Dame Wendy Hall

Interviewed by

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Welcome to the Archives of Information Technology. It's the 30th of November 2018, and we are in London, at the British Computer Society. I am Elisabetta Mori, and interviewer with Archives of IT.

[00:16]

Today I'll be talking to Dame Wendy Hall. She is a British computer scientist and Regius Professor of Computer Science at the University of Southampton, and an Executive Director of the Web Science Institute. She was Dean of the Faculty of Physical Science and Engineering at the University of Southampton from 2010 to 2014. Between 2002 and 2007 she was Head of the School of Electronics and Computer Science, where she was founding Head of the Intelligence, Agents, and Multimedia Research Group. In 2000 she was awarded a CBE and became a Fellow of the Royal Academy of Engineering. She is also a distinguished Fellow of the BCS, a Fellow of the IET, and of the City and Guilds of London Institute, and holds a number of honorary degrees. She became a Dame Commander of the British Empire in the 2009 UK New Year's Honours list, and was elected a Fellow of the Royal Society in the same year. Her computer research career began in the early Eighties, pioneering work in multimedia and hypermedia, both at the time emerging disciplines. Her research interests now include the development of Web technologies, particularly the Semantic Web, hypermedia system and linked services, advanced knowledge technologies, digital libraries, decentralised information systems, and human-computer interaction, and Web science. She is founding Director of the Web Science Research Initiative. She was elected as President of the British Computer Society. She was Senior Vice-President of the Royal Academy of Engineering, and President of the Association of Computing Machinery. In 2016 she was named a Kluge Chair in Technology and Society at the Library of Congress in the US. Welcome Dame Wendy.

Mm. Hi.

[02:24]

Where were you born?

25th of October 1952. It's all on the record, in Wikipedia. I was born in London, I was born in Ealing, which is a suburb to the west of London.

Can you describe your parents? What were their occupations?

Well, my parents were defined by World War II, because they got engaged in 1939, when they were both, eighteen, nineteen. And then my father was in the Air Force, a volunteer for the Air Force, and he was shot down in 1940 and was a prisoner of war for five years. My mother went into the Army. And, my dad was repatriated on VE Day, May the 8th 1945, and they got married on May the 26th 1945. They hadn't seen each other for all that time. And then they were married for 62 years. So... My dad was an accountant. Oh, well actually a bookkeeper; in those days it was all done by hand, but that, nowadays we'd call him an accountant. And my mother was a clerk in an office, and then of course, when my, myself and my brother were born, she, she became a full-time housewife, although she worked part-time still. A little, little bit she worked. But, it was very traditional in those days that the woman was at home, and the husband was at work. But they were very much defined by their war experiences, and wanting to give their children a better life than they had had, and a better education. So, you know, I was a baby boomer, typical baby boomer. Went to a fabulous, brand new primary school built in the, in the Fifties.

[04:13]
So what was your family life like?

Oh, it's... I mean we were quite poor. We never knew it, but my mother used to run out of money. My father was paid in cash weekly, on the Friday, and, you know, he gave all the money to my mother, but, she used to run out of money by Tuesday, Wednesday. We didn't know. There was always stuff for us to eat. But she told me in her later life that she often went hungry, for us. But we didn't really know it. We had, you know, a toilet outside, and no hot water, no heating. We had a coal fire. It was all very different to how it is now.

So you had brothers or sisters?

I had one brother, one younger brother. Yes. But it was a very very happy, I had a very very happy childhood. And my parents were so keen on education. They just, they were so determined that my brother and I would, would do well. And this was the... We were so lucky. I mean I, I had free education until I was 24. I had a, you know, I was born at a time when the Health Service was born. And I, I, you know, I had parents who encouraged me all the way. I was the first in my family to go to university, as a lot of baby boomers were.

[05:30]
Did your family influence your choices in subjects at school?

No, they didn't. But I... I was always good at maths. I have.. I, I... It just was natural. And my father, being an accountant, I guess that's where I get the numeracy, the ability. But my parents just wanted us to do well. And they had no idea of, of what, you know, where I would get to in life. But, from day one in primary school it was recognised that I was good at maths. And by, year three, you know, when I was seven, I was teaching other children maths. The teachers were getting me to help people who had problems. Because I could just do it. And, so that was, that followed me throughout my career, that mathematical ability. So I always went the science route. But it wasn't anything anyone planned for me.

[06:30]
So, what about high school?

So I went to Ealing County Grammar School for Girls. So, I must have done the Eleven Plus, as we had in, the British system at the time. I have no memory of doing it. I must have sat an exam that was the Eleven Plus. I really have... I do have a memory of my parents telling me, I was going to go to the grammar school, and my best friend was going to go to the secondary modern school. But I just, I didn't realise what that meant. I just accepted that's what was happening. I didn't think of it as a streaming thing. I lost touch with her after that, and made new friends at the grammar school, but... And it was an all-girls grammar school. And a lot of my peers now, female peers, went to that type of school. I was very lucky though, that it was an all-girls school, that had fantastic science teachers, fabulous maths, physics, chemistry

teachers. So I did a full range of O Levels as they were then. I loved history, I loved Latin, and I loved... I really loved school actually, I was... [laughs] I just... They were some of the happiest days of my life without a doubt. I really enjoyed learning, I still do. But the maths, I was obviously, always going to do maths and physics A Levels.

[07:55]

But, I have a story to tell here. I actually always wanted to be a medic. I loved *Dr Kildare* on television, and just wanted to be, a doctor. And... But when I went to... My headmistress was a, a fierce woman, as they were, and I went to see her when I was about to choose my A Levels, and I said I wanted to, you know, go, study medicine. And I, I... She said something like, 'Wendy, medicine is not a career for women.' Now, in, this would have been, 1968, something like that, it wasn't. You see there were very few women in those days, and at the time I absolutely hated her, because she wouldn't let me do the A Levels that I needed to do for medicine. She basically said, 'You're really good at maths. You will follow that route, and you will have a great career.' All this time later, she was probably right. If I'd have gone into medicine then, I may not have been able to achieve what women in medicine can achieve today, and, I have had a fabulous career, following the maths route. So, I can't deny her that. But I did for a long time resent it. And I resent... Also, she wanted me to go to Cambridge, because she had gone to Cambridge. She, she was a historian. She sent me off to a, a two-day sort of induction course at Cambridge when I was in the sixth form. And I absolutely hated it. I went to Churchill College. Nothing against Churchill College. But I, I just hated it. There were so many people there with a lot of money. And my host took me to the bar. I didn't mind going to the bar, but they just said, 'Oh, you know, we're running up a bill, and, my father will pay the bill at the end of term.' And I thought, well my father won't be able to pay the bill at the end of term. I don't belong here. And I wouldn't apply to Cambridge. So that's how I rebelled. I've no idea if I'd have got in. I probably... I, I guess I would have done, I got very good A Levels, I don't know. But, I wouldn't. I didn't apply Cambridge. And, who knows what that did. But I did go the maths route, I did maths and physics for A Level.

[10:18]

We'll stop there. I would like to know what is your opinion about girls-only schools.

Well, I, I sometimes, when people say, 'What would you do differently? If you had all the money in the world, how would you get more women to do maths and computing, or science generally?' And one of the ways is to teach them separately. It... Because it, to us, it wasn't... Nobody told us we shouldn't do science; nobody told us we shouldn't do maths. There was no peer pressure not to do it. Right? I was a very gregarious person. I had boyfriends from the age of twelve, thirteen. So, I, it wasn't that I was just in this cocoon of an all-women environment, but, I, I think I benefited hugely from that teaching, where there was no competition, there was no sense of having to be something different. Because what seems to happen, the research shows that no matter how good the primary schools are, when girls go to secondary school, and the hormones kick in, they start to feel a pressure that says, women don't do science. And it's, it's... There's a, it's very very unconscious bias these days, but it's there. And often it's peer pressure. So... But, but obviously, you know, the research also shows that kids benefit a lot from co-ed schools. So, I think there... I, if I had the ability to do it, I might, I might well experiment with streaming for science. Some schools have done it, and I don't have the knowledge to know, well how much it works or not, I don't know the stats on it. But I think I benefited hugely from going to an all-girls school.

