Capturing the Past, Inspiring the Future

Geoff Henderson

Interviewed by

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At

NETALOGUE, PORT TALBOT, WALES

I'm Tom Abram, Editor of Archives of IT, and I am in Port Talbot on the 5th of September 2019, it's about half past eleven, and I am at the offices of Netalogue with Geoff Henderson.

[00:27]

Geoff lives in this area, Porthcawl, and formerly worked for IBM for 27 years, between 1973 and 2000. Before joining IBM Geoff worked for the British Steel Corporation, or Steel Company of South, Steel Company of Wales I think it was originally, from 1960 to '73, where he headed the team that developed the world's first-real time control system in the steel industry. Based on that, Geoff is the author of a brief history of production systems in the Steel Company of Wales, and, we'd like to hear about his experience that is incorporated in that story. Geoff, welcome.

Thank you.

[01:25]

I'm going to ask you a lot about your life and career in a moment, but I wonder whether we might start off by talking briefly about the significance of the Steel Company of Wales and its project at what was really a pivotal time I think for technology and the steel industry and South Wales. And, this was, this was a big project. So, can you tell us something about what was happening in the world and South Wales at that time, and why this project was important?

Happily. The Steel Company of Wales was formed in 1948, under a very inspirational general manager at the time who became managing director, a man by the name of Fred Cartwright. He had travelled a lot in America, had a lifetime's experience in the steel industry, and was determined to build a steel industry that could be the best in the world, on a greenfield site, as it turned out on three greenfield sites, eventually four greenfield sites. And he was determined that these would be the most modern steel-making facilities in the world. Work started in about 1948, and by 1950 or '51 we were making steel. Systems at the time were basic, paperwork, paperwork and paperwork. We had a very impressive head office, which must be one of the few steelworks head offices which had an ornamental lake in front of it, and palm trees. And his plan was to have palm trees around the works, but the soil wasn't quite right. But he remained a visionary. And the entire ethos, which became

apparent to me when I joined in 1960, was that this was an innovative place, people were receptive to new ideas. Good ideas could travel, and poor ideas would be knocked down very very smartly.

[03:37]

I joined as a trainee. And, when I joined, it was *the* place to work, if not the *only* place to work. I was born and brought up in a town called Port Talbot, which is where the main steelworks was, still is, a town then of about 45,000 or 50,000 people. And the works employed about 20,000 people directly and about another 10,000 indirectly, who were drawn from a radius of maybe, 35 or even 40 miles, people would travel to work. It was very well paid, some of the best paid jobs in Wales at the time. And it was… So it was *the* place to come. They had apprenticeships, training schemes, graduate schemes, all sorts of schemes. But the thing that I observed most was that, it was, not only that it had a family feel to it, but, and you knew lots of people there, because you all lived in the same place, mostly lived in the same place, or most of the people you knew worked there, one place or another, but that it was, you always had the feeling that you could do something. It was absolutely fundamental to the economy, and that remains the case today. Most of the steel that was made, of the raw material, came from North Africa and Scandinavia, or from the Welsh coal mines, and about half of what was produced went to export, and a big, a significant percentage of what was made locally went into the car industry, making domestic appliances. So as the consumer boom took off and Macmillan said, 'You've never had it so good,' one of the things he was talking about was the revolution that was taking place in the home, with things like domestic appliances and people having cars and, and whatever. And the, the company even produced a monthly newspaper, which, one, had a page devoted to ladies' things, preferably things made of steel, and two, focused on the uses of the steel. So there was a constant reminder of the fact that we were producing material that was enhancing people's lives. And that was never outwardly spoken, but that was the message really.

[06:04]

And after a few years as a trainee, working in different departments, I, I think I really found my niche in Organisation and Methods, which was all about information flows, how to trap information moving around the system and how to trap it in a way that was useful for the people who were recording what was happening, and to make it, to make it just fit as part of their everyday job. Because a lot of the people that we were

dealing with weren't purely clerical staff; they were people who had jobs contributing to the making of steel, and as a byproduct of which they told you what they were doing. And it was that record that was important to us. So I learnt all about information flows, and, and sitting down and listening to people and understanding what they did. And by the time I had finished my stint in, as a trainee in Organisation and Methods, I had a pretty good idea of how the place worked. And it all reinforced my view of how important this place was to, to Port Talbot and, and the area really.

So, South Wales, I guess South Wales lived on steel and coal, which no doubt are closely related.

Yes it did.

So this, this was a key factor in the economy of the area.

Oh, amazing. I don't know what percentage it would be of the, of the economy there, but it would be bigger than anything else by a big margin, by a multiplier.

[07:43]
And computers in those days were, were really something quite new, weren't they? I mean, Archives of IT kind of starts around the, the development of the LEO computer in 1951, the first commercial application, and we are talking about the early Sixties here. So I mean, do you remember what was the state of computer technology in those days?

Yes. The Organisation and Methods department was part of the computer organisation, so I had a small brush with computers at that point. And I can remember being mildly impressed when shown the computer room that we had, which was on the ground floor of the head office building, and in which we had an IBM 1401 and an IBM 1410, and if you could get your program to run on the 1410 it took a few minutes less time. But they were, they were large, physically quite large machines, but, the 1410 was blessed with 16K of memory if I remember right, and the 1401 had 8K of main memory. So any program you wrote had to fit with, whatever the operating system was in these things, it had to fit in this, this amount of memory.

So you had a bit more leeway if you could get it to run on the 1410. But you almost had to say, well this isn't going to work on one, you'll need the other one to do this. And, they were devoted to, almost entirely to accounting, and in fact the computer department was owned by the chief accountant, as were a lot of computer departments for a long time, it was part of the finance, so, what was then called the accounting function but became called finance. I remember the, the machines were blue, the same colour blue as the chairs we are sitting on. And, the place was noisy, because, it needed air-conditioning, and the fans in these machines were noisy. If someone hit the emergency power off button by accident, and silence came down, you knew who had hit the button because you could see the green face. But, it was almost all, it was all batch processing. The only means of input to these things were punch cards, 80-column punch cards. The second noisiest place in the building was the punch room, that turned production reports and accounting reports and invoices into punch cards so they could be read by the computer. And there were probably 50 or 60 punch machines, and they were incredibly noisy places to work.

[10:23]
So this, this is groundbreaking stuff though, because we're, we're going to talk about moving from a world in which computers were confined to the accounting department into computers on the shop floor so to speak, and managing industrial processes.

Mm.

And this was all part of the, the revolution which I think Harold Wilson dubbed as the, the 'white heat of technology'.

[laughs] Yes, he did. And, and in fact when, at a point in about 1966, or '67, I lost one of my systems analysts to, who wanted to go and work, and did go to work, for Tony Benn who was then Minister of Technology.

Oh fascinating.

And he joined, he joined the Civil Service. So… I think he was the only man I lost to the Civil Service, or to Harold Wilson and his lot. [laughs]

[11:16]
OK, well that kind of sets the scene. Shall we move on to your own background in this part of the world? You were born I think in 1944, and you, you lived the early part of your life in Port Talbot. Can you tell us a bit about your family?

