers in the home.

Mm.

And indeed, latterly with mobile computing we can now on our mobile phones, even as we travel, we are connected to huge amounts of computing power.

Mm.

So, we, we've seen this dramatic transformation in public access to computing over a, 40-year period?

Mhm.

Sorry, I… Can we…

[pause in recording]

[2:44:40]
Right. Computer literacy, I, we, I think we hoped would make people more aware of what we as a profession do in building big application systems, the banking systems, or, health systems, or whatever. But, what I think we've seen is that, the modern app that we have on our mobile phone actually insulates us from what's going on inside our phone, and the phone in turn linked to a machine, and so on. I've said many times to students, don't do this in the real world, but do it as a thought experiment, the next time you are queued up at a cash dispenser, and you see the person in front of you just picking their money out of the machine, tap them on the shoulder and say, 'Can you just explain to me what happens when we put out card in and type our PIN, and the money comes out, can you explain to me, what happens?' And, the vast majority of people have no idea. They assume somewhere there is a computer. But, they have no idea. The thought that when they go to the other side of the world, to Australia, the same card goes into an ATM and it delivers them Australian dollars from their UK bank account. So, I think, we hoped computer literacy would spread understanding. But in practice, what computer literacy has done is to provide skills, IT skills, but they are, you know, it's the ability to provide PowerPoint slides, to construct perhaps simple spreadsheets, to, to type letters on a computer. It really hasn't helped people answer the question of, how does that cash dispenser work, or… They're still

unaware, most of the time, that all the traffic lights are strung together; you know, all they see is, the traffic stuck at the traffic lights in Trafalgar Square, and they go tut-tut-tut. They, they don't recognise the problems of, for example, the success of providing notices, the displays of bus, you know, at a bus stop, which says, 'The next 159 bus to Streatham is coming in three minutes.' And the technology behind that. And people just accept it. And, they forget that it's actually real people who built those systems, and who keep them running, and who modify them and enhance them and so on.

It's seen like a utility, like, in the same way we treat electricity to the Grid.

Yes. Yes.

[2:47:43]
Just on the theme, the positive themes about computer literacy. I'm conscious of, because of the office you held as President and before in the BCS, that brought you into contact, indeed joined, the Council of the European Professional Informatics Society, CEPIS.

CEPIS. We call it CEPIS…

Well I think, if we can that will be easier for me any…

Easier for everybody.

Yes. And I'm conscious you, you were President, '97-'99.

That's right.

But, am I right in saying you were one of the first four signatories to the European Computer Driving Licence, the ECDL?

Well, yes, I was heavily involved in, in getting it going. After I had been BCS President, I became the BCS's representative on the Council, on CEPIS's Council.

During my year as President, I'm pretty certain it was while I was President that we approved the BCS joining the project that became ECDL. ECDL had been running, or, a computer driving licence had been run in Finland, and the Finnish association offered it to CEPIS members as a CEPIS project. So that, we could have it, as indeed it has happened, right across Europe. And, that started, the BCS agreed to be part of that project in, I think, at the beginning of 1993, and, I then continued to work in CEPIS on the development. And, it was quite complicated. It had started in Finland, and the basics were there, in that, the Finnish society ran examinations against a syllabus. The Finnish association didn't teach the syllabus. They had three targets in Finland, they were the unemployed, they were people in prison, and big employers, which was a slightly unlikely mix, but, those three groups. And so, various… The companies obviously organised their own training, and the Government was involved in dealing with the unemployed, and with those in prison. And the idea being, obviously, to give them skills that would make them more employable when they came out. And, it was all in Finnish, which is, not an easy language to understand. But it was offered to us. And, we got help fairly quickly from the European Union to translate the Finnish version into English, French and German, from memory. [2:51:16]

And, we then… There were, a small group, there were probably about six people, there were probably four active directly at any time. And, there were two activities. One was to design the syllabuses, and extend the syllabuses. IBM's Office software as we now call it was developing, and although ECDL was vendor independent, obviously, as the major supplier, the dominant one, Microsoft software sort of dominated the thinking. And so one worked on the syllabuses and the examinations, while the other group, of whom there were probably, it's slightly the smaller group, there were two or three of us, we struggled with how to raise enough money to be able to launch the thing. And, it was a difficult problem to solve. Many of the CEPIS societies didn't have a great deal of money, and we tried various formulas based on membership, and the trouble was that the BCS had literally ten times the number of members of most of the others, and therefore any pro rata system, the BCS was ending up being asked to fund more money than in its still fairly straightened circumstances it could reasonably invest, particularly in the speculative venture. What emerged by chance was, the idea, except as an academic I didn't realise what it was, of basically, a franchise, that… And, what we worked out was, that, CPIS would