[12:06]
So, after your grammar school, you went to university.

So I picked universities that were... I wanted to leave home. And of course my, right, you know, I really discovered the world when I went to university. Because my home life was very... My parents were very conservative with a small c, quite religious. They were, they were poor, we... You know, I mean I didn't eat rice or pasta until I went to university. My father ate meat and two veg, right? [laughs] And, you know, that's all my mum cooked. She was a great cook, but that, she cooked very traditionally. And, we never went abroad, we couldn't, we didn't have any money. I did go abroad once at school, to Paris, a school trip. But... So the world opened to me when I went to university. But I wanted to be within a train journey from home, so I tended to... I didn't... As I said, I didn't apply to Oxbridge. I applied to good maths departments in a circle around... I don't know, it was definitely Bristol, Nottingham,

Kent, Reading I think were also on my list. But Southampton was top of the list, and don't ask me why. It seemed like a nice place, on the coast. It was only an hour and a half from London. And it had a fabulous maths department. And I guess, when we did the tours of the departments, that was the one that I felt most at home at. And I'm still there. [laughs] So, who knows?

[13:42]
Have you got any special memory of those years?

Of the university years?

Mhm.

Well, there are two distinct parts, undergraduate and postgraduate, because they're very different types of studying. I mean I, I just adored university. [laughs] I mean, I love learning. And I, you know, I... I, I had a fabulous maths department, and, fabulous degree. I have, had a circle of friends who I've kept in touch with. And, I didn't know I wanted to do a PhD, at all. I, I think I thought, I was pretty certain I wanted to teach actually. And I started applying to teacher training. I went to some interviews at, for teacher training, postgraduate training. And, at the time my boyfriend was at Loughborough I think. So I applied for places near Loughborough. He's someone I met when I was at school. And, I wasn't going to stay at Southampton. But one of my lecturers said, 'Well you're going to get a First. You really should consider doing a PhD.' And I didn't know what a PhD was. I had heard of this thing where you got a doctor, but everyone said it was very difficult to do, and I really fancied going out and earning some money so I could buy clothes. And, and then they started talking to me about it, and I thought, another three years at university, that would be nice. And, another professor said to me, 'Well, you'd be really good at doing a PhD. You have to understand, this won't guarantee you a job at the end of it, but you'll have three wonderful years doing it.' And he was so right. I loved my, I did pure mathematics. I always went the pure maths route. I, I loved, I absolutely adored the abstract world, and my PhD was in algebraic topology. And, really, that's just you, your brain, and in those days, a pencil and a piece of paper. I mean that was all you needed to do pure mathematics. And a good supervisor, which

I had. And I, again, it was a great social life. Very different to undergraduate days. But, I did a bit of teaching as well, as postgrads do. I taught maths to engineers actually, which helped me get added tutorials for maths to engineers. That helped me get my first job. But... And then, in my third year I met my now husband.

[16:14]
At university?

At university. He was a physicist. Yes. He was doing a PhD and I was in maths doing a PhD. And we met playing darts.

At a pub?

Well at the students'... At the, staff bar actually. We... Back in those days the teams, it was in, it was, they had to have at least one woman on the team, that was the rule. I was quite good at darts. I wasn't token. But the physicists didn't have many women, they didn't have... So they borrowed me from maths. And... [laughs] And that's how I met my husband. It wasn't, you know, we didn't start going out straight away, but that's, that's how we met. Yes.

[16:50]
So, what is the first computer you remember, the first time you have heard, or you saw a computer? Like, when you heard about or you saw a computer.

Well, saw, it was a big mainframe. And in those days, you know, [laughs] they were huge. These vast rooms you couldn't go into. So the idea of seeing a computer. You saw a computer *room* really.

And do you remember which one?

Oh yeah. It was... Oh I can't remember what it was. [pause] I suppose it was a... Well it was either ICL or IBM. Now you've got me. And it was, it was in the computer room at Southampton. And my, the person who became my boss at the computer science department later, Professor David Barron, he was the first professor

of computing at Southampton, and he taught us FORTRAN as part of the maths undergraduate course. And I absolutely hated it. You know, you wrote... You were asked to work out the area of a triangle, and then you'd put, I don't know, 20 punch cards into the system, and it came back a day later to tell you, you had missed off a full stop. [laughs] And I was just... I wanted to be in the maths world, right. This is... And as soon as I found out that this wasn't examinable, I just, stopped doing it basically.

Were you punching your, your cards, or did you assign that to someone else?

No, I did it. I did it. But as soon as I realised that this wasn't going to count to whether we passed the first year or not, I stopped worrying about it. And just, and focused on the maths. Little did I know, I was going end up in the computing department. But, I just didn't, that wasn't what I, at the time that just all seemed too fiddly, and, I would much rather be doing the algebra than actually... I've always said to people, I'm a mathematician, not a calculator. I love the abstract.

[18:42]
Then, what did happened? So how did you end up...

So, I couldn't get a job as a... When I got my PhD in the August of 1977, and... So, a pure maths PhD doesn't qualify you for an awful lot, except, I don't know about nowadays, in those days, you know, going and being a, a lecturer in mathematics. And, I applied for several jobs in good universities, good maths departments, to be a maths lecturer, and didn't even get... There were hundreds of people looking for jobs like that. The universities were contracting at the point actually. So I managed, I got an interview for a job at Durham University. I will say Durham, because this is the archive. And I went to Durham University, on the train. I was interviewed to teach maths to engineers, a one-year, temporary post. And I went into the interview room, and it was just, you know, I don't know. It's a bit, my memory is a dozen men, but it probably wasn't that many. It was probably half a dozen professors, male professors. Because there were mathematicians and engineers. And, I did the interview. And those were the days, when you finished, when... they kept everybody in the same room, and then... So when you finished your interview, you went back into the

waiting room, and everybody waited till the end of the day, and then they came out and told you who had got the job. And they'd offer someone the job, and if they didn't take it, they'd get... You know, basically, they kept you there till someone had accepted the job. That was how it used to be in those days. So we waited. And they came out, and said, offered the job to a man, I guess it was, obviously accepted it. But the head of department, the computing department – sorry, the head of the maths department, there wasn't a computer department then, came over to me and he said, 'Wendy, can I have a quiet word?' And I said, 'Yes, sure.' And he said, 'I actually wanted you to have the job, you were the, you were the best mathematician we interviewed. But they wouldn't give it to you because you're we woman.' And, he said, 'I don't think...' 'They didn't think, the engineering professors, that you would be able to control a class of male engineers.' Right? So I was 24. I suppose I had a miniskirt on, I don't know. I can't remember. But I, I just, in those days, accepted it, because, we weren't as conscious then of issues of bias. It was just like, it, it seems so weird to say it now, but I didn't go, oh I'm going to report you to anyone for saying that, because there were no laws of equality in those days, and, none of the diversity that, you know, everyone has to go through now, in terms of the way you treat people, and... I mean, there's still problems with women getting jobs in science and engineering. But it has, it's not as, it was not as overt as it was in my day. And I, that was my first sort of, inkling that there was an issue about being a woman in this world. I hadn't really thought about it before. I had done my PhD. I was the only British female student I think doing a PhD in maths at Southampton. There were women around, but they weren't from, they were from other countries. And...