Yes. My, my father's family were immigrants, from, my father's father came down from Gateshead, where he was a ship's architect, and sometime in the early 1900s… I never got the chance to talk to him about this, because as young, young people, we're not interested enough in history, but I regret now not having these conversations with him. But he came down to South Wales sometime in the early 1900s, I think as a result of, maybe, a minor recession in the north-east, and he joined the Port Talbot Steel Company, which had been around a long time, and who were suppliers of steel to the Admiralty. And his expertise was in warships. I have one of his textbooks at home, a textbook of naval architecture, which explains how dreadnoughts were designed and built and so on. So I think the, that knowledge led him to be recruited by the Port Talbot Steel Company. And over many many years he became the equivalent of chief clerk at the Port Talbot Steel Company, and he did that job till he retired. And he knew, or Fred Cartwright knew, my grandfather. I found out later on when I met Fred Cartwright when I joined.

What does chief clerk mean?

Well I, I suppose today it would be similar to, not quite chief accountant, but, when every, every process was clerical, and almost everyone in the building was clerical, apart from specialised metallurgists and a few others, it's all about, how do we record what it is we, we need to make, how do we record the passage of the making of it, how do we generate invoices, how do we collect the money. So it's all the administrative processes. Perhaps director of administration or something now. I don't think it was…

It's a big job.

…that senior. A… A relatively big job I think. He was certainly the only person in my family or my, his family or my mother's family, who had a car. And he had a car in the 1930s. So, he was one of the very early people in Port Talbot having a car. So I think he was, he was a, he was a quiet man, but clearly clever, and I discovered when I met Cartwright years later how well respected he was, when I was introduced to Cartwright when I was a seventeen-year-old, and my first time in Organisation and Methods I was introduced as James Henderson's grandson. And I didn't know that the man who was introducing me, the head of Organisation and Methods, knew my grandfather. I had no idea that he knew. But that, there was only one Henderson family in Port Talbot, so that might have been the connection. And Cartwright immediately said, 'I remember your grandfather very well,' and talked to me for ten or fifteen minutes as if he had known me all his life. So there's a seventeen-year-old trainee talking to the, the managing director as if he had known him all his life. It was a sign of the respect that he had for him I think. He was, I think he was a clever and capable man. His… He had two sons, one, my father, was the younger of the two, and the elder went on to university, went to Swansea University, took a degree in physics, and then joined the Foreign and Commonwealth Office and worked abroad, mostly in East Africa, for the next, 25 years or so. I didn't know him well until he retired, and came back to the UK. But the effect on my father was that, once my father got to sixteen he had to leave work in order to get a job to support his elder brother at university, something that my mother always resented. I don't know if my father resented it, because I didn't know him, he died when I was four and a bit. So… But I think, clever, I would… Clever, interesting people. And when I got to know my uncle I realised quite how clever he was, and how interesting he was.
[15:52]
My mother's family, equally clever I think. My grandfather, that's my mother's father, you'll find him on Wikipedia, was the premier bell peal composer of the twentieth century, and that's all about maths. Now he left school when he was fourteen, and apparently his teacher said to him, 'You have to leave school now, there's nothing else we can teach you.' He joined the railways, British Rail I suppose, or British Railway, Great Western Railways as it was then, and he worked there all his life. But his passion was bell-ringing. And, one of the, probably the most prolific composers of the twentieth century. And he had, he and his wife had six children. My mother was the youngest; the eldest went to university, got a First in maths.

Uncle Reg, the next one, he got, his degree was physics I think. He became a, they both became teachers. The third one became a bookkeeper, which today we would call an accountant, and became chief bookkeeper for the local Co-operative Society. The next one went into the Army. And, my mother was expected to leave school at sixteen and look after her parents, that's what youngest did, but she was a bit more stubborn than that, and, she stayed on at school, and eventually taught at a school founded by her elder brother. And she did that until the children came along. But maths, maths and maths is in that side, my mother's side of the family.

[17:38]
Yes, it's an interesting family background isn't it, with all… I mean, they were kind of, quite early participants in the higher education, you know.

Yes.

I guess there weren't that many people going to university in those days.

And those who did got a scholarship, if you were good enough you got a scholarship, and both my mother's siblings, elder sister and elder brother, both got scholarships, they did so well at, whatever the equivalent was of A Levels at the time, I can't remember what it was called now.

[18:13]
So you mentioned that your father died when you were four.

Mm.

What effect did that have on your family life and your development?

I… It affected us financially very badly. Provision… My mother was in receipt then of what was called a Widow's Pension. And I just, I just remember constantly being… I don't think short of money. No one at the time had… All of your friends were in the same position really. No one was particularly well off, but nobody was particularly poor, and you just learnt, you just learnt to get by. It was as I got more of

a teenager that I realised how little money we had relatively. I, I really wanted a bike for Christmas one year, and it was made clear to me that there wasn't a hope, that… So I, I got myself a job as a delivery boy for a grocery company, and the deal I did with my mum was, I would give her my pay, which I think was seven shillings a week or something, and I would keep the tips. And I was a very keen cyclist anyway, and I, I had bought an old bike for ten shillings off a school friend, and I had patched it up, and, used to go out most days. So I was quite a good cyclist by that point. And, the fact that I was a good cyclist meant that I could deliver, in a given amount of time I could deliver more orders than my predecessor. So over a period of time I doubled or trebled the deliveries that we were able to make, and therefore doubled and trebled my tips. And, and the tips paid for my bikes. So, that was the way it worked. It had quite a dramatic effect. I don't remember my father other than from photographs, but I, but the consequence was that, my mother was always short of money. And she did odd jobs. She did a lot of tutoring to try and, you know, supplement her income and so on.

[20:24]
So it sounds like cycling was, was a pastime.

Yes.

What else filled your childhood, sports, games, friends?

I, not a lot of friends, but I just, I had a small number of very good friends, some of whom I'm still in touch with today. Cycling was the big part of it. I wasn't interested in rugby, I was positively not interested in cricket. I did a deal with my sports master at grammar school that, instead of playing rugby I'd go for a bike ride. I was getting the exercise. If that's the objective, you know, I'm never going to be a good rugby player, I'll get the, I'll get the exercise on my bike, and you get the exercise on the rugby field. And that, that worked, that worked very well for me I think. My other passion was, I was brought up in a place that had mountains and the sea, and so, we would spend hours walking over the mountains, or playing down on the beach or whatever, as, as we were growing up. But once cycling came along, it eclipsed just about everything else, and I joined the local cycling club, I made a lot of friends, some

of whom I still see today. And… But the other passion I had was, was books, and, I joined the library when I was in the junior school, and after a couple of weeks I had a, some sort of conversation with the librarian about, well can I read adult books? I'd like to read about, history and whatever. And, no no, you've got to read books from the children's section, and… In fact we came to an agreement I think, and I, and I got extra tickets, membership tickets for the library. I joined in my friends' names, and my brother and sister's names, so I could get more. You had, you were only allowed two tickets and two books every two weeks. And I was reading faster than that, so I joined my younger brother, and I used his two tickets, and then I think I joined my sister and used hers, and then I joined some friends and used theirs. So I was consuming books at a, quite a rate, and still do. And then when I went, went to grammar school, I just got terribly bored.

[22:41]
Let's move on to your education then. Because I, I think you've mentioned to me that, your junior education was, was enjoyable, but, grammar school perhaps, not so much. So, what was it about the junior school that was, great?

