Alan Burkitt-Gray

Interviewed by

Richard Sharpe

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By Zoom

Welcome to the Archives of Information Technology where we capture the past and inspire the future. It's Wednesday, 20th September 2023. Now, I'm Richard Sharpe and I've been covering and been part of the IT industry, first of all in computing, since the early 1970s. And I must here give you a disclaimer. I know this man rather well, because I worked with Alan Burkitt-Gray. He was wise then when he was young and he's wise now, and he brings his years of expertise in covering and researching information technology to the fore. Now, Alan, you were born in 1951, which was a good year for computing – with a small 'c' – because the first, 1951, the first business application was launched in the LEO machine out at Cadby Hall.

In Hammersmith, yeah, yeah.

The first Japanese computer. IBM UK was formed and the Whirlwind Early Warning System was operational in the USA, by which IBM bootstrapped its way into the computer industry. What were your parents doing when you were born?

My… I was born in a very small town in Yorkshire, called Goole, which is a transport hub, as we would call it now. So my grandfather, my paternal grandfather worked on the railways, he'd just walk ten miles along the railway every morning to make sure that it wasn't falling apart. My maternal grandfather was chief engineer on the railway shipping arm going across the North Sea. My mother was, she met my father when she was the secretary in a bottling company in Goole, and my father was actually at one stage company secretary of the bottling company, so he was training to be an accountant or a financial person and it was a very small company in a very small town.

And had your father and mother been educated sufficiently?

They, because they were both, they were born in '25 and '27, I mean these days they would go to university, even if they'd been born 20 years later they would have both gone to university, but neither did. My father was, ooh, he was, what, 14 when the war broke out, so he finally joined the RAF in the Pay Corps in about 1944. My mother worked, was going to… worked for an insurance company in Hull and again,

didn't… She started her tertiary education much later in life and she trained to be a teacher, but that was when she was about 40.

Did you have brothers and sisters?

Yes, one of each. My brother is a retired civil servant with a house in Greece and another house in south London. My sister is also a retired civil servant, living in York.

Were your parents interested in your education?

Erm… they were keen on it in the sense of pushing me, were very happy when I passed my eleven-plus, and when I did my O levels, as they were then, and A levels and went to university. So I was, on my side of the family was the first to go to university, thanks to that huge expansion of tertiary education that you and I are both of the same generation that's benefitted from. I went to Leeds and you went to Canterbury University, didn't you?

I did.

Yes. So we're exactly the same era that we benefitted from. So they sort of pushed, yes, but they didn't help with homework and things like that. My brother and I just went on up to our bedroom and did our homework every night and that sort of thing.

What were your subjects at secondary school?

Well, I developed an interest in science and technology in about the fourth year of secondary school, which I think, I can't remember what they call it these days – year 12, year 13? I don't know, I can't remember. I'm out of touch, all our kids are grown up. So I did physics, maths and further maths for A level.

Why?

[00:04:44]

I'm not sure. [laughs] Because I think it was… I was interested. I mean this was when there was a whole lot of stuff going on in the Apollo programme and all that sort of thing and I thought it was probable. I was interested in science, I had been interested in physics at school, and I decided that was probably something I should do. But I did… I remember one of those fairly ineffectual careers meetings that schools have and universities have, and I've never been to an effective one in my life, and I remember talking to the head of science, or it was I think the head of year, and he said what do you want to do, and I said something in physics. And he sort of just blocked it, really had no contribution, no useful contribution to make, and it was just left. That was my conversation at school about careers. But I was interested, I was interested in physics. I enjoyed it and I enjoyed, I enjoyed at that stage the maths, so when I went on to university I enjoyed it less so.

Was it like on a conveyor belt, you just went from school to university, it was going to happen?

I didn't, because actually I had what these days what would be called imposter syndrome and I really didn't believe that I would get good enough A levels to go to university, so I didn't actually apply in my second year of sixth form. I thought, oh, I don't know, and nobody picked up on the fact that I hadn't, which is interesting. It was Doncaster Grammar School, which is now called Hall Cross College? Or something like that. I can't remember, Hall Cross something. Hall Cross Academy, I think. But nobody was interested really, nobody picked it up, and I came back with three good, in those days, good A level results and said right, I'm now going to apply to university once I've got my A levels, and I did. I hung around at school for a term, for the first term of the, a sort of extra third year of sixth form – they were rather surprised to see me. And started applying for jobs, as a gap year, really. So I got, wrote to lots of people, they had some very handy careers guides and I applied to lots of people and got a job with a company that was then GEC-AEI Electronics, which made radar equipment in Leicester. So, went down for an interview in January, basically started a couple of weeks later as a student apprentice, which gave me £10 a week salary, £10 a week wage, in cash, and also a, I think it was a hundred quid a year

for my student years. Which made me relatively rich, because the student grant then was about a few hundred pounds living expenses, so yeah.

And tell me about this apprenticeship then, was it like a sandwich course, or what?

No, it wasn't. It was supposed to be, they pretended it was a sandwich course. They pretended that, but it wasn't. I just got, shadowed what was called the Progress Department, which was interesting, it was a factory making electronic equipment, mostly radar equipment for the Navy, Type 42 destroyers and things like that, and we went round, I went round with this guy, just checking that that had been done, and that had been done. And it was electronic assembly, but it was also machine tooling, it was bits of metal, it was plating and all that sort of thing. It's a factory that doesn't exist any more, it's a housing estate now in Blackbird Road, Leicester. And it was interesting to see, it was the first proper time I'd been into a factory. So no, it wasn't really a course. Though much later, a couple of years later I went back, because my father died of kidney disease while I was doing my first-year exams at the… so I basically missed the last part of my exams and I was also fairly stressed out in the first part of my exams, so I thought right, I'll take a year out. I went back to what had by then become Marconi Radar Systems, for a year and they sent me off to what was then Leicester Poly, is now De Montfort University, to strengthen up my maths, I went once a week, a morning a week to Leicester Poly to do a maths course. Came back after that end of year exams, doing well, and went back to university for my second and third year.

So they were quite flexible?

Yeah, they were. Yes. I mean, and I did stuff, you know, I was in there in a purchasing department and I made phone calls, you know, called people to say, we have ordered something, where is it, and why hasn't it been delivered, and all that sort of stuff. So got a taste of office life.

[00:10:00]

At university, were you into sport?

Never. I'm not interested in sports at all.

Right. What were you interested in?

The last football match I saw was the 1966 World Cup Final.