Which countries?

Oh, there were, Indian students. I don't think there were any Chinese in those days. One of my best friends today is a lady from South Africa, Judy Bishop, who, we did our, she was computer science PhD when I was a maths PhD. But I didn't really notice the fact, you know? I didn't, it wasn't, I just wasn't aware of it. That was the first time. And even then I thought, well, didn't really want the job anyway, don't want to be in Durham. So, that's fine. But, it's stuck with me to this day.
[22:42]

And in fact the week later I had an interview at what was then Oxford Poly, for the same sort of job, teach maths to engineers for a year, and, I got it. So that was my first job. And then, that was only for a year, and I then applied for a job... Because by that time, Pete, my husband, who I met playing darts, we were then an item, and he was working in Southampton. And so I was looking for jobs nearer Southampton. And, there was a job at what was then, it was La Sainte Union College of Higher Education. It was a teacher training college, run by an order of Catholic nuns. But that's by the by. And, they wanted someone to each maths to people who were going to be teachers. They were going to be secondary teachers. So it wasn't the job I wanted really, but it was a job, and I, you know, I was enthusiastic about it. And it was a good, very good training. And that's where I met my first personal computer. And my head of department, Jack Thomas, bought a Commodore PET, and, because he could see the future, and he said, 'Wendy, you've done a maths degree. Well you can do some computing.' And my, I sighed. He said, 'We need a BASIC, you know, BASIC programming language course, for next term. We really ought to start teaching this.'

[24:06]
What did you think? I mean, your last experience with computers was...

Well, I was quite interested, because it, there were no punch cards and paper tape sort of, involved. And I, you know, we went through the demos, and it was all fairly interactive. And, I could, I began to... I wasn't really interested in computing per se, but I, because I was in an education sort of environment, I really, I thought, really... I, I thought, well this could be useful in an education environment. We could do things with this that, to teach people maths. And, so I took it, I took the Commodore PET home for one summer, and taught myself BASIC. And as Edsger Dijkstra famously said, 'If BASIC's your first programming language, you're mutilated for life.' And I think I, I think he was right. Because I've never really been a programmer. And there's two things in that. I'm an abstract thinker. So what I'm good at is thinking about what computers are going to be able to do for society, for people, for the future. I don't worry so much about how we're actually going to program them to achieve... I just assume someone's going to be able to do that. So I, of course, I mean I... In fact, we, I taught myself BASIC, and with someone called John Layman, who was the

geography teacher at LSU, we planned the first courses, computing courses, for the students, our teacher training students, and... And then the BBC Micro came along, and that was much more interactive, and had the graphics as well. And by then, boy, and we were building all sorts... Well I, again, I didn't do the coding. John did some, and we paid people to do it as well, to actually write simulations of engineering, like, running a power station, running a, a, you know, a national grid, we did simulation of that, with power stations coming on and off, and the weather. Making people turn their heating on, so, we needed more power, and all the estimates of what you would need. And, it was fabulous stuff. And it was so, such an interesting way to teach about electricity supply and demand, and, you know, it was so powerful to have that. So, I got very interested in that.
[26:27]
And, I then thought, well if I'm going to do this, I really want to do it properly. So I registered for a master's, MSc in computing at City University. And...

In London.

In London. And I, it was a one-day-a-week course for two years. And LSU, the college, supported me to do that. And I came up here to London one day a week, and learnt about computing. I learnt Pascal in those days it was, I learnt programming, and compilers, and operating systems, and all the, you know, what was considered a core computing course in those days.
[27:05]
And then, actually, basically, at the college, the Government were beginning to say that anyone who taught teachers had to have a postgraduate teaching qualification. And I didn't. But I had a PhD, and an MSc in computing. So I thought, actually, I'm going to have to look for something else. And Southampton University was advertising, as all the universities were then, this was 1983, the Government was funding lots more computer science students at universities, and Southampton was advertising for lectureships. And I got one. So I started back at Southampton as a computer science lecturer in January 1984, and, my maths professors... Because maths was... Computing was in the maths department in those days at Southampton, and the maths professors thought I would come round and, come to my senses and go

back to maths eventually. But, no, I stuck with the computing. And look where it's got me. [laughs]

[27:58]
Did you work outside the UK at some point? Did you go...

[pause] Yeah. Well, I had a sabbatical, at the University of Michigan.

Which year was that?

'89. So basically, I went to Southampton in '84, and spent, well, the first four or five years learning how to teach undergraduates programming, right. And, I also did, because I had the theoretical sort of background, I did things like, I taught theoretical computer science as well. I talked about Turing machines, and, you know, as I did the theoretical computer science course, I taught, I got very interested in Prolog as well. And the PhD students, because this logic... So I actually did start in AI. I've rediscovered that lately. I got interested in two things. One, Prolog as a language, because, it appealed to my mathematical abstract ideas, to have this logical program language. And, and I was supervising students in concurrent Prolog and things like that. Which seems light years away now. But I also got very interested in, I saw videodiscs, right. Laser videodiscs. And I saw videos on a computer screen, that you could interact with. Oh, wow, just think what you could do with education, like in education. So I started to play with the discs that were around. There was one on the anatomy of the knee that came from London, University of London, a crazy guy called David Clark I think it was, produced it. Everything you wanted to know about the knee and were afraid to ask. And boy, in my later years, has that been useful. So that was me working with the anatomy department in Southampton, to design teaching around that videodisc. Then I did something on cell biology; then I did something on history. So I was doing several things there. One is, learning how to use computers in an education context, and also, interacting with different disciplines, which has been the story of my career.
[30:03]
And then, I also had got this idea about hypermedia. I had been to MIT. I had visited MIT for conferences, and I had got very interested in the work of Seymour Papert,

who was the Professor of Epistemology in, in the new Media Lab. And I had learnt from him ideas around Logo, which was the language to move turtles around the screen. I read his book *Mindstorms*, which was, you know, absolutely... All this was very fundamental in me getting excited about how you would use this to teach, to teach kids, about all sorts of things, but in particular programming languages from, from Logo.

[30:48]

And, while I was at MIT, I met people who were doing hypermedia work, and through that, it's a bit in the distance now, is when I discovered the work of people like Ted Nelson and Doug Engelbart, got me into the ideas of hypermedia. And it was at that stage in my career that I went to, I got a sabbatical for six months, and, we went together, my husband and I, to Michigan. I went there because he, he was working for a company that had a sister company in Troy, which is just outside wonderful Detroit, in Michigan, and I got a place at the University of Michigan. And there I met people who were doing amazing stuff, with videodiscs, in education, and it was like, I didn't need permission to do it there. In the UK there was quite a lot of resistance, including in Southampton, where one professor told me once that, if I carried on doing this multimedia, hypermedia work, there was no place for me, either in Southampton or in computer science. Because it wasn't computer science. But David Barron supported me. He was the, he was the head of department, and, with me. So I, I... He supported me to go on this sabbatical to Michigan. And I was, I got permission there to do... You know, it was like, permission in my head to do this type of work. Because they were all doing there. And I met so many people, who, you know, have been so influential in the rest of my life.

So in a few days there will be celebrations for the university of 'The Mother of All Demos'.

Yes. 'Mother of all Demos'. Yes.

[32:22]

And, so what is your memory of Douglas...