take, that the, the examination scheme, the driving licence, we would, we would basically sell little booklets in which you could record your progress through the examination topics, until, when you had done, I think it was all seven in the initial version, when you had passed all seven, then you had the driving licence. And so, we would sell, these little booklets were called Skills Cards, we would sell Skills Cards. And, that, once you had got a Skills Card, then you could enter for the examination, having, when you had done appropriate study. We, we charged one euro, CEPIS charged a euro for a Skills Card, and training companies sold training plus the Skills Card to the students, and… Sorry. And the trainers, the trainers were licensed by the national computer societies. So, you had… And licences were provided by CEPIS to the national societies, and each national society was guaranteed that CEPIS would only licence a CEPIS member, a member society.

Mhm.

[2:55:01]
So, you had CEPIS, the National Societies, and then the trainers. And, we stumbled to this arrangement, more by good luck than anything. And the thing we didn't understand was… Because we were worried about how to promote the driving licence, so, to create demand, to take it up. What we didn't understand was, that the trainers would do all the advertising for us, because they wanted the students, because they were going to make far more money out of the students than anybody else, the National Society and CEPIS itself. And so, eventually, we launched it in the mid-Nineties, using that model, and, the national societies were getting a euro, and CEPIS got a euro. I spent the… The CEPIS executive board was meeting every six weeks, and for much of that time we would spend an hour or several hours talking about aspects of the driving licence, and we thought if we got 100,000 people to do it, in the lifetime of the whole project, we would be thrilled to bits. So when European Union Commissioner Bangemann, who was responsible for IT matters, when he got the Skills Card for the millionth ECDL participant, we kind of, pinched ourselves, and they're now past ten million. It's left Europe, there's the International Computer Driving Licence.

Mhm.

[2:46:49]

So, this thing has grown out of all proportion, and when I think back to 1994, 3, 4, when even 10,000 people doing it, you know, you were thinking, you know, admittedly spread across Europe, but, a third of the members of the BCS having signed up to do this, you think, no, there's no way. You know, one per cent, two per cent might do it. And, we, we set this thing rolling. And, it then grew, and so by 1997 I think it was clear that a council of computer societies was not sufficiently focused to run what was now a major business activity. And so, Peter Morrogh, who succeeded me as President of CEPIS, Peter Morrogh and I negotiated the setting up, the separation basically, of the ECDL foundation from CEPIS, and we, we got a guaranteed revenue stream for CEPIS, and the ECDL foundation basically got the intellectual property rights, and we negotiated that and set up the foundation which, 20 years later, well it's just celebrated its twentieth anniversary last year I think, in Dublin, and is still a major provider in the IT skills market.

[2:58:38]

And, looking back, I mean, we had a struggle to persuade the BCS to agree. People on the Council of the BCS were opposed to the BCS going into that, because, it wasn't a professional qualification. They said it's just an end user qualification. The way I persuaded them, as President, to accept it was, that it was a service to our professional members, that they had, that our members, the BCS members, had end users working for them, and with them in their companies and businesses, and that this would be a useful, we got one or two of them to stand up in Council and say, 'I really want this for my business,' and it was on that basis that we managed to convince the sceptics of the millions and millions of pounds that had gone into the BCS as, as royalty payments, and, and other income, from ECDL since 1995 or thereabouts, when the income, when the actual running of the ECDL started.

[2:59:49]

Yes, so the, the individual national professional societies such as the BCS receive income from the project.

Yes.

In other words, from the trainers, the people at…

Yes. The trainers… That's right. They license the trainers, which generates income. They can provide other services. BCS has been particularly innovative in generating additional products alongside ECDL. But, it's also transformed small societies. Small societies have been able to run it, and generate income, and one of the things that I didn't recognise was, if you are in a small country, and I think of the Baltic state for instance, even a few thousand euro, or 10,000 euro, over a year, transforms the finances of your society. The Computer Society of Zimbabwe is still running, and still running the ICDL, the international version, and through all the stresses and strains that Zimbabwe's been through, it has continued to generate a small income for them which has helped sustain the society in Zimbabwe, and I still get email from the Computer Society of Zimbabwe about their activities. And I suspect, although I haven't confirmed it with them, that without ICDL they might well not have, have kept going as a society.

So a huge commercial success, a huge success in, in bringing computer literacy throughout the world.

Mm.

[3:01:39]
And while we're talking about the, the international environment, you were a British delegate on the International Federation for Information Processing…

Processing, yes. Yes.