Right. What were you interested in?

So I've avoided sport 57 years since.

And what were you interested in?

I was interested in, I've been interested in archaeology, but not that stage. I joined the astronomy society, I joined… I became interested in the environmental future, joined a conservation society and another organisation that was worried about what science and technology is doing to the planet. I didn't at that stage join the Green Party, or whatever it was called in those days, but I was rather more environmentally interested than most people at that stage.

That was quite a political era at universities. Were you political?

I wasn't in the parties, or any student parties or anything like that. I was friends with lots of people who did, I mean I was a fellow traveller probably, but I'm not sure who I was fellow travelling with.

When you left, you graduated did you?

I did, yes. Yes. But the time at Marconi had basically told me that I was not cut out to work in the industry. I mean, firstly I found it very tedious, very boring, doing the same thing week after week after week, I mean I was in a test department at the end of that second period I spent at Marconi, which was testing lots of little bits of things that were about, I don't know, five, six centimetres across, cubes, really, that were power supplies for submarines. This was 60 years ago so it, you know, I hope the Official

Secrets Act is still okay. But… and I decided this was not for me, and I could see other people developing circuits on the bench in the factory floor, on the factory floor, and I thought, no, I don't think I'm going to do that. I really didn't know what I was going to do, until the last summer holiday, at the end of my second, before my third year, and as part of the environmental organisations I was at at Leeds, we organised a conference and we hosted a conference for, the National Union of Students wanted to do an environmental conference and thought we were the most organised student environmental organisation in the country, so would we host it for them. Which was great fun, and we had a couple of hundred people coming to Leeds, sleeping on camp beds in the university gym, and there was, as a result of that, one of the speakers there was Maurice Frankel, who was later the Director of the Campaign for… oh… oh yeah. I've forgotten, what was the campaign for? He was basically campaigning for privacy legislation and things like that. But at that stage he was running a small organisation called Social Audits, based in Poland Street in Soho in London, which was a strange building that was a home to a bunch of different organisations. There was the UK division of Friends of the Earth was in there on a different floor, there was Gingerbread, which was a campaign for single parents or single mothers, in that building. It was some building to be in. Anyway, he was running an organisation that did environmental surveys and he was doing one on a government organisation called the Alkali Inspectorate, and he wanted people to go around their local areas in that summer holiday, for about two or three months, and find out what was going on in the area. So I said, yeah, okay, I'd volunteer. They just paid expenses. And I went round with a clipboard, and I suddenly realised – I'd been a very shy person – I just realised, if you'd got a notebook and a clipboard and a pen you can wander the streets and you can knock on doors and you can talk to people, and you can say to people hanging their washing out, are you getting any problems from this factory that's right next door, or this power station or this coalmine, or you could go and talk to councillors and heads of public health, medical officers of health at the local councils in my area, which was Doncaster, Rotherham, Sheffield.

[00:15:08]

And I got written about in the local newspapers and I got picked up by Radio Sheffield, and they did a live interview with me on Radio Sheffield, and I thought,

this is actually quite fun, you know. I know about technology and I know about this sort of thing, but I also can write. So at the end of this process, almost just about meeting my deadline, as ever – you will know that well – I had to write a long report on what I'd been doing and what my findings were, which came to about 20,000, 30,000 words, and I just bashed it out on an old typewriter that my father had brought home from the office a few years earlier, and thought, I rather like writing. Went back to university for my third year, thinking I don't know what I want to do, I don't want to be an engineer, I don't want to go back to Marconi, this is not for me. And I talked to the careers advisory people at Leeds University, who were as hopeless as all the careers advice people I'd been talking to, you know, since I'd been, since I was at school, and they said, oh no, stick to the electronics. Don't go into the media, that's no future. So I thought, oh dear. And then I had a moment of – if I didn't say, I was doing physics and electronics at university, so I mean I was steered towards that for the future. And then there was one evening in my student flat and I'd been reading *New Scientist* since I was about 15 or 16, and I just flicked to the back, to the job ads, and I'd never done that before, and there was this job ad from a company called Morgan-Grampian, based in south-east London, saying are you graduating in science or technology or engineering this year, if so, would you be interested in training to be a journalist. And so I thought, ow, this is me, this is what I do. I am about to graduate in physics and electronic engineering and I would love to write. So I applied and I went to an interview in April, I think, 1973, and got a job offer, which was fantastic. At this point I also applied to various other people because I thought, I didn't even know that the business press existed, or the technology press, you know, well, you don't, these things appeared on tables in libraries, you've no idea how they're put together. So I got two job offers, but actually chose the one that had started my interest, which was Morgan-Grampian, in Woolwich, Calderwood Street, Woolwich. It's now a block of flats, I mean the building's there, they've just turned it into flats. So it's a rather horrible 60-year old grey building looming above Woolwich. But it's where I started and they did, they took me on. They did a course, they sent me to the London College of Printing, which is now part of the University of the Arts, London, at the Elephant, Elephant and Castle. Taught me about printing, taught me about journalism, taught me about how to structure stories. And of course, in that period of training I worked on a number of magazines: *The Engineer*, I worked on the subs desk at *The Engineer*, I went to work for a magazine called *Electronic*

Engineering quite recently. Got my first foreign trip. Because, you know, in those days a lot of people didn't do foreign holidays, but I got my passport and I went to Paris by myself for an electronic components exhibition. And this was, yeah, I realised I'd taken the right decision. And 50 years later, this month, September, it's 50 years since I started out in Woolwich at Morgan-Grampian as an editorial trainee.

When did you meet your first computer?

Sorry?

[00:19:10]

When did you meet your first computer?

Oh. Oh, at university. I, because I did physics and electronics, we'd actually got exposed to the University of Leeds computing department. I wrote a couple of programs in ALGOL 60, whatever it was. Although I didn't then pursue that, and it wasn't really until after I wrote about computing when I was a journalist, my first years, certainly when I joined the *Engineer* magazine and John Mortimer, the editor, basically thought I was going to be the correspondent for the electronics industry and the computer industry, but it was really how it was serving the engineering industry. But that was good because it did expose me to computers. When I actually started using a computer was at the next office to you at VNU in Frith Street, in Soho, when I was editor of *Informatics* and we'd managed to cadge some early personal computers, SuperBrains, which ran off CP/M. And we'd managed to get a deal, yeah.

What do you remember of your first coverage of your first news story and you thought, ah, this is it?