We had, I had a, a truly inspirational teacher, Tom Harrison, and he was just… I can see his face because I have a school photograph of us that was taken with him in it. And he was, I don't know what it was, but he kept you inspired and interested, and whatever, and I, we had the Eleven Plus in those days and I, I flew through the Eleven Plus. I was second in the borough. The results were… You found out if you had passed from the local newspaper, and my mother sent me out to buy the local newspaper the day it was going to be published, and it was listed in the sequence in which you had passed the exam. And I came second I think. So my mother was very pleased with that. But I was extremely disappointed to discover that, after my name was the name of the grammar school I was going to go to. Because we had two grammar schools in Port Talbot. And when you sat the Eleven Plus, you put on the top of the paper your name and which grammar school you would like to go to if you passed. And I had put the one grammar school that I wanted to go to, and in the papers I was down for the other one. Now I had deliberately not chosen the other one, because that's where my mother went, that's where my sister was, that's where my aunts and uncles had gone. They had all gone to the same grammar school.

But you ended up at grammar school.

Yup.

And, it wasn't the one you wanted to go to.

No.

And, it doesn't sound like it worked out too well.

No.

So, tell us a bit about that.

Right. So, get, I get to the wrong grammar school, where a number of the teachers have taught my aunts and uncles, most of them have taught my elder sister. And, by about the end of the second year, I was doing well, but by about the end of the second year I was getting bored. And, I just simply became rebellious after that. There were few subjects that I was really enthused by. I was naturally good at art, and I was naturally good at maths. But, I don't have any particular facility for languages, and at the time we were doing French, Latin, Spanish and Welsh. And I just got more and more bored, and the more bored I got, the more rebellious I got, and the more troublesome I got. And as a result of which, towards the end of my fourth year, and I was getting caned fairly regularly throughout this for minor infractions of school discipline or whatever, and the cane was a popular, a popular tool of the headmaster, towards the end of my fourth year he called me into the study, and he had spoken to my mother, he knew my mother, and they knew all my aunts and uncles, and said that, I was, I could go home and never return. I wasn't expelled, he didn't want to do that I think, because, the family name. But I was to go home and never darken the doorsteps of the school again.
[26:30]
So, I, I had no idea what I was going to do. And my father had been a fitter at a, served an apprenticeship and was a fitter in the steel company before he died. So I

thought, well I'll… I, I can take my bike apart and I can put it back together again. I'll do the same as him. So I applied for an apprenticeship at the steel plant, and I flew through the aptitude tests and the personality test and the IQ test, and the mechanical tests. You were given a box of parts to assemble a gearbox, and I did it all. And I went into the interview feeling pretty cocky, that I was going to fly through this, and the first thing they said to me was, 'We are not going to offer you an apprenticeship,' to which I said, 'Why? I've done all this. This is all easy.' And he said, 'Exactly that. You should stay at school and go to university.' And I didn't know how to explain that that wasn't an option. So, undeterred, I applied to the National Coal Board for an apprenticeship, they being the next biggest employer in the area. Sat the same tests [laughs], with exactly the same result: 'You should stay at school and go to university.'

[27:53]

At that point I was stumped. But my mother knew a senior manager in the steel plant, and, she took me down to see him, to ask for some advice. And, he got me onto the accounting training scheme. His attitude, 'Well you're clearly bright enough, so let's give this a try.' He did it as a favour to my mother really. And, it was a terrific training scheme. It was day release and evening class. But every three months they moved you to a different department in the works. And most departments give you something useful to do, that you could learn. Some didn't, but I was lucky, I had ones that did. And, and in that three months you could get a really good… I spent three months in personnel, where I discovered we operated a colour bar. And, and where I discovered that some people coming in applying for low-level labouring jobs couldn't read, or couldn't write, and I would fill in the application forms for them. Because, the, the job of the trainee in this particular part of the department was statistics, statistical analysis. And, no one wanted the job in the front office where people came in looking for a job. That was a distinctly unpopular job. And I loved that, because I like people, and I could do the analysis when people weren't there and whatever. And, I learnt a, I learnt a great deal about dealing with people. But every department I went to I learnt something. And the idea was, that by the time you've done your accounting qualification, you know how a steelworks works, procedurally, what the processes are, what the flows of information are, how information is used. It was a, looking back on it, it was a really good scheme. And about the fourth or fifth department I was put in was Organisation and Methods, where I just blossomed. And

within, probably… They extended my stay. Because each day was three months. They extended it. And they were going to extend it a third time. Within about three months departments were ringing for work to be done, and asking for me to do it. And, I just took to it like a duck to water. Systems analysis is just, bliss really. You just sit down, and you talk to people, and you ask them what they do, and you listen carefully, and you design a system that works for them. And off you go. And the only reason I left was that, we quarrelled about money. Because, at the time I was eighteen, and I was by then married, and I was being paid as an eighteen-year-old, and I wanted to be paid the same rate as the other people in the department, especially when people were asking for me to do the work and not them. And I could see no reason why I shouldn't be paid at least the same as them. And the manager of the department, in fact whose widow I was talking to yesterday afternoon, lovely lady, was adamant that I could only be paid as an eighteen-year-old. And, I said, 'Well I know I can go somewhere else. I know enough people in this plant now, I know I can go somewhere else, and earn a lot more money, more than twice what I'm getting paid here.' And he said, 'Well in that case, that's what, you know, that's what you're going to have to do.' So I did.

[31:29]
So you could leave one department, and apply to another department?

Yes.

It seems slightly unusual in terms of management approach. [both laugh] But, yeah, that's, that's the way it was I guess.

Well there was… There was… They weren't rubber barons or anything, but, managers did have a great deal of discretion. And, Jim was an accountant, and went by the book. And the guys who were running the plant processes were far less, their job was tonnage. Their job, let's produce as much steel as we can, as well as we can, as cheaply as we can. And, so that's where I went.

They had some autonomy then for…

Yes. Yes.

…hiring and firing and setting salary levels and…

Not firing.

No.

Nor setting salaries. But they had different salary scales.

Right.

Because it was mostly unionised, there was a rate for each *job*. And it didn't matter whether you were fifteen or 50, if you did that job, you got paid the rate for that job. And, at the time I was earning about, £8 a week, £9 a week. This would have been 1962. And, I immediately moved to a job that paid just over £20 a week. And I did, I worked there for, eighteen months. And you did… There were about six or eight different jobs in this staff category as it was called that were really at the heart of making this rolling mill work. And… And I found I was really good at it. I was really good at maximising the earnings of whichever crew I was working for. There were five or six different processes, and, and the job was, to make sure that they had a flow of material, that meant they never had to stop, and certain materials paid better than others. So you were sort of measured by the crew on your ability to deliver the goods for them. It was very competitive in a way, because you had three or four units competing with one another, and so, you could become a hero, or not. And, I just found I was naturally good at it.
[33:54]
And I… But I was, after about fifteen months I was getting bored, and, I've learnt that boredom is [laughs], I'm not good at handling boredom. And it just wonderfully coincided with the computer department and the man I had quarrelled with about pay deciding that they needed better systems to trap what was happening on the shop floor. Until that point all production reports as they were called were handwritten, with carbon paper, six copies of every report, one went to the wages department, one went to accounts, one went to the production scheduling department. And the, the

further down this six carbon copies you went, the trickier it was. You can imagine the quality of record keeping was less than brilliant at times. We were getting into trouble, because material was being lost. Customers would ring and say, 'Where's my order?' and, you couldn't tell them with any degree of certainty where it was. And there'd be lots and lots of panics to try and recover from these things. So it was becoming obvious that the recordings, manual recording systems, weren't up to the job. So someone, and I don't know who, had decided, well we've got to do something about this. The computer department are the people to sort this out. Computers were a new thing. And, Jim was tasked with putting a team together to do this. And they realised that they needed more than just programmers; they needed systems analysts. And, they advertised. They decided, well, a good place to start, we can train a systems analyst, a good place to start would be people who understand how this place works. Because no one in the computer department did. There were, there was one chap who was ex-metallurgist, otherwise, I think they were all straight from university. And a very, a bright, clever lot, but, had no idea about the plant.
[36:00]
So the job was advertised, a vacancy was advertised, for someone to join the computer department. Dozens of people applied, and I was lucky enough to get it. I flew through the aptitude tests, and, all that sort of stuff. And, and the man I had quarrelled with, and left eighteen months earlier, was kind enough to offer me the job back: well to offer me the job. So he didn't hold, he didn't harbour a grudge.