Doug Engelbart? Well, I met Ted first, Ted Nelson. He, he invented the terms hypermedia and hypertext. And, I heard him speak at a conference, and didn't know how well I was going to get to know him. He was just this guru, crazy guy. I can't remember the first time I met Doug. Probably at a hypertext conference. But I became personal friends with both of them. I mean Doug unfortunately is, is dead now. Ted's still alive and kicking. We celebrate the fiftieth anniversary of the 'Mother of All Demos', Doug's demo of his two-handed mouse, live on, over a network, in San Francisco. And it was such a seminal moment in the history of computing. And I was able to weave it into my teaching in terms of the hypertext research I was doing, but also, the HCI, you know, the whole, how you interact with computers. In those days, HCI was revolutionary. Because, everybody had learnt computing by, you know, control line programming, and, you know, it was so revolutionary to interact with computers in any other way. We really didn't, you know, think about the fact we'd have it all on our mobile phones, that sort of idea. And we had no digital video or digital anything. You know, we were, we had to write the, or someone had to write the code for the video to be displayed on the computer screen.

[34:58]
Do you remember any episode with Ted Nelson maybe?

[pause] Oh, so many. Well, I had a... We... Ted and Doug came to Southampton several times. Ted, well, he's getting a bit, doesn't travel so much now, but he, he was, he did, spent a sabbatical a long, a whole year at Southampton once. But Doug came and visited when they were in, over in the UK. And I had a... I've had many... I have many memories of Doug. But the one is when he and his new partner, and Ted and his partner, came to our house for dinner. I had these two men as friends in my house. And that was the dinner party of a lifetime. My husband still talks about it as well. The memories, the... We have one photo of it. But, everything else is just in my head, and the things they talked about, and, [sighs] I was so lucky. I've met so many amazing people during my career. But that, that is a fabulous memory to have. [laughs]

[35:06]

So, after six months you returned to the UK.

Yes.

And then what happened?

Well, I took off I suppose. I, I... I got my promotion to senior lecturer. And I think also, I got the acceptance that the work I was doing was, well it's now called pioneering, but was interesting enough to be supported at Southampton. And, I mean Southampton has always actually supported what I wanted to do post that moment. And then, I, I... It was just, in some ways it was the right thing at the right time. This, this, the whole what we now call the digital world was about to take off. And, this was the beginning of hypertext, and I, I came back from Michigan, and we started designing... I had started before I went to Michigan to design Microcosm. Because I knew I wanted to build a hypermedia system that enabled people to find information. And I wanted to build it in a way that... I was inspired very much by a TV documentary called *Hyperland*, which was produced as part of the *Horizon*, BBC *Horizon* series, and it was, it was talking about videodisc and that. And it was demoing it. It was a simulation of what it would be like to be able to point at one thing, and, or even ask a question of a computer and get a video back or a, you know, like we do all the time now. And it was a, it was a TV documentary. And I was, I wanted to build a system that enabled this type of, you know, you ask for something and you got back... You ask for, you know, I need a, I need a picture of Turing, and you get back 1,000 pictures of Turing, or a video of, something, or... And, so my Microcosm was designed to enable people to find the information they want when they wanted it, in a multimedia information system. And, I started designing it before I went to America, and got lots of ideas at Michigan. Came back. One of my postgrads wrote the first version of it. And we were demoing it at the end of 1989. Which was the same year that Tim wrote his manifesto for the Web.
[37:36]
And I met Tim Berners-Lee at the first European hypertext conference, which was in December 1990. So we were there giving a paper about Microcosm, and he was there talking about what was to become the World Wide Web. He hadn't actually called it the World Wide Web then, although I think they had decided on the name. And he

put the first website up in 1990 at Christmas, just after that conference. So I've known him ever since that point. And really, then, for my career, I was able then to build... I was of course doing, I was doing management jobs at Southampton. I've done all the things junior lecturers have to do, to work their way up through the system, teaching all sort of stuff. But, I kept this, I got this research strand. And it was, just began to take off. It was just, because the digital was about to arrive, digital video, and, you know, digital everything was about to arrive. We were, there were all sorts... I suppose we were working on Windows computers then. So we moved into a Windows environment. And, I got my chair in, I can't believe it now, 1994. So it was quite a fast track. When I came back from America it was quite a fast track.

[39:00]
And in 1994 you were the first female professor.

At Southampton.

At Southampton.

Of engineering.

Yup. So what was the experience?

Some people say I was the first, I was the first... I... Yeah, it was the first female professor of engineering at Southampton.

Yes.

Oh well, I was, well, both proud and a bit intimidated really, because I, it was, it was a very weird, very very male-dominated environment. I mean engineering departments still are. But in those days, it was, if you walked into a committee room, you were always the only woman there. And it was better when I became, made a, when I was made a professor, [laughs] there was a bit more sort of respect. But it was, it, it was hard, it was quite hard, yeah. But... But, you know, good for Southampton, they made me a professor. It was a long time before there was another female professor at

Southampton though. Another, ooh, I don't know, ten, fifteen years before there was another female professor. There was a female professor of physics as I recall. [pause] I, I... I don't know who the first female professor of engineering in the UK was. But, yeah, that was, it was the beginning of... Because at that point, once you become the first of something, then you start getting invited to be on committees and all sorts of things.

[40:19]

But the big turning point in my life, around then, I got the chair, and then, Howard Newby was the Vice-Chancellor at Southampton, and he recognised some potential in me, and he gave, he basically gave me a year's research fellowship. He awarded some sort of, vice-chancellor's research fellowships. I think he did three of them. And he gave one to me. And, that enabled me to, it gave me the time to write the proposal that got me the EPSRC Senior Fellowship. And that was a five-year fellowship, which in fact, I had it for six years because, some, I did a REF panel in the middle of it. But, that, that's really what was my springboard to where I am now. Because that was five years, just to do research. And that was when... Because what I wanted to do was take Microcosm and make it into a intelligence system, and that's when we created new posts, and we had Nick Jennings[?] and Nigel Shadbolt came to Southampton, and that's when we created the Intelligence, Agents, Multimedia Research Group. And, that gave me the space to think about what I wanted to do with Microcosm. But of course at the same time the Web was growing. So we had to develop the Web version, and we became a Web research group as well.

[41:47]

But, additionally, the other thing that is amazing, the EPSRC, they gave me this research fellowship, and then they said, 'Would you like to be on the council of the EPSRC?' That, I was... [exhales] Nowadays, you have to be elected and, you know. I just got a phone call from Richard Brook, who was the Chief Executive at the time, and he said, 'We're looking for some new people for the council. I'm told you would be a really good addition to the council. Would you be willing to do it?' [laughs] Of course. It was the turning... It was... Because it got me into the policy realm, and I was really quite young to be doing that. And, that... So I was both an EPSRC Fellow and on the council, determining the policy of the EPSRC for research. And that was the beginning of my policy work.

So, the year 2000 was an important year for you, because you were elected Fellow of the Royal Academy of Engineering, and you also received the CBE. Would you like to share some memories of the time?

Yeah, well, these were seminal moments again. I, I never thought I'd achieve these sorts of things. The Royal Academy of Engineering, people started talking to me about it. I knew my nomination had gone in. For the CBE, it came totally out of the blue. I got that for the work I did on the EPSRC Council. But I just got a letter out of the blue from the Prime Minister at the time, Tony Blair I think, to say, 'If the Queen is minded to give you this award, will you accept it?' And I know everyone's the same, they feel the same about, about this, that, they think, well… A lot of, some people turn it down, but, you know, most people are excited by it. And the day at the Palace with my parents and my husband was just, amazing, getting the CBE from the Queen was amazing.

[43:03]

The Royal Academy of Engineering was more about status from my peers, and, I got that for the work I did on Microcosm, which was the hypermedia system we built, which was a much more sophisticated hypermedia system than the Web, but, it was proprietary, and closed in the sense that, in the context of the Web, which Tim had made open and free for everyone, so everyone could use it, and that was so important of the development of the Web and everything that's come since. But in Microcosm, we were actually, you know, we, our links for first-class entities, so, we described the reason why a link was made between two objects, and stored that link record in a database, we called a linkbase. And… We patented that actually. Not that it gave us any money, but, it was very innovative, and actually prescient of the semantic work, because it was all about inferring information from links. I didn't know that at the time, and, Tim and I used to talk about these things, and, didn't really realise we were talking about the same thing, which is madness now.