The first one was, yes, it was interesting. It was an idea from the editor who said, oh, look at this, he'd been pitched by a PR company who made, was responsible, whose client made depleted uranium, which you might have heard, which is basically what's left over when you get some enriched uranium from nuclear power stations or bombs, and what you're left over on the other side is depleted uranium, because it has less

content of fissile material, it's less radioactive, but is still a bit radioactive. And at the time the British Nuclear Fuels in Cheshire was saying, well, this is just waste, can we do something with it, and they were used, were pitching it as armour, because uranium is the heaviest naturally occurring metal. As armour, as weights for golf balls, to make your golf balls heavier, which apparently is important, but I don't know. They were using it for all sorts of reasons, or rather they were investigating lots of reasons. And I thought this is quite interesting. And in fact, I was at a meeting while I was researching this story, I talked to somebody from, someone in the nuclear industry, it might have been the Nuclear Protection Board, or whatever it was called – it's probably changed its name – and this press officer said, oh, yes – in a casual way – this is a stupid use for fissile, for radioactive material. So of course, I quoted him. I found out later at a meeting, entirely unconnected with it, I was talking to somebody who also worked for this agency, and he said, oh yeah, he got fired, because he shouldn't really be talking out of turn and he shouldn't have said something like that. So I thought, mm, interesting. But, you know, it was…

Power.

Yeah, well, quite, and rather salutary because it was something, you know, this person was speaking accurately, you know, this was a stupid use for radioactive material and you were just distributing it into the environment, you know, to the edges of golf courses where golf balls got lost, and it was full of still radioactive depleted uranium. And it was a stupid use and the industry was out of control. And I thought, well, this is interesting. So probably what I wrote did influence policy, at least it made the nuclear regulators more careful about what British Nuclear Fuels could do.

This is 1973. Ethernet had been developed, 16-bit microprocessor from National Semiconductor, ICL launched the 2903, and, IBM launched the DL/I relational database.

Well, yeah, and I can comment about that, because actually, the following year's 1974, was when I joined *Electronic Engineering* magazine, and I realised how my university education was already out of date because we had not done anything about microprocessors. [laughs] Absolutely nothing. We'd done sort of basic AND and

AND gates and stuff like that, but nothing about what was about what everybody was then calling the next Industrial Revolution. I can't remember whether it was the second or the third, but anyway. And that was the cliché that Intel at the same time was developing, and I thought, bloody hell, I've just graduated last September, or last July rather, and we didn't touch microprocessors at all, and this is what's driving the industry today. It showed a slight – more than a slight – a significant disconnect between university and industry. They were not teaching their students what was going on.

[00:24:42]

Right. What type of other story did you do when you were at Electronic Engineering, The Engineer *and then helped to launch* Electronic Times?

Yes. Well, it was… there was a lot going on, because if you remember what happened, was happening at the time. One of the best stories I did, I did quite a lot of stories for *The Engineer* about the microelectronics industry, and this was the time at which the US, thanks to the Apollo programme, but also thanks to Vietnam and some of those unforeseen, unexpected consequences, were putting a lot of money into microelectronics, Intel and Motorola and National Semiconductor and GI and all the other companies, getting lots of money from the Pentagon and, you know, DARPA, to develop microelectronics. And the British industry, which were people like Plessey and GEC and Marconi and a few others were saying we're not getting any money, we want lots of support as well. And I was covering that and I was talking to people and I knew really well people in companies like Plessey, and I was talking about what they were doing. And of course, they were doing the classic British technology industry thing of doing stuff under contract for various divisions of the Ministry of Defence just for the defence market, not for the global consumer market. And the difference in the States was they got lots of money from the Department of Defense, but then they went on to explain, develop and exploit consumer applications. But the Brits didn't, they thought, right, we just send, every month or every quarter, we just send the Ministry of Defence our bill, how much we've spent, and they will send it back plus a percentage. Costs plus. Classic, that's how contracts worked in those days if you were developing something for the Ministry of Defence. And I did this

article about really the Brits in comparison with the States were not going into consumer markets, they were really just working as developers for the Ministry of Defence and just getting costs plus back as their funding and they weren't being persuaded to develop and investigate consumer applications or industrial applications. And then one day I got a phone call from a guy called Peter Gillibrand, who was the head of communications at GEC, and GEC was then a few years into that huge merger that had been pushed through by the Industrial Reorganisation Commission in the late – or Corporation – IRC, in the late sixties, brought together English Electric, GEC, Marconi, AEI and a number of other companies. At the same time hived off the computing division to create ICL. But the rest of it was the electronics, not computing. And this had all come together in this sprawling monster called GEC, but it had lots of different identities, including Marconi, including AEI Semiconductors in Lincoln and so on. And I just said, you know, almost a throwaway remark in this article, that the British companies were not doing very much, they were just, they were taking the money from the Ministry of Defence and spending it on defence projects, but not going into commercial applications or industrial applications. I got this phone call from Peter Gillibrand saying, oh, would you like to come and look at our research labs in Wembley, in the Hirst Research Centre, and you could talk to Peter Clayton? I think it was Peter Clayton, who is the head of research. He was what you'd call today a CTO, he was head of technology in the whole GEC empire, working directly for Arnold Weinstock who was the CEO. And I went up there with Peter, went into this extraordinary research lab, which was huge. I mean this is where so much work had been done in the Second World War, for example, it's where the magnetron radar device had been developed, having been invented at Birmingham University, it was then industrialised for use in airborne radar equipment in the Second World War. And I got a complete bollocking – excuse the language – I got a complete bollocking from Clayton, the head of research at GEC, who said I was completely wrong, but in this tirade against me just proved I was totally right. That in fact they were getting all their money from the MOD and they weren't going into commercial applications and industrial applications. They were just saying thank you very much, Minister of Defence, you know, we'll spend that and then we'll send you our bill next month. And they were doing fairly ineffectually jobs of developing electronic equipment for military applications that they would just sell to the MOD and they wouldn't sell into the wider world, and they usually ended up, because of the

way it was structured, spending far more than it was budgeted, which is why, you know, to this day, military contracts in the UK usually are up two or three or four times what the initial estimate was, especially radar contracts and stuff like that.

[00:30:34]

Why did you move from Morgan-Grampian, apart from to get away from Woolwich?