[36:24]
Can I just take you back to…

Mm.

…that transition from education to work. You left school without any formal qualifications.

None whatsoever.

Yes. And, it sounds like you, you got your original job, and made the moves subsequent to that, on the basis of natural ability and aptitude, rather any formal skills. Is that fair?

Yes. Mm.

So, you, you presumably, you were good at maths, and you, you must have acquired some, you know, further maths skills as a result of being at grammar school and so on.

I don't… The maths wasn't important, I don't think.

Right.

I think the ability to think logically was crucial. And, personality test, the general point that, that way, I'm practical, I like simplifying things. I'm not a complicater of things. I'm always looking for the easiest, simplest way of doing things.

And I think you were at the point of, of saying that they were going to train you as a business analyst, but had you had any other training within the steel company up to that point?

Not for that, no. The training scheme that I was on was, training in, in accounting, accounting practices, business practices, economics. So it was, system design, or systems analysis, was what I had learnt on the job in Organisation and Methods. But it's… I think people complicate it. I think if you, if you analyse a problem, and you work out… If you're capable of analysing a problem and deciding a solution to this, the simplest solution to this, is this, and you can express that to other people so that they can write the software, or whatever, it, it's not a complicated business. I think too much software is over-complicated. Like domestic appliances are over-complicated, everything's flipping over-complicated. There are 64 computers in my car. What on earth is the point of ten of them? And if the motherboard fails, the whole car fails. You know, it's, it's got, things have got too complicated I think.

OK. So, I think that helps clarify the, the extent of the formal education and training.

Mm.

[39:03]
So, you're just embarking on this, this project then to get rid of the six carbon copies.

Yes.

What happened next?

And, when I joined the department, the first steps had been taken to put a computer system in which was punch card based in a part of the plant that was the most critical in terms of record keeping at the time, a place called the slab yard. And a slab yard deals with pieces of steel that weigh on average fifteen to 20 tons, they're about fifteen feet long, four or five feet wide, and six feet thick, and they all look the same. So it's easy to lose track of which is which. It's a very dirty job. But it's absolutely critical. And, the solution to this in 1965 had been designed, and it was designed around producing a punch card every time one of these slabs was produced in one part of the plant, and retaining that until the slab that it referred to moved on to the next stage, and the punch card became the input to the next stage. And so, the punch cards that were left represented the stock. And there were probably, three or four thousand of these things in stock, and keeping stock in a steel plant is… These things are worth hundreds of pounds a piece. So, knowing how many you've got, and which ones they are, and who they are for, because they're all made for a specific customer by this point, they're targeted at a particular customer, that was becoming the big challenge. And so, we, I joined the… I had doubled the size of the team when I joined the IT department, and Ron was the man who had designed this system, and I worked with him to implement it, and to, to train the operators. And I, I learnt a huge amount from that. And one of the many things I learnt was how not to design a system, because it was over-complicated. And one of the steps totally unnecessarily involved changing the format of the one card into another, and that involved a mechanical machine which was very sensitive, and which the operators discovered, if they put a ripped punch card in at the front, the machine jammed. And, this happened every now and

again at about three o'clock in the morning, and one of us was always on call. Because if the system failed, eventually you would have to stop the plant, and in a steelworks, you cannot do that. That's just too expensive. These things cost £100,000 an hour to run or something. And so you'd get a phone call at, three o'clock in the morning, 'The system's down.' The card machine's jammed or something, and… And, [laughs] you could not go into the place and say, 'Well, who did this then?' Because then the union would say, 'Oops! Everybody out. You can't accuse us of damaging something.' So you learnt a lot about labour relations, and trade union attitudes. And over time I found that, if it happened, I'd go in, I'd fix it. I'd talk to them about what it was, what we were trying to do, why we were trying to do it. Why it was important to do this. And over time that, that fell away. But it taught me a lot about dealing with people on the shop floor whose principal job is not doing what you want them to do; it's making sure that the plant keeps running. And we, we put that in, and it was quite successful. I wrote… It was the only bit of software I ever wrote. I thought I had better teach myself programming. If I'm going to be writing program specs for people, I'd better understand how to do it myself. And so I taught myself 1401 Autocoder. And, so I ran the stocktake, the stock program, a couple of times to make sure that I knew what I was doing. It was the only time I ever wrote it, or, you know, in my time.

[43:09]
So the computer was…

A 1401. The 1401 and the 1410 at that point.

So this was an IBM machine.

Yes. Yeah. And the machines, the machines we put on the shop floor were IBM machines.

Who decided to buy IBM?

Well the shop floor was designed… I think the decision was, was made by the bloke that I was working, that I had been put to work with. And the, the IBM decision on

the mainframes had been made years earlier. And the machines were rented, and they weren't purchased. So when you wanted a new one, or a bigger one, they just took one away and brought a bigger one. And you just carried on as usual.

[43:44]
So, we're… What's the…

We're at 1966.

1966 we're talking about are we?

Yes.

So at that time, there was IBM coming over from the USA. ICL hadn't been formed at that point, but there was Ferranti, and, Elliott, and GEC, and, all in the UK market. And, and how were such decisions made? Was there a procurement policy, or was it the IBM salesman that tipped the balance, or, or what?

Well, they were silo decisions I think. We had General Electric process control machines out on the plant, and those decisions were made by the Industrial Automation department. The Operational Research department had a Pegasus. One of only 38 ever built. And they did a lot of the work on the design and layout of the plant using this Pegasus machine and running process models and all sorts of things. We almost never had any dealings with them, or with the Industrial Automation people, they were different silos. Competition almost… Not then, but certainly later. The accounting systems, there were Powers-Samas accounting machines. They had been there for decades probably. But they were the biggest users of the 1401, 1410s. And, I, the policy… There was clearly a policy decision at some point that the mainframes, if I can call them that, the computer centre was going to be IBM. And I don't know how long those machines had been there when I, when I joined. I wasn't curious enough to ask. So, it was a fact. That's, if you walk in a computer room, they're going to be blue.

Yes.

And the decision to buy these, 357 punch card system for the slab yard, had been made by the chap that I was working with I think. And, this was equipment, and there probably wasn't anything else on the market at the time, this was equipment designed to work in an industrial environment. It was chunky, heavy-duty, you could use it with dirty fingers or whatever, and it would just simply work. Its weakness was, this transformation of the punch card. If that step hadn't been in, we'd have had no problems with it at all I think.