[44:20]

But, that's, that's the work that my Royal Academy of Engineering nomination was based on. And, and so that was really, that was the first sort of, beyond the EPSRC Fellowship, that was the sort of, status symbol from my peers, and I was one of… There were very few women in the Royal Academy of Engineering then. I think there were only, something like fifteen or sixteen, seventeen Fellows, female Fellows of

the Academy in those days, out of about 120. It was… It's different now, it's getting better. But, in those days that was quite a thing.

[45:38]
And, from 2003 to 2004 you were also President of the BCS.

Mhm. Well I was beginning, in the late, in the Nineties I started doing things for the BCS. And, I think my first role was Chair of the Publications Board, I think, and then I worked my way up through Council and Vice-President to President. And, and I was, as I was working, working my way up, I mean this is all volunteer jobs, but, I was at the same time saying, I was prepared to be Head of the School of Electronics and Computer Science. I didn't, I didn't really expect these two things to come together. So I became Head of School in 2002, and then, I agreed at the same time to be President for 2003-2004. And I thought, well that's OK, I'll get a year under my belt as Head of, in fact it was the *Department* of Electronics and Computer Science then, and I'll be President the next year. And then, our Vice-Chancellor at the time, Bill Wakeham, decided to restructure everything at the university, so I had to transform a Department of Electronics and Computer Science into a School of Electronics and Computer Science, with completely different governance rules, at the same time as being President of the British Computer Society. Which I wasn't expecting. But I was, I'm a great believer in seize the day, and I thought, if I don't accept the presidency now, then it might not be offered to me again in the future. So, I just knuckled down and did it. And I had a fabulous year being President of the BCS.
[47:17]
And I enjoyed, absolutely, being Head of Electronics and Computer Science, but I wasn't sure I wanted to do a management job. And, I, while I was Head of Electronics and Computer Science, we unfortunately had a major fire at Southampton. It was an accident. [laughs] That sounds bad. We… We lost two buildings. And this is not… It was a horrible time. It was very traumatic. I was in New York at an ACM meeting, and I got the phone call saying, 'Wendy, your building's on fire.' And I thought they meant, you know, where are the keys? And, I said, 'No, I'm in New York.' Yeah, and named someone who would have the keys. They said, 'No, Wendy, we've lost one building, and there's another one might go.' And, 'Well, is

anyone… Is everyone OK?' Well it was a Sunday, it was Sunday morning. Well, it started overnight, Saturday/Sunday. So luckily there was nobody in the building. Or maybe unluckily, because maybe if there had been somebody in the building they might have raised the alarm quicker. And it was started by a spark, electricity spark, they think, by something overheating in our labs. And, I rushed back, and it was, you know, I then I had to spend the last two years of being Head of School really recovering from a fire disaster. You know, we had, we had to… So, we had to keep running, teaching, doing research, with two buildings lost. And it was, yeah, quite, quite an interesting leadership learning experience.

[49:36]
In 2005 you received the UK Fawcett Campaign for equality between men and women prize. They named you as an 'inspired woman'.

[laughs] Mm.

And, in 2006 you received the Anita Borg Award for Technical Leadership.

Well all this is going on you see whilst I'm Head of School dealing with the fire, right. So, these are the things that keep you going, these awards. The Fawcett one was for the work I do on, trying to encourage more women into computing. And I've been working on that ever since I can remember. I wrote my first paper about the lack of women in computer science in 1988 when my colleague Gill Lovegrove and I realised that we had no women at all on the three years of our computer science undergraduate degree. And there had been women on before, and there were plenty, you know, there were, quite a lot of women were in computing in the Fifties, Sixties. But, it all changed in the Eighties when the personal computers came out and started to be sold as toys for the boys, because that's all there was to do with them, and… And, in those days it was, it just, changed the culture quite, incredibly quickly, to being one that was a science culture, to one that was a geek culture. And we've never really got over that in the West. And I've, I think it's something… I mean I didn't really… I've never shifted… It's so hard to shift the dial on this, and change it. And, you know, here I am, 30 years later, after that first, that paper I wrote, I mean, you

know, we're still struggling to encourage more diversity in computer science. So that was a, that was a great award to get.

[52:01]

And the Anita Borg one actually was for leadership. That was for leadership of a technical team. So that was exciting, because, two things. It was for, it was for… It was a technical award, but also it was in America. It was an American organisation. That was, recognition by my American peers was fabulous to get.

[52:21]

In 2006 you also became a founding director of the Web Science Research Initiative.

Yes. So, this was something that the rest of my career in a way has been based on. This was with Tim, and, the story goes that… Well that sounds bad. It sounds like I'm making it up. But this is what, [laughs] this is how it went. I had always sort of, been interacting with Tim, and we, we had met, you know, regularly at conferences, and we were at the Hypertext Conference in New York in 2004. And, to cut a long story short, he basically said, he was finding it hard to get people interested in the Semantic Web. And, he knew… By that time Nigel Shadbolt was at Southampton, and we were working on a project in this area, advanced knowledge technologies I think it was. And, he, Tim said, said to me after a dinner, 'I need a European base,' because he was at MIT at the time, 'to help me build the Semantic Web in Europe. You know, could you do that?' So, Nigel and I got on a plane, and went to Boston to meet Tim and his colleague Danny Weitzner, who in fact was a lawyer, and in another part of his life was Deputy CIO at the White House for Internet policy.

[54:38]

And this was 2004. And we started talking about what would make a difference to get people interested in the Semantic Web. And that took us back to looking at how the Web itself had grown since Tim first started it in 1990, put the first website up. And, we were trying to think, well how, what would shift the dial in terms of getting the Semantic Web, or the Web of Linked Data, moving more? And we, we realised that, that actually, the evolution of the Web had not, wasn't just about the technology. I mean it sounds stupid to say it now, but it was like, we've got to, we've got to bring other disciplines into this, to study, you know, we've got to understand this from a point of view of people, human behaviour, society, economics, law, politics, you

know, mathematics. There's so many disciplines that, that the evolution of something as, this whole, a sort of connected network of computers and then software to enable people to interact with information and each other. Because by the time we were talking about this, Facebook was just starting, social networks were just beginning to start. Because, we had interactive browsers. And we… So we, we decided, [laughs] rather naively, to start this thing called, a new discipline to study the Web from an interdisciplinary point of view, and we called it Web Science. And I always say, there's two things I hate about Web Science, one is web and the other is science, because it sort of, implies you're only studying this thing called the Web, you know, the http, html, which implies technology, and science to a lot of people implies hard stuff. And actually, we were using science in the terms of knowledge, and the Web in terms of a, you know, a connective network. We couldn't call it network science because that term had already gone, and that was a much broader thing, to do with the mathematical understanding of networks. And so, we called it Web Science. Might have called it connectivity science in another, if we had thought about that earlier. And we… This was launched as the Web Science Research Initiate between Southampton and MIT. So initially it was just the two universities working together to grow this. And then we evolved that into what's today called the Web Science Trust, which is a not-for-profit organisation that encourages the socio-technical interdisciplinary approach to the study of this, you know, the Internet, Web, digital ecosystem actually. And we would be applying it to AI as well. I mean it's a, it's a, a much broader thing now than when we started. And also, then that led eventually to the development of the Web Science Institute at Southampton, which is Southampton, sort of, the centre that I now run, or, the institute I run at Southampton, as our instantiation of this whole activity.

[57:48]
In 2008 you were made Guest Professor at Tsinghua University in Beijing in China..

Mhm.