[laughs] Well, getting away from Woolwich wasn't… yes. Well, I, you recruited me, Richard, that's what happened. [laughs] You recruited, you advertised for a news editor, because you had been news editor and Alan Cane had left to go to the *FT*, and you'd become editor and you wanted a new Richard Sharpe to be news editor. And so I turned up at an interview and I met you and I met a few other people. I met – who was the head of editorial at what was then Haymarket, but was rapidly becoming VNU? The guy who edited *Management Today* who was on…

Robert Heller?

Yes, yeah.

Robert Heller.

Yeah, I went in his little office, and then you offered me a job, so yeah. So in 1980, yeah, September 1980, I came and worked with you.

But why did you move? Why did you take the bait?

I think I had been at Morgan-Grampian for seven years. Now, I was at *Electronics Times* as news editor and had helped to start it, and I had met Joan, who was a reporter there, and we got together and 40-something years later we are still together. But, the person who was the head of *Electronics Times* was not somebody I respected and I didn't like the way he was doing things.

1980 you moved across.

Yes.

Wasn't it, 1980?

It was, yes.

Yeah. Quite an interesting year. Relational technology is pushing out Ingres, and I always wondered why they'd chosen a French painter as the name of their product until I realised what it meant. And also the industry is becoming aware of itself, because Tom Forester edits The Microelectronics Revolution*, which I think was quite a seminal book, and IBM was then planning to launch a PC, and going about it in a completely different way from its vertical analysis and research and development, going out, getting somebody to write the operating system, getting BASIC onto it, and getting someone else to provide the microprocessor, hence obviously eventually developing the Wintel architecture. And that's quite a change from the life down in Woolwich to the life in Soho, which is where we were. Tell me about it.*

Oh no, it was great. Well, I did a book as well, or rather my colleague and I, who had been on *The Engineer* together, and then I was on *Electronics Times*, Elaine Williams, as she was, Elaine McClarence as she is now. We were coming back, one of the problems in Woolwich is that it is half an hour's train ride from central London. I have no idea why they put it in Woolwich, it was a complete failure. But then, IPC also moved its publishing to Sutton, in the other direction, equally inconvenient. It meant if you were at a meeting at lunchtime, meeting somebody for lunch, and you finished at about 2.30, by the time you got back to the office it would be about 4 o'clock, given that there were only about two trains an hour in those days. It was a complete… it was one of those stupid accountants' decisions to move somewhere, in the days before the internet it did matter where you were, it did matter. It was great being in Frith Street in Soho, because it meant you could pop out round the corner for lunch and you could be back at your desk in just over an hour, and you could meet all sorts of people and go to press conferences and things like that without it filling the day. But one day Elaine and I were coming back on the train and we were recognising that most people did not know about the implications of silicon chips that

were then being developed. So we decided to write a book about it. Unfortunately, I mean we did write a book, it was very heavy work, it came out in, I think it was 1980 or 1981, and… but two other people produced books on exactly the same day from different publishers, both about the micro revolution. So we had three competing for the market, but it was quite good. So, you know, it was a significant year for me because we produced that book and it got me doing different things as well and thinking about the wider context of what was going on. But it was a time at which the world at large was starting to think that these silicon things were probably quite important.

[00:35:39]

As you moved into being news editor first of all, this involves not writing as much at all, not interviewing people much at all, but a lot of management.

Yes.

What is the Alan Burkitt-Gray method of management?

[laughs] Eating lots of Mars Bars and swallowing lots of Anadin Extra. It was the busiest and most stressful job I've ever done, bar none. I mean it was, coming into the office on a Monday with almost a clean sheet of what was going to go on pages one, two and three of *Computing* that week. One, two, three and four of *Computing* that week. Doing pages two, three and four on Monday, getting them typeset, reading them, and then doing page one first thing Tuesday morning, using this magic technology called a fax machine. But it just shows how things have changed in the years, the 40-odd years since then. I mean we had, what, a team of eight or nine reporters, and four production people, subeditors, including Liz Anderson as chief sub, and some very colourful characters. We had Steve Connor, who sadly died a couple of years ago, who did great things on *The Independent*. We had Peter White, who is still flourishing, but I think with a consultancy. And we had a number of other people working for us at the time who were absolutely superb and first thing on a Monday morning you'd have, we'd have a meeting at 10 o'clock – we didn't start first thing on a Monday morning – at 10 o'clock, and people would list the stories that they

were going to do. And some people had some great stories that they would deliver, and some people had some great ideas that they didn't deliver, and you had to manage that through Monday because by the end of Monday you had to have three pages laid out and sent off to the printer on the train to Carlisle where it was printed. Because they were typeset in London and sent by Red Star parcels on the train from Euston to Carlisle, where it was printed, because we were huge. It was, what, the biggest weekly publication in the UK. We did 100,000 copies, and they were about 96 pages, tabloid pages, impressively laid out. Great pictures, lots of lovely pictures by photographers like Tony Sleep that we sent off to press conferences…

Dougie Firth.

And three or four pages we'd also earlier, at the end of the previous week we'd done the pages inside as well, from page five and six onwards. And that was a day when we had features and news, what, about 30 pages in a 96-page magazine. The rest was job ads, which shows how the industry has changed. You don't get job ads in print any more.

Guy Kewney was there as well, wasn't he?

Guy was freelance and he came in and did a PC page every week, yeah. Yeah. Yeah.

I remember he said that when the BBC Micro came out, I remember him chortling because he knew in advance that it was going to go, not to Sinclair, but to Acorn, and Acorn were going to make the BBC Micro. Which is, I think, a story you would have edited.

I probably did. Yes, I remember that time when the BBC was going to choose what product it was going to have as the BBC Micro. Yeah, and it became that. Acorn, which obviously then formed ARM, which spawned that whole, the whole software development and the dominant position of ARM in the semiconductor industry, even though we don't make semiconductors in this country any more, ARM, which is now quoted on the New York Stock Exchange, or NASDAQ, I can't remember, this week,

after a few years of being owned by SoftBank. Yeah, that was the beginning of that growth of a really powerful company in the industry.

[00:40:16]

You switched over to be features editor, did you not?

I did, yes. I don't know, you sort of decided to stir the pot for some reason, but yes. And I went to be features editor after Norman, because Norman went off to edit another magazine.

Well, I stirred the pot because I thought the news was getting so thin in terms of being immediate, and the features could have been written at any time in the last century, if you know what I mean.

Yes, yes!

So you nearly died of boredom, I think, in your first week of being features editor, and the previous features editor – who was it, I can't remember now…

… things on paper of pre-written features and you saw them and thought, ugh, yes. And ugh, not knocking Norman, but that, you know, a news editor, a features editor had to do that, but you don't know how big the paper's going to be until probably Monday, so you always had to have several in reserve. Yeah.