[46:20]

We got that to work. And then, the focus shifted to another… Having made that work, the focus shifted to the final part of the, the plant, which was called the cold mill. And in a steel plant you start off with molten iron, hot hot hot. You turn it into steel, molten steel, that's hot. The further down the process you go, in general, the cooler things become. And you get to a place called the cold mill, which does have one place that heats things up, but it's not significant. And, there were problems with keeping track of where material was in this place. So, the decision had been made before I joined that the next hotspot to tackle was the cold mill, and I think there was a decision… So, when we were hiring people, or, someone to work on systems analysis, we had better hire someone with cold mill knowledge, and that's where I had worked for the previous eighteen months. So when I arrived, that decision was taken. And the next decision was, well OK, what are we going to, how are going to do this? And, sometime around that point, maybe… I joined in the middle of '65. By about the middle of '66 I think, we had acquired two IBM 360 Model 40s. And this was a transformational step, huge step forward, not just in memory capacity and direct access device capacity and speed, but the multi-programming element of it, and the fact it had telecommunications capability. And, whereas, I think when I joined the discussion was, well, we'll put a similar system to the slab… we'd put a punch card system in, and… And it became more and more apparent to me, why don't we just connect the terminals to the 360? It's got that capability. Let's put terminals on the shop floor, and pick it up, pick up the information straight away. I don't think I met… I don't think there was any resistance to it. People were, liked new ideas, as I said earlier. And I, and I found myself, not a lone missionary, that's over-stating it by a long way, but I was, I was, I had… I was working with the chap who was then my manager, who had come out of Operational Research, a super clever bloke, Wesley

Davies, who was a very encouraging sort of chap to work with. And I was given a free hand virtually.

[49:04]

I had… I thought, well, if we're going to do this online thing, whatever it is, we need to think about how, what information do we want to collect, and how are we going to do it? How is it going to work? Now, if you handwrite a report, I have just processed this piece of steel for this customer, and it's this size, and it's this weight, and, these are the characteristics, that's about 100 characters of information that goes down on one of these carbon copies, all of which is punched in. If you process a piece of steel, and you can look up a computer record, the only thing you need to know is, you tell me the identity number of this. Because, I know everything else about it. So I can produce the production report, and I can minimise what I'm asking you to do, because you've got ten other jobs to do. This is incidental, telling me what you've done is incidental. It's terribly important, because, that's how they get paid. So they have an incentive to record very accurately what they've done. And, having worked there, and I had worked with a lot of these crews, it didn't take much for me to go and sit down and talk to them and think about, whereas before I hadn't thought about it, I'd go and talk to them, and I'd think about, well how much information do I need from you to be able to trap this transaction? And the next stage was, well as I now only need a relatively small amount of data, what sort of device do I need to put on the shop floor to, to trap it? And… I have to say that the terminal that we designed for the cold mill, I designed literally on, probably on the back of an envelope, or a napkin, at Port Talbot's only nightclub, with a salesman from Elliott Automation. [laughs] Because IBM weren't, the system that we had, the punch card, I definitely don't want to use that. They didn't have any hardware. Because they would have been the natural choice that would have done the job in the cold mill. We had sounded out a number of other suppliers, and Elliott Automation came back with, 'Well, there's a couple of things we can do,' but, one of the key ones was, 'We'll build a terminal to your design.' And that was number one. And number two, 'We can mimic a channel-attached device on the 360 which will make for a very high speed transfer between the cold mill and the computer room. And that was very attractive. Because it was clear that if we were going to put something on then shop floor, we needed a pretty sharp response time, and I decided, it had to be less than five seconds. If it was more than

five seconds, somebody would light a cigarette and then they'd forget. So five seconds was my scientific target.

[52 :01]

And Elliott were, did exactly everything that we asked them to do. The terminal that we designed was about five foot six tall, it was about, four feet wide, it was made of stainless steel and heavy steel. It had to be acid-resistant, corrosion-resistant, grease-resistant. Filthy places to work. And the people using it were not likely to take their big rubber gloves off to use it, so it had to have large rotary switches that you could easily grasp. It couldn't be a, it couldn't be a laptop type keyboard [laughs] or anything like that. It, it had to be something chunky that fitted. And they, they designed it. I designed, it, they built it. And, we never had any problem of acceptance of this thing. And for, for about, six or nine months, I pretty much worked alone designing, having got the terminal right, designing what the message formats were going to be. And for a typical device, there might be, for a typical process, there might only be four or five different message formats, but it, it all had to flow, because the people we were dealing with were not clerically trained people. Their job was production. And, they had, they didn't want… There was a sort of, I'm a tough guy, on the shop floor. I, I'm not here to do this sort of clerical work. But I discovered very quickly that some of them were going home and telling their kids, you know, 'I'm working with computers now.' And it became a, it became a plus thing. So I never had, we never had a problem with the unions, mostly. We did have a problem later on over payment, in a different part of the mill. But mostly I found people were interested and keen, and much more interested in the management of the mill, thought they were going to be… It turned out that, I had more trouble with the first line managers' acceptance of the systems than I did with the people on, on the shop floor.

[54:12]

What year are we in?

Sixty… The design work for that started in, probably, '67; we started writing the software, late '67, early '68, and through '68. And at the same time, we had to write the control system that was going to manage the transaction processing system. And we looked at CICS, IBM's CICS package, which didn't have restart/recovery at the time. And, it wasn't IMS at that point, it was DL/s, and that was built for complex

databases. We didn't have complex databases. And, IBM and IMS. IMS just stank of, big CPUs. It was, it was too big, too heavy and too slow for what we wanted, and CICS didn't have restart/recovery. So we decided that we would use some basic access methods that IBM had written, like BTAM, and there was a thing called BATS, British access telecommunications system, which some chaps in IBM had written, but not an IBM lab. And we put those things, two things together, and we built a system that we christened STACA. So it was our own CICS equivalent as the transaction processing system. And we were lucky that, we had some wonderfully competent system programmers, Dai Parry and Marcus Benney were the two, were at the heart of writing STACA. And it, it just, it just worked. We went live in January 1969. We took it off the air after about, three or four days or something, because, we, we hit a glitch in the way that we were updating order records. So we had to correct that design, it was a design flaw on our part. And after that, off we went.
[56:10]
And, within… Oh. Oh I had hired some more people from the cold mill, because, I needed people to help train the operators, and so I hired two people who had worked in the cold mill, and again, like, we knew lots of people. And we built a computer room in the basement of the cold mill to house two Elliott ARCH 102 machines, which were the ones that were channel-connected to the 360s. And a nice little aside to that. The steel mill we've just driven past, which is four miles long, has cellars underneath it that are four miles long. That's where all the pump work is, and a lot of the motors, and all sorts of stuff that you don't see. You don't need it on the shop floor, but it's got to be close by.
[57:02]
So we built the computer room down there. And, it didn't need… There's no artificial light down there obviously. And during one training session… And we had a, we had one of these terminals down there, and that's where we did all our training of the people to operate the things. There was, I think there was a knock on the door one night, and we did our, we did our training in the wee small hours, because that's the only time you had access to the 360s. And, and this chap was curious about what this, what this room was, what's going on in here. And, I was always very sensitive to the union about this, and thinking, now, what's this man's motive? Because we had had discussions about pay. Everybody using these terminals got paid extra, that was, that was obvious from the start. If you want us to change, it's worth it to you,

therefore it's worth it to us, and want more money for doing it. I wasn't involved in the negotiations other than as an adviser, but, we always, the company always paid. And… So I was wondering what this chap's interest was. And I explained it was a computer room, and what we were doing, and we were going to be rolling these terminals out across the shop floor and so on. And he said, 'So when are you here?' I said, 'Well generally, we do our training in the wee small hours because,' this and that reason. 'So what, what's it used for at other times?' I said, 'Well it just stays here locked and secure, because we've got two computers in it.' 'Would you consider renting it out?' he said. [laughs] 'Because we run a film club. [laughs] And this would be perfect for a film club. No one can see inside it, the foreman can't see what we're doing.' [laughs] And it turned out, there were two film clubs I think running in the mill, which ran on the night shift, when things were quiet, and there were people sowing movies. [laughs] And needless to say, I had to decline. And he took it rather well.