Can you tell us more about that experience, with the East?

Well, I still… That was the very beginning. I had… Oh excuse me. [taking a drink] I didn't realise it was as early as 2008. I had forgotten that. I, through the University of Southampton I've always enjoyed international travel, and, I was in Hong Kong, and the university said to me, would I go over to Shenzhen in China, which is just across the Causeway, if you know your South-East Asia geography, to the new area, the new economic area the Chinese were building, Shenzhen, which thirty years ago was a fishing village, and now it's like, the fourth biggest city in China, might be bigger than that. And it's all about innovation and tech. And Tsinghua University had a graduate school there, and they were looking for collaboration with universities with common interests. And I went over to see them, and they, I told them about Web Science, and they got very interested. And so we started a collaboration. And then, that's when I got my guest professorship at Tsinghua. And I have stayed, I am now, I go two or three times a year to China, maybe more these days. I love it out there. And I have a very good collaboration with Tsinghua University. There were professors over this week from Tsinghua to Southampton. I'm on their advisory board now. And that's led me to all sorts of interesting adventures in China in terms of collaborative research, policy work and so on.

[01:00:27]
And in 2008 you were also elected President of the Association of Computing Machinery, the ACM.

Gosh. That, that same year as well? Mm.

And you were the first non-North American to be elected to the role.

Yes, I was. There was a Canadian. I can't say I'm the first non-American to be President, because there was a Canadian lady before me. But, yeah, I was the first person from outside North America.

North America, in terms, America the continent.

Yeah, exactly. So that's why we, we used to sell it, pitch it that way. And I had pinged from, pinged, my work with the BCS Publications Board had brought me to

the attention of the ACM Publications Board, and I, it's another one of those phone calls that come out of the blue, from the then chair of the Publications Board at the ACM. I don't know if I, I can't remember, it must have been, five or six years before I became President. It all happened so, you know, it started to happen so fast. And he just said to me, 'Wendy, would you like to be on the Publications Board of the ACM?' And, I asked him what it entailed, and it seemed I could do it. And that was the beginning of my work with the ACM. And again, I went through the whole, quite quickly, the same as with the BCS really, I went through… I guess, when I, when I get involved in something, I, I give it my, a lot of energy. And so, I climb quite quickly. And, that's why I'm always so busy. Because I don't, I don't say yes to things and not get engaged. So, I went on the Council, and then, I got elected as Vice-President, and then President. And that was, oh, a fabulous two years. It was in between my two big… I was building the Web Science work up, so my research work was all about that, and working with Tim and Nigel and Danny, and then others, Jim Hendler and people come in, and building a global network of websites laboratories. So, it worked for me to have an ambassador role for the ACM as well, because, when I was travelling round the world, I could talk to people about Web Science and then the next day would go to an ACM meeting. And while I was President of the ACM, we set up three regional councils, one in Europe, one in India, and one China. And so I was helping to internationalise the ACM. Because although the ACM is a global organisation, a lot of people think the A stands for America. It doesn't. It stands for the Association of Computing Machinery. But because it's based in New York, people feel it's an American organisation. And my push as President was to really internationalise it. So those three things were my legacy to the ACM. There were other things as well, but, those are the main ones. And I am, I've, you know… That took me, of course, all round Europe, but, to India and China as well, as President of the ACM.

[01:03:33]
And in 2009 and 2010 you received other prizes. You were promoted to Dame Commander of the Order of the British Empire.

Yes.

And you were elected Fellow of the Royal Society. And also, in 2010, Fellow of the ACM.

Oh gosh.

For the contribution to the Semantic Web and Web Science.

Mm.

And for service to the ACM and the international computing community.

Well the latter speaks for itself. I… I felt like, I couldn't try and be Fellow of the ACM while I was President, so we waited until after I was President to, to get my nomination in. And of course, that's huge, because that's, you know, an international body. But, well, in terms of peer recognition, the biggest honour is the Fellowship of the Royal Society, that is the pinnacle in the UK, and to some extent in the world. I mean the Americans have their equivalent, which is NAS, but the Royal Society has been around a long time. And I'm hugely proud of that. Because you, it is fiercely competitive to get in. And it's something I never… I didn't even know they let computer scientists in, to be honest with you. And we've only recently got our, a computer science sectional committee. Because computer science came under, it was split between maths and engineering in terms of elections. I obviously went through an engineering panel, but, the… When you get into the Royal Society, and you are asked to be on the selection committees for, you know, for the new nominations, for new members, or new fellows, that you realise how hard it is, and no one believes they ever manage to do it. And that was fabulous. And that takes me places, both the Royal Academy of Engineering, I was Senior Vice-President for them as well, and I was on the Council of the Royal Society. So I, I've done, you know, I get engaged with them as well. But they open doors for you; it is quite amazing, the places they take you, and the committees you get on, the working groups you get on, the international travel you can do, to go to meetings around the world. I'm currently Chair of the Publications Board of the Royal Society. So you see, I've, there is a theme running through this. I've, you know, another part of m has done a lot of work

on open access, and digital… This is the digital library work that I am, I am so interested in, the evolution of publishing in the digital world.

[01:04:08]

And then, the Dame, well, it's special isn't it. There haven't been many dames, compared to the knights who have been around since mediaeval times. And, so, yeah, that was… My mother was still alive. My father had died by the time I got that. I don't think my mother… She came to the… We had the, that investiture was at Windsor, so was, my mum, my husband and my brother came. And, the wonderful thing about Windsor is, it's much more intimate than Buckingham Palace. Buckingham Palace, you go in, and, and the Queen's, it's a throne room, one of, and she's up on a, quite a high dais, with a throne behind her. Not the big throne, but a throne. And so she's quite high up. And because she's a little woman, she's lovely, and she's quite high up, and you, you look up to her. And it's all gold everywhere. Windsor, it's all gold everywhere, but it's much lower, it's a much more intimate room. You're right there. And she's on a much lower dais. So… And she actually comes down off the dais for people who are in wheelchairs, or, whatever. And, so my mum was in a wheelchair for that ceremony. And, so we drove up to the, to the castle. Because, I had asked, I said I wanted a wheelchair for my mum. So they let the car through, right up to the castle. And we arrived on the day. And my mum was determined not to get in a wheelchair. [laughs] And I said, 'Look, you won't be able to deal…' And this lady came out in a uniform, and she said to my mother, 'I am looking after you for the day. Here's the wheelchair. I will take you round everywhere.' So it was like my mum was getting the award. And it was fabulous. So she gets in this wheelchair. She get taken up in a lift; we all have to parade around the castle. And then, of course she gets front row seat, because she's in a wheelchair they took her right to the front. So she was as close to the Queen as I am to you. And I can't tell you, that made her life. [laughs] Made her day certainly. Yeah, it was very very lovely.

[01:07:01]

So you received other prizes in the following years. [both laugh] Like, particularly you were assessed as one of the 100 most powerful women in the United Kingdom...

Yeah, how… [laughs]

…by Woman's Hour.

Woman's Hour. Mm.

On BBC Radio 4.

Mm.

And…

So… Oh go on. Go on.

And, also in 2016 you were made the Kluge Chair in Technology and Society at the Library of Congress in the US.