And whoever was the new news editor nearly died of a heart attack.

He had to do, yes… oh, who was it? Was it Graham? I think it was Graham, wasn't it?

Probably.

Yeah, who went off to do Egyptology, which is probably less heart attack inducing. [laughs] But yeah, and we did more newsy features, which is what I like and what I've been doing ever since, really. Feature analysis of news is a good thing, yeah.

Why don't we have Plessey and Ferranti around now?

Oh. Because… [laughs] Well, they imploded. I mean this country – and it's not just government policy, but it's also shareholder policy – that you basically try and merge companies, and nobody has created a good company by merging them. Ferranti died – there are all different reasons – Ferranti died because of fraud. It bought an American company called – I've forgotten its name, it's a long time ago – it bought an American company and then didn't do the due diligence properly and found that it owed billions of dollars, and so it imploded. It was Signal, Ferranti Signal something, it became. So a company that had really founded the electrical revolution in the 19th century along with Thomas Edison, the Ferranti family here in London just down the road from me in Deptford, and Edison in New York state, had founded the electrical revolution in the 1880s and nineties. Ferranti just imploded. Plessey also did the same thing a bit later. It bought an American company called Rolm – R-O-L-M – which it found, because it thought it had to get into telecoms, into modern telecoms, but it had to [sighs]… it bought the wrong company and it ended up looking very exposed. At the same time, they realised on the telecoms side, and we've already touched on the electronics side how they relied on the Ministry of Defence, on the telecoms side they relied on the British Post Office, which became BT, and the Post Office shared the contract for telephone exchanges between the various companies. So it basically said, oh, you build the one at Woolwich, the exchange at Woolwich, and we'll build the one in Putney, or something like that. And they just shared the work between them and there was no innovation, they were all built to the same design. And they all, every country in Europe just built for its own local operator. So you had what became Alcatel built France Télécom, which is now Orange. Siemens and others built for Deutsche Telekom as it is now, but was then the PTT. Ericsson in Sweden built for Telia, as it is now. They all built for their local operators, they all built to different standards, they didn't look for international sales at all. There was no aim to do international sales of telecoms, except in that controlled market. So System X, which is what GEC and Plessey, with some work from SCC, built for the

British Post Office, sold a few to various Caribbean islands which were part of the Commonwealth, or even still part of the Empire. And that's all they did. And I think maybe Jersey. I mean there was no global market for telecoms equipment in those days. They missed out on that, and so they lost.

[00:45:14]

And then BT I think was becoming, decided it ought to have a second source of telephone exchange equipment because it was relying too much on Marconi, or this new company which they then forced together, called GPT, and then became Marconi, picking an old name out of the company's history. They'd decided that they needed a second supplier and they went to Ericsson from Sweden and basically, the industry gave up. I mean they'd made too many bad decisions, bought too many dodgy companies across the world, mostly in the States, and really didn't know what they were doing. And the problem is, and I think the fundamental problem is that the financial sector, the City, don't understand technology, certainly didn't in those days, and the Whitehall and Westminster establishments don't understand high technology. I mean there is still only one MP in the House of Commons who knows anything about telecoms. He's the MP for Newcastle Central, who is a PhD from Imperial, or maybe UCL, I can't remember. She's a PhD in telecoms engineering and she has a lot of telecoms operations in West Africa and she knows what she's doing. In the old days there was one guy called – who's now dead – who was MP for somewhere else in the north-east of England who had worked for BT or the Post Office. They were the only people. Most of them don't understand a word of it. They come from a background which is, doesn't touch science and technology, doesn't require any understanding of science and technology. So they can get bamboozled by companies and then they don't… and then they take the wrong decisions. As we see today, it's like what's happened today, when Rishi Sunak, the Prime Minister, says, oh we need to ease down on the climate targets that the UK has adopted in phasing out petrol and diesel cars, and who is the first powerful opponent who comes along? It's Ford, because they say you've just screwed up our schedule. We were doing the most ambitious transition to electric cars in the whole history of the motor industry and you've just screwed it up by saying we're going to do it a few years later. Now,

Westminster and Whitehall do not understand technology at all. They are incompetent.

You left Computing *eventually.*

I did.

Why?

Well, there was, in the next office in the same company, *Informatics* wanted an editor and so I moved to be editor of *Informatics*. That had been a weekly, in some sort of great upsurge of interest in the market, for advertising, mainly for job advertising, but it had moved to be a monthly, and so I went to run that. But it also not only did a monthly magazine called *Informatics*, but it had the *Informatics Daily Bulletin*, which was an amazing operation, whose successor still exists, but in a different company. That was producing an A4, double-sided newsletter every day by about 5 o'clock every day, taking it round to a print house round the corner in Soho, and then who photocopied it a couple of hundred times, a couple of thousand times, and mailing it off first class mail from central London that evening, and it got to people's desk, certainly within the UK, the next morning. And in the days before the internet, days before the web, that was the fastest news service in the IT industry, because it would- and we had some great people. Tim Palmer, who was the editor of the *Informatics Daily Bulletin*, and the rest of the team, and we got some absolutely great stories, by dint of just phoning people up and being so close to people that they told us what was going on. But it was a lot of work, there was probably a couple of, two and a half thousand words on an average daily bulletin? I can't remember. It was very tightly packed. It was in WordStar, I think it was done. Extraordinary old technology. Printed on a daisywheel printer and then just literally photocopied and mailed out in brown envelopes. And we charged, what? £1,000 a year for this, one a day. I do know from newsletters, you know, the big effort is selling new copies. You always get some drop-off in annual subscriptions, you get some repeat subscriptions, but it's a very intense sales operation, so you need more salespeople than you do journalists. And it's very heavy work.

[00:50:24]

Then you went freelance. Why?