…from '93, 1993 to 2010. And, thinking about education, about professionalism, you were involved with the IP3 programme I understand.

Mm.

Perhaps you could say a little bit about…

Yes. Basically, IFIP had always had in its objectives the promotion of professionalism. And, my predecessor as secretary of IFIP was Graham Morris, who was a past BCS President, and I may well have been interviewed as part of this series. Graham said to me when I took over from him as the British representative that one of his unfulfilled ambitions for IFIP was for IFIP to have a professional stream of activity. IFIP has around 50 national societies worldwide in membership, but most of its activity is devoted to technical issues, university and industrial research issues. So communica… you know, everything from hardware, communications, software, the theory of, you know, the mathematical theory behind computing and so on. It does have a very good technical committee on education, and it does have one on social issues. So it's not entirely technical, but it is very heavily dominated by technical issues. And in particular it does not have a technical committee on professionalism. So, Graham had shared this thought with me, and, given my background and so on, I agreed with Graham that this indeed was an omission, and it was in IFIP's objectives. And so, what happened was that, IFIP every three years has a world congress, and, we had a congress in Chile in the early 2000s, and, I was able to organise, as the British rep, I promoted a stream in that congress where we invited about six I think representatives from national societies around the world to talk about professionalism in their country. And, we got representatives from both of the big American societies, the ACM and the IEEE, BCS was present. The Canadians were present, the South Africans were present. I don't think they all spoke. But, we had six speakers at that event.

Mhm.

[3:05:05]
And, we agreed… I invited Charles, Charles Hughes, who was the BCS President, and had made professionalism his theme for the year, I invited Charles to come out to Santiago and speak about the BCS view and understanding of professionalism. And, there is no question that, apart from the Australians, the British, the British and Australians have undoubtedly the best, most developed understanding of what being an IT professional is, and models, and very similar models, of how it should be carried out. And, if Australia was missing from that previous list, it should have been added. The… [pause] We… The group of us who attended the session in Chile

agreed to meet again, and, we had a meeting in Cape Town. I, for some reason… Charles was in South Africa, Charles Hughes was in South Africa, actually, I think for a family wedding. Charles was in South Africa. So we agreed we'd meet in Cape Town. And the South Africans were there, the two American societies sent representatives, the Australians came, and the Canadians came. And we formed a loose association within, under the, to operate under the IFIP umbrella, to promote international professionalism, IT professionalism, worldwide. And we decided that we would go for a scheme of accreditation, that, what became known as IP3, the International Professional Practice Partnership, that that group would set what Charles Hughes referred to as a gold standard for professionalism in IT, for recognising individuals, as achieving that gold standard, and, we set out then to accredit societies. The BCS was very supportive, initially, of that scheme, as were the other societies, and, I think, we, we had six societies who each made a significant financial contribution to set the programme up. The BCS subsequently decided to withdraw, which was a pity, but they had their own reasons for doing that. The others have continued, and, successive chairmen, Canada provided a chairman, I was for a year Chairman, and most recently it's been led from Australia. And, the Australians, the Canadians have now got as it were mutual recognition. They have been, had a visiting party that has said that their standards, the standards they set, are suitable for professionals. I know recently that the Japanese are in the process now of going through the accreditation process, and the South Africans, and so on, the idea being that we would set a, a standard by which an IT professional would be recognised globally. And this is a continuing project, and, the other societies are gradually coming forward, the Dutch society has recently joined, the South Koreans have been involved. So, we are seeing a slow, gradual evolving process by which these societies are willing to be accredited as having a qualification for individuals which meets a global gold standard as, as Charles original christened it.

[3:09:40]

It does, I have to say, it does seem unusual in some respects that, you know, an initiative that the BCS and, and yourself were involved with, set up, has now, I should perhaps, unfortunately the BCS has decided to go down another route.

Yes. The… I think the BCS's view, as I understand it, is, that they believe that the BCS, through the, the CITP, Chartered IT Professional, that the BCS can be the global licensing body for the standard. I mean, the irony is that the IP3 standard is based directly on CITP, which is, there is CP in Australia, Chartered Professional, which the ACS use. CITP and CP were, essentially, for all practical purposes, the same.

Yes.