OK. So let's, let's compare and contrast those two. So, one of the 100 most powerful women in the UK, *Woman's Hour*. That was fabulous. I mean I, you know, you have, they have judges, and they, how do they find who are the most, the 100 most powerful…? In some ways it's, it's a, it's luck that you get on these lists. It's who knows you, right? But, what they're trying to do is, raise the profile of women. So people can't say, 'I need a speaker and I don't know any women so I'm going to invite, you know, the men I know.' And it's all about the… They've just done another one this week, the Inspiring 50, for women in tech, this week came out. And that's all about raising profile. And to some… I mean of course it's flattering, but actually, I want to win the prizes the men get. And… [laughs] And… So I, it's a very mixed blessing. Because I don't want to be known as a *woman* in technology. I'll say this because I'm in the BCS and everybody knows how much I love the BCS. When I got the Distinguished Fellowship of the BCS, they did two awards that year, one to me and one to Martha Lane Fox. Because, up until then there had been no women made Distinguished Fellow of the BCS. I know this because the President at the time talked to me about it. And… And I had already made the point, there were no women, but I was hardly going to nominate myself for it. And, so they awarded the two to Martha and myself. And when they sent me the press release, it said,

‘Wendy’s a very famous,’ you know, ‘one of our most well-known women in computer science.’ I said, no, I’m not… I’m not getting this because I’m a woman in computer science. I’m getting it because I’m a well-known computer scientist who happens to be a woman. And that is so… And of course they didn’t mean it in any bad sense. It’s just the way it comes out. And this is this, you know, we’re… So we’re the top 50 women in technology, we’re the top 100 most powerful… But there’s still thousands, there’s thousands of men much more powerful than us. You know, it’s always… It’s this difficulty of, publicity, raising profile of women, so that you can get more women out there, but at the same time, putting women in a box marked ‘women’, when actually what we want to be is in the same box as the men. So I just want to make that point.

[01:10:38]

Now, the Kluge is completely different. Again, this came out of the blue. I love these most of all, right. I love things I don’t expect. I got a phone call. Usually the big things come by phone, even these days. You occasionally get an email, with a big thing on. In the old days, in the old old days it was a letter, right. But now it’s usually a phone call if it’s something different and big. And the Kluge Chair, I got a phone call from someone at the Library of Congress to say, ‘Would you come and spend some time at the Library of Congress and be our Kluge Chair in Technology and Society?’ I knew nothing about it. And when I looked into it, I realised that they wanted to pay me to spend some time in Washington at the Library of Congress, playing around with their archives. And, to me as someone who had cut my teeth on multimedia archives, I was so excited to do this. And then, actually, when I got there, my husband was excited, we went together, and we spent, three months in, 2016, in Washington. Gosh. And, and then I started getting into the whole… Because I’ve always been interested in digital libraries. So I started when I was there, not just looking at their archives, but actually helping them, working with them on how they create a digital library out of what is a fabulous archival library. And I’ve, you know, I was on the Board of the British Library here as well, and I loved doing that. But to actually spend time in, we both had a fabulous time in Washington, and loved it. And I really enjoyed my time at the Kluge Center. And I’m now still advising the Library of Congress on their digital strategy. I still stay involved. It’s one of my favourite places in the world. Yeah.

[01:12:28]
In 2017 you were co-chairing a major UK government review of the country's capabilities in artificial intelligence.

This was another phone call, totally out of the blue. I… It's interesting. As I talk today, I am realising the wonderful phone calls I've had. Some of them I do say no to. [laughs] But this one was, out of the blue. 'The Government wants to do a review of AI, and would like you to co-chair it.' And, I had… Of course, there are all the questions, how much time, you know, and when's it got to be done by, how much help will there be? But it all happened quite fast. And of course, I mean it was so interesting, because, this whole AI thing, the current AI revolution. I mean AI has been around a long time, there's lots of it out there, but there's this peak in terms of machine learning, deep learning at the moment because of the, the data availability and the computer processing power we have these days. And also, it's the timeliness of all this coming together. And I think also there was a, the, the people who ran Davos, run the World Economic Forum at Davos, Schwab wrote a book called *The Fourth Industrial Revolution*, which I think he gave to all the world leaders when they went to Davos in January 2017, and they all came back thinking, gosh, we've got to be, we've got to something about this, this AI revolution, because, we're going to, otherwise we're going to end up losing all the jobs, and all the jobs will be created in America and China. So, that's certainly… So I think that's part of the spark.
[01:14:59]
And, so yeah, I… You know, I found myself on March the 1st 2017 in Number 10 with my co-chair, Jérôme Pesenti, being briefed on what they wanted us to do. And we had to deliver it in four months, by the, they wanted a draft by the end of April. Two months. And they wanted the final set of recommendations and the, you know, as much finished, finished, the report finished bar the ministers' comments by the middle of July, so the ministers and their staff could take it home to read over the summer. And then it was published in October 2017. But even more exciting than that, because at the very beginning, on that March the 1st day in Number 10, they said, 'If we get this right…' And this was a team effort obviously, I mean we had a secretariat that, you know, wrote the words, we steered and managed and, the whole thing. 'If we get this right,' they said, 'this can become a Sector Deal.' I had no idea what a Sector Deal was. [laughs] And it was all to be part of the Government's

Industrial Strategy, which we've heard so much about in the last year. And they wanted to create some new sectors. And, you know, a sector's usually vertical, it's transport, or it's health, or it's pharmaceutical, or it's aeronautical. And, so the idea of… I mean they have a life sciences one as well. But the idea of an AI sector, where AI is about infrastructure really, is quite, was quite novel I thought. And, so, they announced this Sector Deal in November 2017. The recommendations were accepted, and there was funding for it in the Budget in 2017. And then the Sector Deal itself was announced in April this year, 2018. And it has Greg Clark, Matt Hancock, my signature, and Jérôme Pesenti's signature, against a one billion pound Sector Deal, of which £300 million was new government money. And, a joke at the time that, I sign this off. If the Government defaults, do Jérôme and I have to find the money? But they assure us we don't. [laughs] So… It's just… You know, it's a, you know, that will go down in history. That's, you know, very fulfilling.

[01:17:59]

And now, I'm still working to implement it. So I, I'm… I'm not a business person, so, the AI Council, which we will, will be announced soon, which was part of what we once said in the review, will help manage this, these developments of what we recommended in the review. That's in the process of being set up. And, Tabitha Goldstaub was named as the chair of that, and I was named as the UK AI Skills Champion [laughs], which is… It just, yeah, means I can stay engaged basically with what's doing, what's happening. A lot of which has been done through the BCS.

[01:18:02]

In the report, you also give a lot of importance to the Alan Turing Institute in London.

Well, it seemed to us that… The Alan Turing Institute had been set up as the Data Science Institute. It was actually in algorithms. I mean, when you read when it was first set up, it was really to try and boost the AI's ability in algorithms, because they, the people who wrote the report out of which the Alan Turing Institute emerged, could see this data, AI thing, coming, and knew that we had to be better than we were at… We have a great, fantastic legacy in AI research, but they, they sensed a gap in algorithm development, design and development. And that coming together with the data, the emergence of all the big data, was really what brought the Alan Turing Institute about. They gave it the name Alan Turing, which is, you know, a fabulous

name for any institute, and of course he's credited with the, you know, really, being the grandfather or godfather of AI, because of his, his papers, his, you know, 'can machines think?' papers, and, paper. And, he… Sorry. Not he. We, we felt that… The Alan Turing Institute is funded in quite a peculiar or novel way, whichever you want to think of it, has some government funding, but a lot of the funding comes from universities. The Crick Institute is funded similarly. So, the Government asked universities to invest in this. And the universities get something, get researchers and PhD students and projects back. And, it is quite hard for the institute to work out what it does that the universities don't do, when actually, the universities are putting money into it. So it's, it's… It's not like an institute that has its own employees, that… I mean it does have employees, but they are usually, often from, or, the universities that fund the institute, or they're coming from projects that they've got with universities. And… But we felt that, if we tried to set up… We needed some national institute, and we felt we couldn't set up a separate… It just was the wrong time to try and set up a separate AI institute.