Well, I firstly went to, the company I used to work for, Morgan-Grampian, bought something called *Satellite TV News*, this was just the beginning of satellite television, direct to home satellite television, but also cable. Cable television was coming along as well. This was the early eighties, the government under Kenneth Baker, who was IT Minister, whom I've interviewed, you've probably interviewed, other people used to follow around at conferences and exhibitions. And he decided that the future of technology and communications in the UK was broadband cable television, which was for the time quite advanced, because there was none. The only cable in the UK at that time was for people who lived in poor reception areas and used to get it on little thin copper wires that had been laid in the 1930s to deliver radio, deliver the Light Programme and the Home Service, and it was adapted to deliver two or three television channels. And Baker and the rest of the Department of Trade and Industry was persuaded that this was – and the Home Office which then regulated broadcasting – were persuaded that we ought to have broadband television, which they didn't then know about the internet, I don't think, but they would deliver, they could deliver 20 or 30 or 40 channels. And so Morgan-Grampian bought this title from a guy in Derbyshire who was just called, he was just a satellite dish enthusiast and built his own satellite dishes to pick up such, the services that broadcasters were using to exchange programmes, so when there was somebody reporting from, you know, a conflict zone in the Middle East, they would use a big satellite dish to relay it back to the studio. And these weren't encrypted in those days because nobody had any encryption methods and nobody else was going to pick them up anyway, but there was quite a market for picking up these signals, and it was particularly in the US where the cable operators had been using satellite to distribute the signals around. So Morgan-Grampian bought this title, they then hired me to edit it, and I can't remember if they approached me or whether there was an ad in *Broadcast* or *The Guardian* media page. But anyway, I went to edit this thing called *Satellite and Cable TV News*, based in Covent Garden, which was an interesting company because we had a bunch of other publications, particularly rock publications, rock music publications as well in the same building. Used to get fans standing outside Covent Garden tube

station because the building was, the office was on top of Covent Garden tube station, were waiting because they were sure that their idols were going to come and be interviewed in the offices. It was quite fun. But, the company – and the company doesn't exist, it all got broken up a long, long time ago – didn't really… had a good suite of consumer titles, it sold on bookstalls every day, every week and it knew how to promote those. It had a good suite of business titles that I started with, that were usually subscription-free and survived on advertising. But we sort of fell in between two stools, so they really didn't know how to promote it, and honestly, the industry, they were just going to the UK, there were only a few companies investing in cable and satellite at that stage and as I was saying, it would have been cheaper to take them all out for lunch than to buy a page of advertising. So it lasted from January to November and then it closed down, and then I got, because Morgan-Grampian was, recognised the National Union of Journalists' chapel, and the NUJ a few years before had done a really good redundancy deal where you get not only six months' pay, but six months' redundancy, I went away with basically a year's salary after a year's work. And of course in those days if you got made redundant, you don't pay tax on redundancy money, so I took away a huge amount of money. It doesn't happen any more, it gets capped.

[00:55:07]

So I took away a huge amount of money, so I thought, even though I got some offers, you know, do you want to go and work for another title in the group, I thought no, this is going to be my chance to be freelance and it's the only chance I've got, because I've got this nice cushion of lots of money. And so I went freelance. And fortunately I landed on my feet, because at the same time, the weekly magazine for the broadcast industry had lost their cable and satellite correspondent, she went with a colleague to start a cable and satellite business, a programme business. Everyone, almost everyone in *Broadcast* at some time went off to make programmes or write books, or to join the BBC. I can think of the people who I worked with at *Broadcast* – in Soho Square, we were back in Soho – in Soho Square, half of them ended up working for the BBC, and I'm still in touch with one or two of them. But, so I landed on my feet at a really good time because they wanted me to do two pages of news on the cable and satellite industry every week. So I went in with a fresh sheet, clean sheet, and I just phoned

around all the people who I'd met in the previous year. I, you know, a journalist's contacts book is their most important resource, and I just used to sit on the phone on a Monday morning and start dialling them all and saying what's going on with all the cable operators and the satellite companies this was a time when those 11first operators that the government had nominated were then starting to build their networks and there was also a lot of innovation in satellite. There was Sky, there was then a thing called Sky Channel, not owned by Rupert Murdoch, but it was doing, it was expanding to the continent from London, and there were other projects, like ITV's to develop satellite services. And even companies like WH Smith's and others were all coming up with ideas to do satellite channels, they all wanted to get to know it. And so there was a lot going on, there were a lot of people to call and I did manage to fill my couple of pages every week, for distribution, you know, to the whole media industry. And it meant also, because there was so much going on, and because they all read *Broadcast*, I got phoned up by various local radio stations and the *Today* programme and other people if they wanted, something was happening in the cable and satellite industry because I was the correspondent for *Broadcast* magazine, so I was the person that got phoned up to come and talk about it.

Why did you move on to telecoms?

It was because I was, part of this going freelance. It took a long time, actually. I mean I'd always been doing some stuff about telecoms way back, but I spent seven years just being freelance, but then I got chucked back into working on a fulltime job, which I was quite glad about, because the stress of being freelance is quite… I didn't want to do it any more. In the early days of being freelance it was okay, because it was before the age of fax machines or email, it's that long ago, and I would write my piece and then I would go in and hand deliver it to the features editor and say, have you got any more for me, and I would get some more commissions back. And I used to come in to *Computing* and *Informatics* and the other offices in other places around London and deliver stuff. I sometimes posted stuff. But then, but then when fax machines came along I was much more isolated, you just wrote stuff and you faxed it off to somebody in the middle of the night, and I was getting very depressed about this, I wasn't seeing people. And so fortunately I got an editorship of a start-up called *Cable and Satellite TV News*, and – *Cable and Satellite TV International*, sorry – and

I worked for that for three years. And then I went on to another publication called *Government Computing*, which was going to the public sector, it was not owned by government, it was owned by a consultancy. I went on to *Government Computing*, it was owned by a consultancy, and it was obviously very oriented around IT, the IT industry. Indeed, we did the first stories about the Royal… about the Post Office getting its first computers, because that was when they were starting to do, to computerise their counters. And it was already a mess in the… 1999 and 2000, and that's what led to that huge scandal, but that was, you know, ten, 20 years later.

Horizon.

[01:00:26]

Yes, exactly. Yeah, yeah. I've got some… Then, then I got offered another job. I mean I got headhunted to do another job and it just took me where it took me, really. Yeah.

You mentioned 2000, what was your thoughts of Y2K?

It was a hell of a lot of work by a hell of a lot of people and I knew some of them. You know, I knew the head, Peter Grimmery [sp?] [de Jager?], was it? I can't remember. Yes. It was 23 years ago. Yeah, we were doing the Y2K project and it was a huge amount of work and people say, oh, you know, it was all a falsehood. But it wasn't a falsehood, it was lots of people did a lot of hard work late into the night getting systems to work for January 1st, Saturday January 1st 2000, when my kids, who were then quite small, saying, oh Daddy's computer's going to explode, Daddy's computer's going to explode. And I remember switching it on on 1st January 2000 and it worked perfectly well. [laughs] But yeah, it was a very odd time, as you will well remember. But people still say, oh, that was all false. It wasn't false, it was bloody hard work by lots of people.