[59:00]
So, this project then. Seems to me the components in it were, Elliott's did the, the hardware stuff, and the, the detailed system implementation. You had some programmers working within the steel company who did the communications stuff by the sound of it. You were the mastermind.

Well I was the mastermind of the systems analysis team.

Right.

And I controlled the application software team. So the… The, the transaction processing system was done as one piece of design; under that, there were application programs that processed the messages, so that they came in to the mainframe, through the transaction system, and delivered then to applications that updated all the records, stock records, order records, whatever it was. And my team wrote the message processing software, so a message came in, this is what we do with it. So, the systems analysis, you define the message, you define the processing for it, and then the applications, apps I suppose they'd be called today, were written to process each of those unique message styles. So, I was completely dependent on the transaction

processing team for the, for what we called STACA, and everything after that, the message processing stuff, we wrote in my team. And all the analysis programs were also… The stuff that the user saw was part of my team, and the stuff they didn't see but made it all possible was written as part of this system called STACA.

So your skillset was systems analysis and specification and project management.

Yes. And, as I subsequently discovered, when I applied to IBM for a job some years later, I applied for a job as a systems engineer, and the man who interviewed me, Marshall Wood, who was then the branch manager in Birmingham, said, 'No, you should join as a salesman.' And I said, 'No no. Dirty word, salesman. I'm a, I'm a techie.' And I, I had… He had come down to visit Port Talbot some years earlier, and I had taken him and some others around, and we talked about what we were doing. And I said, 'No, I'm a techie.' And he said, 'You're not a techie.' He said, 'You're a salesman. I've watched you work with these people. You're a salesman.' And being stubborn, I joined as a techie. Did all my systems engineering training and qualified, and the day I qualified as a systems engineer I switched to sales training. [laughs]

[1:01:44]
So, the transition into IBM as, and, and salesman in due course, is, is the next instalment. Is there anything… What else happened between 1969 when you got this, this cold mill…

Cold mill.

…yeah, running, and your departure from the company in '73?

A number of things. The first was, that in, late in, sometime in '69, just after we had gone live in the cold mill, the industrial automation people conceded that the new process control computer system was not going to be ready for the opening of a new steel plant. That was called the BOS plant. And… I think that would be about the middle of the year. And the steel plant was opening in about six months' time. This was a multi, multimillion dollar, pound, investment. The Queen was going to be

officially opening it. That was going to be a couple of weeks after it started of course. And so, with them having conceded that their computer process control system wasn't going to be ready, I was told that I had six months to develop a computer system so that the place could open, run, and record what they were doing, and we could keep track of it all. So I put together a team of people. I hired a PhD who had been a metallurgist in the BOS plant – or, in the then steel plant; someone else who was a metallurgist; and I put a couple of programmers on it. A team of only about, half a dozen people, to do the same job as we had done in the cold mill. What data did these guys need to run the place, what do we need to collect, how are we going to collect it, how are we going to process it, what's the logic, how does it work, how does it connect with other things? We did that. We, we hit the date. And when the Queen came along to open the plant… And we, we chose IBM hardware for this, because by that point they had developed a range of hardware that was suitable to work in an industrial environment, and, was also available within the six months. I, I first went to Elliott Automation and said, 'OK boys, I need another system,' and they couldn't deliver it in six months. So, we agreed that, they were therefore out of it. And I chose the IBM 1070 system. And it worked, it worked a dream. We designed our own terminals, which you could do with the is. They provided control boxes that you could connect terminals to, and they had all the telecoms capability. And we designed the keyboard to be used by the operators on the shop floor. We hit the date, the Queen put her finger on one of these terminals, and a golf ball, an IBM golf ball printer alongside said 'British Steel' or whatever it was, 'welcomes Her Majesty the Queen.' I don't know if she took the printout away, but, we should have had it framed. And, so, once again we were heroes. We had, we had done the cold mill system, and it worked, and then we had done the steel plant systems, we could start, and we… And we rolled that out quite quickly into further stages of processing. So I had different teams working on different parts of this.

[1:05:31]

And by, I suppose, 1972, we had implemented all the hardware we had bought for the cold mill, all the hardware that we had bought for the, the steel plant and the next set of processes, and, I needed some more money to finish it off, to take it right through to the dispatch of the product to the customer, and then I could join the whole thing up. And I was having difficulty persuading people to part with the money, and we were by then nationalised. We had been nationalised a couple of years earlier, '69 I

think, but it began to bite in the early Seventies. And we started… We, we lost the management team that we had had before, and the top management team were Yorkshiremen from Sheffield, who had worked in much smaller plants. And the, the ethos was completely different. There was… How… There was more… There was an obsession with process and bureaucracy and paperwork. And I think I submitted the business plan, two or three times. And the first time it was bounced back because I had used an old format. Something as trivial as that. The second time, it was bounced back for some other bureaucratic reason. And I can remember saying to some people very senior in the finance department, 'It doesn't matter how you want me to fill in the form. What's at the top left-hand corner is what this is going to cost, and what's at the bottom right-hand corner is how much money we're going to make. And all you want to do is rejig the numbers in the middle.' And I got, I got so frustrated with this, after one meeting I, in London I think it was, I got home and I said to my wife, 'I'm leaving.' And she said, 'Where are you going?' And I said, 'I think I'll go to IBM.' And she said, 'Do they know that yet?' 'No, [laughs] I haven't told them.'

[1:07:36]

And, as it happened, that weekend there was an advert in the *Sunday Times*, IBM were looking for salesmen and systems engineers. So, I filled it in, and, and sent it off. And the other thing that had happened in between was, that, in this nationalisation, we had got an organisation which was very risk averse, risk averse on the one hand, and very, oh what's the word? It was biased. They had all come from one part of the steel industry, and they thought that their part of the steel industry was better than anybody else's part of the steel industry.

[1:08:25]

And, a system I didn't mention, that, we put a brand new online order entry system in for Port Talbot, which we did in a matter of months. The first time we had used visual display units. The salespeople were cock-a-hoop. The customers were chuffed, our sales performance and the delivery performance had improved dramatically. Customers were asking for orders to be placed, they placed their order with British Steel. British Steel then wanted to decide which plant was to make it. We had designed a system that put Port Talbot ahead of everybody else. And customers would say, 'Well I'd like this to go to Port Talbot,' and the Corporation would say, 'Uh-uh-uh. No no. Our decision, who makes it. It's all the same. Our decision.'

And our salespeople were saying, 'Come on, come on, we've got the best, we've got something we can sell.' And we got into a conflict with the Corporation, who wanted to load-balance at the expense of customer preference, and we had put in a system that generated a massive amount of customer preference. So that was another ideological clash. And that together with this bureaucracy was, oh, it's not worth it any more, I'll go and do something else.