The Australian view was that, we, we should have a network of societies globally, who would share responsibility for evolving the standard. Because these standards do not stand still. CP, CITP evolve, and move forward. BCS saw, I believed, that it had sufficient maturity, authority, standing, that it could do this on its own, that it could be the global standard. My international experience in CEPIS and in IFIP says to me that a national society cannot set a global standard. Global standards have to have a global consensus. And therefore, the BCS, I believe ultimately, will have to go back to having a national – sorry, a, an international consensus guiding its standards. And, although I'm no longer close to this, I don't think the BCS has yet accepted that it will make much more progress in having an international standard for IT professionals if it does it cooperatively with other societies, rather than seeing it as a business opportunity and charging royalties for using CITP.

[3:13:00]
Thank you for that insight, that's fascinating. And, just, also, back with the BCS. I'm conscious that the BCS was funded, correct me if I'm wrong, funded the Computer Conservation Society, or was part…

Yes, it does. No no. The Computer Conservation Society is formally constituted as a Specialist Group of the BCS.

Yes. And, you were a founding member of that in '89, or, 1988/9.

Yes. The two founders of the Computer Conservation Society were, Tony Sale, who is best known for building, for his building of a replica of Colossus, and Doron Swade, who was the curator of IT, computing, at the Science Museum. Tony Sale

worked on a project at the Science Museum for Doron Swade, restoring, starting to restore to working order computers that the Science Museum had in its ownership. Doron Swade was keen to do that. Tony Sale had the electronic understanding, skills, to be able to restore these machines. And they came to me, because I was then the Vice President of the Board in the BCS that was responsible for establishing Specialist Groups, Technical Board. They came to me and said, 'We want to create the Computer Conservation Society.' And, Tony, who had previously been the technical director for the BCS, before going to the Science Museum, Tony, and had worked with me, he was Technical Director in my early years as the Vice President, Technical, Tony came to me and said, 'It would fit very well as a Specialist Group.' And I said, 'Yes Tony, I agree.' And, so, Tony came along to the next board meeting, Technical Board meeting, that I chaired, and presented the plan, which the Board approved, approved the Conservation Society, as a Special Group. I had got an interest in the early days of computing. And so, I went along to the first meetings, and, partly as a vice president, the BCS Vice President, supporting the, the launch meetings and so on, but also, with a personal interest and commitment to it. And, from those early days, we've had support from both the Science Museum, and also the Museum of Science in Industry and Manchester, for quite a number of years following the work of Doron Swade and Tony Sale at the Science Museum, members of the Conservation Society used to demonstrate the Ferranti Pegasus, which was demonstrated to members of the public, in the Science Museum, in the main hall on the ground floor, and visitors would actually see it working. Members of the… And… But that was, the Science Museum changed its policy three or four years ago, that none of its artefacts are now run, the view being that operating anything, any artefact, shortens its life, and therefore, the Pegasus is no longer demonstrated, and other computers. And they are on display, but they're witched off, and, to my mind they look rather sad. At Bletchley, you have a whole range of machines that run. You've got Colossus. And in particular in the museum world, in Manchester the replica that was built in 1998 to mark the fiftieth anniversary of the Manchester Baby, the world's first stored program electronic computer, the Baby is still demonstrated by a team of members of the Computer Conservation Society, and we have a branch of the society that runs and meets in Manchester. And, tens of thousands of members of the public every year walk into the main entrance in Manchester, and one of the things that is there, running many, mnay days during the year, is the Manchester Baby.

[3:18:06]
So, the Conservation Society maintains its links with those museums, but our principal focus is at Bletchley Park, in the campus there, mainly in the National Museum of Computing, which is located on the, the park, and, most of the projects that are there are projects of the Computer Conservation Society. The EDSAC replica that's being built is a CCS project; the WITCH; the electromechanical relay calculator is; the 2966, the ICL 2966, which runs there, and has been steadily restored. All of these are supported by the CCS, and our members contribute to a rescue fund, which enables us literally to send a lorry with a, a powered tail lift to, in one case, literally get an old computer out of a barn, and take it to safe storage, when the owner had decided that they really didn't want it any more, and we had to do that at short notice, in order to save unique machines for posterity. And we are unique worldwide in the skills of our members in restoring these machines to working order. The ICT 1300, which is currently in store, because there isn't space for it at the National Museum of Computing, that machine was restored by our members to working order. And, other machines up there. There's an Elliott 803. There's a wonderful range of machines. And we also keep an interest, keep an eye on more modern machines. But, we, we try and support the awareness of these activities. We publish the, CCS publishes a quarterly journal called *Resurrection*, which keeps our members, and, we've got about 1500 members worldwide, it keeps them informed of our activities. So, it is a major contribution to public awareness of the history of computing.

[3:20:45]
Including a full air traffic control system you have there.