What happened to Nokia?

Again, bad move. Bad… ambition that led to bad takeovers. God, what happened to them? They got bought by Microsoft didn't they? They appointed a Microsoft CEO, they lost their plot. They were great in the early days at mobile phones, they became, you know, the pre-eminent mobile phone company. I remember doing a story in the early 2000s when the company was expanding its network in Nigeria from just covering the big cities to covering the rural areas, and they were saying that people in Nigeria, even though they didn't yet have coverage, knew exactly what Nokia phone they were going to buy. Nokia did a brilliant job of creating awareness, of building the industry, but then it just lost that innovative… It was too secure and it got taken over. It got taken over by Apple. People said, oh, who wants this iPhone thing? Yeah, and people said, oh, the phone, it's too small. You know, if you've got something that size, that is not a phone, but if you've got something that size you don't have a big enough screen to see anything. They didn't realise that people were developing screens that were that big, you know. And it would be able to show vast amounts of stuff. People were not keeping up with the technology that was going on in the factories, the labs that were inventing displays and doing semiconductors and software companies, like ARM in Cambridge who were developing the systems for it. And Nokia just missed it, Nokia just completely lost it. Maybe it took the wrong turning by doing an alliance with Motorola – sorry, with Microsoft – with Microsoft, wasn't it? I've forgotten. Scrub that. It did an alliance with the wrong people and then just lost it. I mean they're still big, relatively speaking, in network equipment and I don't know, I haven't seen the latest figures because I'm slightly out of it recently, but Ericsson in Sweden and Nokia in Finland and Huawei in China, and ZTE in China are four of the biggest telecoms equipment makers in the world, but they're sort of getting taken over by companies like Cisco and Ciena, basically, who do office space networking equipment and companies from South Korea and companies from Japan. They have been riding on a really easy market for a long time that the industry, the telecoms industry was expanding from 3G to 4G and 5G and every time they changed generations they got a new lot of equipment and people, you know, want their phones to work in their houses and on the underground and all the way along the motorways, and that has meant, been great business for a lot of companies like Nokia and Ericsson.

[01:05:18]

And then when people started casting suspicions on Huawei and ZTE, they did well out of that because Western companies stopped using Huawei and ZTE, particularly in the States. They've done great, very well out of it. I have a suspicion that that roundabout of changing technology is coming to an end, is grinding to a halt. People are saying, why do we need 6G, what even is 6G? And if you look at the schedule, you know, normally there's a new generation every decade, so 5G came in about 2020, 4G before that came in about 2010, 3G came in about 2000. So every decade has been scheduled a new generation, but people are starting to question the assumptions and are starting to say, what is 6G going to be, do we really need to get all this money for it in by 2030, which is seven years' time, with some early adopters, you know, in five years' time. And people are starting to question it. So I think maybe they need to look at what they're doing and maybe – it's not a gravy train, it's been hard work and good technology – but I think the roundabout of developing more and more technology and another generation of mobile is probably slowing down a bit.

Are the fears about Huawei – if that's how you pronounce it – justified?

Huawei. I have no, as I said… I've been to Huawei and I've seen the impressive stuff they've done, but, and every piece of Huawei telecoms kit that's sold in the UK is torn apart by a bit of GCHQ, the intelligence agency that looks at signals intelligence, direct descendant of Bletchley Park in the Second World War, they've got a place in Banbury in Oxfordshire where they will tear apart not only the hardware, but the software. They have never ever leaked any information that there is something to be worried about. They have never found a back door. They have complained about the quality of engineering, they've complained about the fact that Huawei makes changes without documenting them, and things like that. That, yeah, the documentation isn't good. But nobody has ever said, hey look, we have discovered this. Although, you know… And this was largely, the campaign was largely led by the Trump administration, and followed by the Brits under Cameron and May, five or six years ago, and that has influenced… I'll give you a story. In, ooh, five, six, seven years ago, I was obviously for my job doing, I was going to big exhibitions, particularly

Mobile World Congress in Barcelona, I independently talked to the CTO of Deutsche Telekom and CTO of Orange in France, both of them, both of them, I just said, how do you feel about Huawei, and they – and this is before any of the suspicions had been raised about Huawei – and they said, independently, almost word for word, we love Huawei. I also talked to a guy who then, who had been running AT&T in Mexico, and he was telling me about – also at the Mobile World Congress – he was telling me about how you could drive from the Canadian border on an AT&T network right down through across the Mexican border and into Mexico and it would all be a seamless call, even though the companies that AT&T had bought in Mexico used Huawei kit and Huawei software. And I said, well, how do you think, what do you think about Huawei? And he said, we love Huawei. And I wrote it down and I published it and, I mean one of the things you do now with internet publishing is you talk to somebody and you publish it in a couple of hours. And I got no retraction at all from AT&T. In fact, most embarrassment I got was from the guy who was then head of – now dead – their dead head of communications at Huawei, who made an embarrassed wriggle, because he'd just got an approval from AT&T, you know, the biggest telecom company in the world, that Huawei has no access to in the US because they are not allowed to use Huawei, or indeed ZTE.

[01:10:26]

So, operators love Huawei. Nobody has said we've found this little bit of, you know, this space station or this bit of network equipment, and that is clearly a back door. Nobody has ever said they've found a back door and if you, the CEO or the CTO of one of the, you know, Deutsche Telekom or Orange or AT&T, you would know about it and you would say, you would be screaming blue murder. And nobody's ever done that, so there's an absence of evidence, which is not a proof. It may be that they're very clever, but it may be that there's nothing to see. Meanwhile, every network in the world, if you're talking about Africa and East Asia and South America and probably South Asia, but not India, there's a lot of Huawei and ZTE kit in it. And their networks are seamless, you know, there's no barrier between a network in Europe and a network in the US and a network in South America and a network in Africa. You know, you can tunnel your way through. And it's got Huawei and ZTE kit and software in there and nobody's said, oh, we're not going to connect with

Nigeria any more because it's got ZTE stuff in it, or it's got Huawei stuff in it. So I'm a sceptic.

What is the best story you have ever written?