[1:09:39]
So, IBM must have been a very different environment.

Oh, a breath of fresh air, [laughs] it was, yes. One dining room. We had five or six different levels of dining room at Port Talbot. Very status conscious. You knew you had been promoted when somebody turned up with a bigger desk. Terribly petty. IBM was… You had… I don't… I had been lucky in the computer department, I was always, generally, dealing with clever, motivated people, and, even a lot of the chaps out on the shop floor whose jobs were very mundane and repetitive, they were nice people to deal with, and you were like-minded, and you all wanted to succeed. But the politics between the plants, and in the organisation, made it a very uncomfortable place to work. There was none of that. I never noticed politics in IBM. There were always people who were, some people were sort of, empire builders, and they were aggressively ambitious, and, everybody knew who they were and you just let them get on with, because sometimes they'd fail by their own efforts or whatever. So it was a joy to come in to, to come into IBM, and you just, you flourished if you were good, and you didn't if you weren't.

[1:10:56]
My perception, never having worked for IBM, my perception, and kind of, what I've picked up from reputation, is, it's a very sales-driven organisation.

Mm.

And, if you can sell and get the orders in, then, you're going to succeed. That's why there's no politics, because, there's very clear…

Mm.

…a very clear objective. Is that fair?

It is up to a point, I think. We were very sales-driven. It took me, 20 minutes after I joined the company… I was based in Cardiff, and when I applied to IBM I had a telephone call… Well they'd have got the letter probably on Monday or Tuesday. I went to see my boss's boss the day… I posted the letter to IBM in response to the ad on the Sunday evening. Eight o'clock on Monday morning I was in my boss's boss's office to say, 'Look, I've applied for a job with IBM. If they offer me it, I intend to take it. I don't want anybody in British Steel playing silly buggers with this.' British Steel had previously put pressure on IBM to withdraw a job offer they had made to someone in British Steel because they were such a big customer, and all the rest of it. So I didn't want any of that going on. And he agreed that that would be the case. They did offer me a couple of jobs. They offered me the biggest non-director job in the plant, if I would stay. But my mind was made up by that point.
[1:12:34]
The day that IBM got the letter I had a phone call. Oh no, the IBM salesman knocked on my door, and asked if he could have a quiet word. And he said, 'I've been sent to ask you if you're serious about this application.' And I said, 'Yes I am, and, no one is going to play silly buggers with it.' And I had three or four interviews, and the first question in every interview was this: 'Are British Steel going to do anything silly about this?' [laughs] And when I… The final interview I had, it was in Cardiff. And, I said I, I don't understand why I'm in Cardiff, because, everyone I've seen in IBM says, 'We'd love to have you join, but you can't possibly stay in South Wales, that would be just, too close to home. So why am I talking to a manger in Cardiff?' And he said, 'Look, we've had a call from British Steel. They've asked, "If you're determined to have him, will you keep him in South Wales, and keep him working on the steel industry."' [laughs] So that was rather nice. It made, it made getting into IBM that much easier. We didn't have to move house at the same time, and, you know…

And that's what you did, was it, you…?

And, so, I stayed, based in South Wales, for the first eighteen months. And, I only stayed working on the British Steel account for about, two and a bit years, because I got very frustrated, again, with British Steel. They, the politics in the place was so bad, that they had these examples of what's today called best practice. In Port Talbot we had a computer system that was delivering for the customers, delivering the orders, delivering profitability; people were using it, they were happy with it, there were no problems with it. But they would not put it anywhere else. My first customer was British Steel at Shotton when I worked in IBM. They were developing their own system, their own equivalent of STACA, their own equivalent of CICS. Llanwern, which was only 30 miles down the road, were doing the same thing, different. And you think, well this is such a folly, this is such a waste of resource, but it was caught up in the inter-plant politics. So, I, I persuaded, not singlehandedly, I was working with other people, we persuaded British Steel at Shotton to, to drop ICL and to put all their computer systems onto IBM, so that was my first sale. And you're right about IBM being sales-driven. Without sales success, you don't go anywhere in IBM really. [1:15:12]

But the, the thing that I learnt most from that, which I had learnt to some extent dealing with IBM at Port Talbot, there were individuals in IBM that if you went and asked them a question, you learnt to trust them, and there were others that you didn't go and ask the question. And what I learnt at Shotton was that if you built a trusting relationship with the key people, and then, once you had that, you could build it with other people. But in general you had to start somewhere at the top or in the middle, working… You couldn't start at the bottom and work your way up, that was too hierarchical an organisation for that. But once people got to trust you, and realise, well you're not selling me this just because you're a salesman, and I never ever in IBM tried to sell anybody anything I didn't think was the right thing, and I would often say, 'No, that's the wrong thing for you, I'm not going to do that.' Either not do it, or let's do something else, but… That seems to me to be the single most important thing. And behind that there are systems engineers, there were at the time. Every salesman worked with a systems engineer. Sometimes the systems engineer was part-time with his customers. But, these were the guys who, after a sales presentation, and I learnt this in IBM, when I was a customer, right, you know, the salesman would come in and say, 'Oh we've got this brave new world,' and all the rest of it. And you'd go, 'OK, that's very interesting.' And then, you'd talk to the systems engineer

afterwards and say, 'Is this going to work?' [laughs] And, and if the systems engineer said yes, OK, but if the systems engineer said, 'Well, I'm not sure it's entirely the right fit,' or, whatever, there'd be some set of words that you put through, you could put through a translate table and think, OK, well we'll rethink this, we won't get involved with this. And, I always had, I was lucky that we had some systems engineers working with us, Mike Farrington being one, who was one of the guys who was just brilliant. Michael Vilivic was another one. You could talk to them, they understood what you were trying to do, they were as committed as you were, and you knew that the advice you would get, or the answers you would get, would be the right, would be unbiased and, you know, accurate. And, all my time in IBM, right up to the year I left, I always had a passion for systems engineers. And, along the way, I also had a passion for the customer engineers who maintained the stuff. They were the Cinderellas in IBM. And, a lot of the salespeople didn't bother them
, their machines failed, they came in. When I, I had Rolls Royce as an account, I had a team of twelve hardware engineers, and a couple of software engineers. That was a, a function of how much hardware there was, and how much software there was. But every couple of months I would take them away, and I'd explain to them what was trying to do, and how I was trying to do it. And I wanted to get my arms, they were part of my team, and, and I always wanted them to know what I was up to. And they were a fantastic source of information. If a salesman from a competitor called and turned up in the computer room, within five minutes I would know from the engineers, because they were always working in the computer room, 'Oh, somebody from such-and-such was in today.' 'Oh, right, OK.'

[1:18:38]
So you're painting a kind of picture as the IBM salesman being the, the orchestrator of...

He's the conductor of the orchestra, I think, yes.

Yeah.

Yeah. He's the guy who has to close the deal, always.

Yeah.

But, you're always dependent on other people, and I never ever liked…. I cautioned a number of salesmen who I've heard over the years, 'Well I've done this, I've done that, I've done the other.' 'No. The team have done it. You're all… You know, don't claim all the credit, because you can't do it without him, and her, and her,' whatever.

IBM used to have this thing, didn't they, about, everybody sells.

Well, I never heard that, but it's about right.

Yeah.