Indeed. That is, that, the air traffic control system is, it was fortuitous, but it, it is an object lesson in the value of having, of decommissioning a working system. All too often, what we get given are, is a machine that's been turned off, and, literally in some cases, a set of magnetic tapes that may not have been read for ten, fifteen years, twenty years, since a machine last ran, and whatever operating system, executive plus application software there is, is on those tapes. And we've now, we understand about reading those tapes, and, you basically have to get it first time, because, very old magnetic tape, the coating will come away. Experience tells us you can perhaps run it three times, after which there's nothing left that's readable on the tape.

No.

You have a kind of, golden run, couple of runs.

[3:22:04]
So for any of our listeners who haven't been, had the privilege of travelling up to Bletchley as well as seeing a Station X, to pay a visit to the museum, which is…

Indeed.

…effectively, they're connected, they're right next-door to each other.

Yes.

I'd highly, highly recommend that, and…

Yes.

…see some of the computers that Roger has mentioned, as well as NATS, the air traffic control system.

That's right.

[3:22:33]
And thinking of challenges, and bringing us up to date now, I mean, what would you say today was the biggest challenges or opportunities in, in the IT industry let's say, looking forward to the next five, ten years?

I think the challenges are… I think the challenges are growing. And I think… [pause] I think, their importance to, to society at large is growing. We are entering an era where, social media is becoming a challenge. We created it, or, we enabled it. And, we have a role, not a sole role, but we have a role, in ensuring that IT is good for society. The BCS's slogan 'Making IT Good for Society' I think has never been more

timely, when we look at the way in which social media, which is entirely a creation of our industry, is used for good and for ill, in day-to-day life, influencing lives of people, as we've said before, invisible engineering, the development of fake news is, there's always been fake news.

Mhm.

It used to be called propaganda. But, it now has an immediacy. I, I… The Worshipful Company does, goes to the Livery Schools Link careers days, which are held annually for students from livery schools, and we have there cyber champions, and, we are trying to educate youngsters about issues around cyber bullying. We're trying to make them aware, not of the technical problems per se, but just starting at, at the level that they, just as, as school students experience problems. But when you look at issues around cyber security, the huge issues around privacy, the new EU directive on data protection, the issues of regulating a society, which, in which communication between individuals, instant communication, has been enabled in the way we have done, we, we have to find ways of ensuring that we don't do, we don't inadvertently do more harm than the good.

Mm.

I, I'm not a, [laughs] a sort of, Luddite, or wish to ban things, but the challenge of protecting the vulnerable, of ensuring equal access for all, ensuring that we don't create two parts of society, one that has all the benefits of the digital world, and another that's excluded, these are huge challenges that we face. And, it seems to me, at the moment I'm not sure we're, we're getting on top of it. I, I fancy the problems are piling up faster, currently, than we're fixing them. But I remain at heart an optimist, and I do believe that, in as far as these are engineered artefacts, that we can indeed put constraints on the way in which they run and are used, so that we can ensure that the benefits far exceed any risks that may be associated with them. And I don't think we'll ever eliminate risk of harm, or actual harm. What matters is that we achieve a substantial positive balance out of this, this transforming technology.

[3:27:54]

Mhm. And looking on a, a positive side, what advice would you give someone entering the IT industry today?

[pause] I'm tempted to say, no surprises. [laughs]

Yes. [laughs] We're back at the start. Full circle.

Yes. I, I think that… I think that's… Yes. I, I think, in a practical sense, no surprises. But I, I think that, you need, anyone entering it has to recognise first of all the huge power of IT to transform people's lives. I think they should commit themselves to using that for good, and to be continually alert to, to the need to ensure that it's not abused by others, and therefore to look for ways of ensuring that, that it is indeed used in a way that a professional, using that in its broad sense, that a professional person, a person committed to ethical standards, which is part of professionalism, that somebody working to ethical standards, can put their hand on their heart and say, that system, and the systems I can build, are built to an ethical as well as a technical professional standard. And in that way I think, we do stand a chance of getting systems that will build a better community going forward. But if we leave it as an ad hoc business, which it was when I entered it, where anybody can build systems, and indeed we have elements still today, then I think we, we risk, as an unregulated profession, loosing all sorts of potentially damaging applications on, on society, and applications that once loosed will be very difficult to rein in.

Yes, absolutely. Well Roger, thank you very much indeed for sharing that with us. A fascinating insight into your career, your highly successful career, the work you've done with the BCS, work on an international front. So, it's been a pleasure to meet you today, and, on behalf of Archives of Information Technology, thank you very much for speaking to us. Thank you.

Thank you for the opportunity.

[End of Interview]