[01:21:14]

So, it was quite controversial, because the Alan Turing Institute is embryonic, it doesn't yet have a, it's not achieved its full potential yet. It's, it is growing, it is in start-up mode, and here we were, giving this start-up, this unproven start-up, more kudos if you like, more… And as a result, more funding. And I think that makes it, a) it's the natural thing to do. Why would you have a separate data science institute and AI… You know, I mean, nationally it makes sense. And also, it just enabled the Alan Turing Institute to bid for a whole lot of government funding around AI that will make it stronger. It still has a long way to go in terms of finding its raison d'être, but, we can already see how it's… I mean it has the right name for a start. [laughs] But, you know, the fellowship programme that we talked about in the review will be run through the Alan Turing, so, the fellows that are recruited to help boost the AI research in the UK, and supervise all the PhD students that also came out of the review, the extra PhD students in AI, the fellows will be based at universities, but they'll, it'll be coordinated through the Alan Turing, and they'll all be Turing Fellows that will be coordinated through the Alan Turing Institute. So only time will tell if that was the right decision, but that was, that was what was approved at the time.

[01:22:47]

Now a very personal question. What was your proudest achievement during your career?

Oh. I suppose… [pause] I mean I think of my mum at the dame, the damehood ceremony at Windsor Castle. But I think, it has to be the Royal Society, because it's a peer thing. And it's so competitive to get in, I think that, for now, that's my… [laughs] But I do enjoy, my world is very international now, and I love travelling around visiting places, and getting recognition from my peers around the world now, as well as in the UK. I find that very… I still, there's still lots to do. [laughs]

[01:24:26]
Is there anything you would do differently if you had your time, and why?

Be a doctor. [both laugh] I don't know. As I said, maybe that will have been a wrong decision. I don't… I like to say no regrets. You never know. When you make a decision about whether to accept something, a job, or, you know, a role on a committee or whatever, or not, you, you can't go back and say, well if… You know, I've made my… You can't go back and say, what if. You know, I made decisions, and I went that way, and it hasn't… It's… I've… You know, it's hard to think of anything I've done that I haven't enjoyed. I mean we all have things for the day job that you sometimes don't want to do, but, I've loved my time, I love Southampton, and that's why I've stayed there, and it's always given me what I've needed for my career. I've loved the voluntary work I've done. Io do… I've always… Actually, we haven't talked about it, but I've always been an entrepreneur, I've always had companies that I've started. I've never made a lot of money out of them, because, I've never wanted to work in them. I've always started it off, spun it off, spun it up. And, I like to get the technology we develop out into the world. But I don't, I'm not a bus… I'm not an entrepreneur, I'm not a business person in the sense that, I'm going to give up my life to run a company. I enjoy my non-exec directorships very much, and I really enjoy nowadays the policy work I do, the AI work I've done for the Government. And now I'm doing for other governments, because, when I travel… I say, why I like the peer recognition, I'm getting asked by other governments to do AI policy work for them. And that's very fulfilling. It's that recognition, that, they want my advice on something. So I enjoy that sort of thing. My, my difficulty is, saying

no to things, and, slowing down a bit, rather than, keep on spending so much of my time working. But it… You know, somebody once said to me, it's only work if you don't enjoy it. And I, I still do enjoy it very much, so it doesn't feel like work a lot of the time.

[01:27:38]
Mhm. So what do you think are the biggest challenges and issues related to IT, and maybe particularly AI, for the next five years?

Five? So, OK, so that means we don't have to worry about general AI, because we won't get to general AI in five years. I, I do honestly think that, there's so much going into the development of the new, of technologies. We will see huge leaps forward. And we have got, you know… What's in the research labs today will have, in AI and other digital technologies, will be impacting the world in 20, 30 years' time. So, you know, it's, it's… It's constant change and development, very exciting ways. But of course, there is this, we are… It's a whole different type of life in a digital world, and, the balance between the obsession we have for our mobile phones, and, and doing stuff with, with other people, with your family and your friends, is, is a difficult one, and the whole… The issues for me are very much about, has always been about how technology and society work together. And, diversity is hugely important to me. I think in AI it's even more important than software, just general software engineering, because of the issues of bias, and… I find it fascinating going to China and seeing the way they are rolling out the digital world with the, taking the surveillance approach to life. But there are things they do that make life a lot safer on the Internet for their citizens, that, you know, and if you accept that the Government is watching you, they do stop bad things happening. And it's, it's a very different culture to us. So I really think we need to collaborate more, not see them as, well we don't like what the Chinese are doing, so we're not going to talk to them. Because they are going to be so dominant. They're scaling up in AI and digital technology in a way that will make them very dominant, now, in, certainly within the next five years. So we have to learn to work with them. And that's, that's going to be quite challenging, because culturally we are very, very different.

[01:30:56]

So what do you think about, like, will happen in 20 years? How do you think these will impact society?

I think… I will be stupid to say I knew. I don't. [pause] There are amazing opportunities, and the upside, we could have, AI could, you know, get rid of all the boring [laughs], monotonous jobs, so that, people can enjoy the work they do. I think AI will create jobs. We have to make sure there isn't a, an underclass of people that can't get employment. We have to re, almost renegotiate the social contracts, and we value the things that people do that, that computers and robots can't do, like, you know, the emotive, caring jobs that, you know, are a long way off any robot being able to do. And we have to value those jobs. We potentially could have, you know, we could have, we could potentially save so much time with AI doing the boring, monotonous stuff, the repetitive stuff, and go down to a four-day week. Could. I mean the Industrial Revolution led to the five-day week, or six days and then five days, and, you know, we could. But we, it's that whole, what's the balance going to be between people and machines? Now in five… In 20 years, 30 years, we might be closer to some general AI, or at least an AI that can outsmart most humans. Not necessarily have the way, the full range of thought processes that we have, but in particular circumstances can outsmart human beings. And we have to be ready for that, I believe. I don't think we can ignore it and think it won't ever happen. Because I think it could.
[01:32:57]
And there is also a scenario that the Chinese will run our Internet. And… Or the world's Internet. And, we need to think about what that means.

In terms of privacy?

Well, data protection, privacy. Our, our culture. So, I mean I, I, that's on my mind a lot at the moment.

The relationship between West and East?

Mhm. Yes. Very much so. Very much so. But then we're… [whispering] I want to get my train.

[pause in recording]

I am not going to miss my train.

[01:33:36]
So, Karen Sparck Jones said, 'Computing is too important to be left to men.' So, would you like to give some special advice to women entering IT?

Well and men too. I think, the think is, Karen Sparck Jones, what she said then, I say now. AI is too important to be left to men as well. To be left to experts actually, I say. I think that, she said that not to denigrate men, but to say, it's really important that, this is so important that everybody needs to get involved. And, so we need, we need balance. Now, there's a lot of debate, and people… It's so hard to get women interested in coding, and, in the East, women, yeah, you walk into a computer classroom in India and it will be more than 50 per cent women. And, there's whole issues around that, deeply cultural. We… And, you know, the other extreme, and Silicon Valley is toxic for women, dreadful environment for women to live in, work in. And, we need to get that balance right. And we, it may not be in the West that we can get lots of women onto computer science courses, but we absolutely need to get women in the workforce, doing the things that they enjoy, so that they can ensure, get engaged with the development of AI algorithms to make sure they're balanced and fair and, you know, when we start talking about accountability of algorithms of AI, that we have interdisciplinary teams, and interdisciplinary teams will get women in, because if we have philosophers, social scientists, psychologists involved in this, then, we will get a mix of disciplines. And I would just say to people, this is the future, and this is where the, the top rank, top paying careers are going to be in the future. And you can, you know, you can change the world by being an engineer. So, you know, get involved.

Thank you Dame Wendy, it's been a real pleasure talking to you.

Good. Right. I have to go.

[End of Interview]