Oh my goodness. Phew. That's a good question. I think some of the Huawei stuff. I think some of the Huawei stuff over the last few years. And, you know, I remember the stuff I've done over the last two years and things like that are top of my mind. I don't know which… yeah, I think it's when that whole Huawei controversy was unfolding, really driven by senior executives in the US government during the Trump administration. I think I was on top of that, I knew most of the people in there. Not just the public people, not just the Huawei people and some of the security people in the UK, but CEOs and CTOs in Europe, in mainland Europe, but also some of the lawyers behind it. And there's a thing in the States called Team Telecom, which is a coalition of the FCC and other agencies, bits of the Pentagon and so on, advise on, advised the President at the time on telecoms regulation. And I got to know a lot of those, and that was a lot of hard journalism, a lot of keeping in touch with your notebook. I mean, you know, these days all my numbers are on my Google contacts rather than an old paper notebook, because it's a lot more reliable and it's transportable and resilient. In those days it was, you know. But you have to keep in touch with people, and with some things you get a glimmer of a story, you have to phone people up, you have to email people, you have to keep chasing people, and that's the way to do it. I mean it's how journalism works. You know, it would have been shoe leather at one stage, these days it's internet bits and pixels, just chasing the people who know and once you know the people who know, you need to keep in touch with them.

[01:14:09]

What's the biggest mistake you've made in your career?

Ooh! [laughs] Maybe going freelance, but that gave me an opportunity to do other things, including help come up with an idea for the first Channel 4 series with science and technology programmes which was called *Equinox*, which was their rival in the

first few years of Channel 4 to *Horizon*, which was the BBC's science and technology strand. And we pitched an idea about computers. It's still on YouTube. What they don't tell you when they sell a computer. So in my freelance, apart from other things about being freelance that I didn't like, it did give me an idea to chase, to do other things. Erm… Oh, I have done, but I haven't ever been, I haven't ever libelled anybody, which is a good relief. I've done lots of libel courses, I've never been sued for libel. I think when, also when I was freelance, I was willing to say yes to anything, and got hauled into a meeting because somebody said, oh, we would like you to do lots of freelance work, and it was basically doing their gossip sheet, which included sports results, for whichever company, and I can't remember what it was, and I'm glad I can't, because I thought, well, I don't write about company sports matches, sorry, this is not me. So that drifted me, took me into lots of strange areas. So I think, you know, now I'm taking a sabbatical but looking at other things, I've learnt from that experience of 20-odd years ago to be a lot more brutal and if somebody says, could you do so-and-so, I will say, no, that's not what I do. Or, how much are you paying for this, you know. Yeah, so I think these days, yeah, that was probably a mistake. I should have probably not been so free with, you know, my time. But I can't, if I think… I'm sure there are some, I've probably just wiped them from my brain. I will need my early retirement to come up with some new ideas. Burkitt's mistakes! [laughs]

Finally, you've probably been – I know it's not directly on your radar – but you've probably been, kind of missed the stories about AI.

Yes.

Is this really dangerous stuff?

I don't know, because I haven't been working for it. But there is a lot of other things… What I have been doing over the last few years before I stopped for my, what I insist on calling a sabbatical, is quantum, quantum technology.

Right.

And that, I think, is not necessarily dangerous, but it is going to mean a- God, I've become a politician, I answer the question I want to answer, not the question you ask.

That's okay.

I think this is going- it's not really recognised by most people, including, you know, most people who use the internet and people who use networks. I think it is, you know, we've been working on basic key technology that is what, 50 years old, 40 years old, Whit Diffie and people like that. And we're getting two things with quantum computing. (A), you will be able to break existing speeds very quickly. And at the moment with current technology it takes you years and, you know, old intelligence is useless, it's no good reading somebody's messages from ten years ago, or even from last year, especially if you want to do something significant. But, the quantum computing would blow open the security that we've come to expect from our electronic communications, but it would also allow people to increase the level of security in new communications. So with quantum you will be able to protect it to work on another generation, and that's all going to hit us in the next two or three years, and you think the British government, Suella Braverman and Rishi Sunak have an issue with the social media companies now, my God, they're going to have an issue in two years' time. Well, they probably won't be in power then, but the government of the day will have a huge issue because it will be completely unbreakable. There will be no back door. There will be – and for, not just for protecting our financial information and protecting our messages, but crooks will be able to use it. We won't be able. I remember, ooh, in the early days of Skype when Skype was really heavily protected, it was the most heavily protected messaging system, and one or two people at GCHQ who I used to know because of what I'd been doing with government computing, you know, nudged to me that they'd got some back doors, especially one, it changed hands from being a weird Scandinavian company full of geeks to being an American controlled company, and it went to eBay and things like that for a time, and it's now part of Microsoft. And they were suggesting that there were back doors, my goodness, there are probably going to be no back doors in quantum encrypted communications. But it will be a necessary change and it's going to happen quicker than people think.

[01:20:02]

And I say, there's a positive side to it, that it will protect our communications, but it will also blow open- I talked to a number of groups and I had still, until I started my sabbatical, was talking to groups in the States and on this side of the Atlantic, that there are lots of agencies across the world that have been storing data, storing messages for the time that they could crack them. They know the quantum era is coming, they've got all this communication between government agencies, between banks, all sorts of other people, and I guess the good guys are on that as well, they've probably been storing financial transactions for the day that they can find out what's been going on. But there's a lot of data being stored, messaging data being stored that will be decrypted as soon as quantum computing gets to that stage, and that's probably going to be faster than people expect.

What, ten years? For a proper quantum computer?

Five?

Five, you think?

Yes. If you go to the new UK headquarters of IBM, next to Waterloo Station, there's already a quantum computing in their shop window. And there's some amazing developments in Chicago and Denver, in Dutch universities, in Cambridge and Oxford and UCL and Imperial in London. There's a huge amount of work going on there and a huge amount of investment going on into quantum computing. It will… it is… people are absolutely comparing it, or at least they were when I was talking to them, which was, you know, not for six months because I've been paused for six months, they were really talking about it as equivalent to those first few years after the people in the States at Bell Labs developed the first transistor and then started developing into a circuit. And there was that huge upsurge of innovation, which then transferred to the West Coast and to companies like Fairchild and Intel and so on. And quantum is going to be like that, there's going to be a lot of money. The investment people are already looking at what they want to do with quantum computing. And the banks are doing it. Banks are investing in quantum because they

want to know about it and they want to not only invest in it, but install it for their own protection and their customers' protection.

I think that's a very good place to finish. Thank you very much Mr Alan Burkitt-Gray.

Thank you, it's been great to talk to you again.

[recording ends]