You know, and if, if your systems engineers understand what you're trying to do, and why you're trying to do it, and who you're working with, then, they're part of the same script, aren't they. And so, they're subconsciously doing it. But you, the thing that I do absolutely believe is that, there's a, there's a big, there's a big difference between a techie and a salesman. Salesmen understand, most of them anyway, sales plans, and incentive plans, and those sorts of things. And techies don't. There's a, there's something, there's a gene that's different. I'd love to see that identified in a DNA strain. But, if you say to a techie, 'OK, well if, if you sell five IMS licences, you know, you'll get a ten per cent bonus,' there is something in their genetic make-up which means that the minute they walk into a customer, the customer's going to know, this guy is now on a sales plan. They know salesmen are, but they trust techies for technical advice. And, there was a move at some point in the late Nineties to put techies, a) put them all into the services side of things, which I fought, and I didn't do, and to put them on some sort of sales plan, and I fought that. I think that's a, absolute folly. And, if you think about, one of the things the Blair government did, they put civil servants on targets, and all this sort of stuff, 1,000 people who have no idea of how to do it, and it, I think it instituted deceit in the Civil Service. Because what… Then they've got a target, they manipulate it. You know, hospital waiting times. If you hit the target, you get a bonus. So now, we've got one list that's the measured

list, and another list we haven't told you about. And, it's, there is something different about these people.

[1:21:19]
You said something a couple of minutes ago about convincing them to drop ICL. Because, we're now in the, the 19…

That was 1975.

So, at that time, there was a policy, wasn't there, for, for nationalised industry, and government departments to buy ICL in preference to anything else. So how did IBM overcome that?

Well I don't know how we did outside my own experience. It was particularly prevalent in local government. And later on when I was running the West Midlands business, I had Birmingham City Council as a customer, who were the biggest local authority customer we had in the country, and they were all IBM. But the subsidiary local authorities around the West Midlands were almost without exception, apart from Staffordshire I think, were ICL. And we never had any success, that was in the mid-Eighties, mid to late Eighties, we didn't have any success in winning any one of those back from ICL. We had success in the private sector, winning companies to IBM from Unisys and one or two others of these sorts of people. The… British Steel weren't wedded anywhere. None of the steel companies I don't think were wedded to ICL anywhere. There were… I don't think Shotton was the only one. I think there were some ICL machines in Scotland and there were some in Yorkshire. I wasn't conscious of any, of any pressure on British Steel, and my main contact in that campaign was the finance director. He did… He did mention once or twice that there would be nervousness if they settled on us, and it wasn't so much that we… I think he had said something like, if we make the decision now to go with IBM, but we keep the ICL machine, just in the computer room almost, and run ordinary routine stuff through it, then, I won't be the target of so much pressure as if I throw it out. And I was, I was at Shotton for two and a half years, and the ICL machine was still there when I left, and I think that was just, not just, they would have had to convert stuff from the ICL machine to IBM, and there were lots of other things to be doing, and

these systems were probably frozen in time and spec and whatever. So it was probably a perfectly rational operational decision. But I think there was an element of that, that, if I'm seen to chuck them out, they'll throw their toys out of the pram or something. So that, that's my only, only experience of, of dealing with them.

[1:24:31]
So you had a, you had a very successful career in IBM, I think progressing from what… You joined as a systems engineer but did the sales training almost immediately, and progressed to running a large part of Europe. You won the Golden Circle Awards on, on the occasion…

Not as many times as some other people I worked with. I was never that good a salesman.

What was the secret of your success?

I think… [pause] I think I'm good with people, and I think I'm a pretty good judge of choosing the right people. And I think I'm pretty good at motivating people, and I think partly… I don't think I'm better than anybody else in the world, but I don't think there's anybody in the world better than me. And I think if you treat people the way you would like to be treated, you really, it's hard to go wrong if that's where you come from. And if you combine that with, everyone's important, and everyone's different. I don't think I've ever met two salesmen who are the same. And, I've often met salesmen who are motivated by the same thing, by money or whatever, but there's always something different in the way, like, people like to be motivated, and if you can maintain that ability to treat people as individuals, and then that you only employ people who are good, and if people fail, you do your best to help them, but if you fail, they have to go. And, and you should never employ a duffer. If you've got someone in an organisation who's a duffer, the other people in the organisation, I'm inclined to think, will think the bigger duffer is you for keeping him, or her. And I had a boss at one stage who employed a guy who I thought was a troublemaker, and, a number of times I tried to persuade him, 'You have to do something about this chap, because, it's your reputation that's suffering,' and I just couldn't get him to see the point. But I fundamentally believe that. And my measure in IBM, one of them, was,

the number of people who weren't working in my bit of the business who came to ask if they could have a cup of coffee and was there room for them? Because that meant that they were hearing that this was a good place to be in IBM, from people who worked for me. And they're your best adverts, really. And then your customers are fabulous adverts, and if you build relationships with them and they trust you, then why would they not do business with you?

[1:27:31]

An interesting thing I learnt from IBM – from Rolls Royce, my time, I spent eight years at Rolls Royce, the most technically competent customer I ever worked with, and they were very difficult people to deal with at times, and they got quite explosive at other times, was, I stopped… When I took over the account, it was after a huge loss to Amdahl, and that shook IBM in Europe from top to bottom. The sales team was, there were five of us, the system, there were ten or more systems engineers, they were thrown to the four corners of the world, and I was the only person who stayed, and I stayed because when IBM said to the head of IT, 'If you make this decision for Amdahl, I'll take everybody away.' And the customer said, 'Fair enough.' And that shook the sales director to his roots. And he said, 'Well don't you care about any of them?' And Roger Store said, 'Well we think Henderson's OK, but don't care the rest.' So I was told to stay. I didn't want to stay, because I thought they'd made a really awful decision for Amdahl, which was… And, about a week later, I was going out one evening, and I bumped into the head of IT strategy, and he said, 'How long are you going to be grumpy with us?' And I said, 'Look Michael, I, I don't like the decision you made, I don't like the way you made it, and, I didn't ask to stay here. I've been told to stay here, so I will do a good professional job, but don't expect me to enjoy it.' And he said, 'Well, what if I explain to you how we took the decision?' And I said, 'Yes please.' And we sat down for a couple of hours, and he showed me the series of presentations that IBM had made, I recognised the handwriting of my marketing manager, which explained to Rolls Royce that they didn't know anything about IT. We knew what was best for them. They responded with a presentation I thought was quite rational. We bounced it back, again why they were wrong. And he took me through all these presentations, I hadn't been party to because my responsibility rolls were all the smaller computer centres, and at the end of that two hours, I said, 'Mike, you're absolutely right. If I had been in your position, I'd have done the same thing. But you will never do it again. I'll never give you the chance to

do it again.' And so I won them back. And turned them from the eighth to the fourth largest customer we had in the UK.

[1:30:02]

But it was, it was really interesting about, trust, and motivation, and, and all those sorts of things. You've got to get inside other people's heads. Why are you telling me this? And what I drew from that presentation was, I came… I was driving home, it was a half-an-hour drive, and, I was thinking, OK, well, well I'm now going to stay, and I'm going to stay because I want to stay, and there's an opportunity to turn… Because they, they'll have to do something else in a year's time, or two years' time. So I've got a year to invest in this. And what am I going to do differently? And I made two decisions. One was, to almost pre-announce, which was a criminal offence in the US, you could not pre-announce, I would virtually pre-announce what we were doing, and I would say, 'So you're the first in the country to know this,' and I would start my presentations… The announcement time was always three o'clock in the UK, nine o'clock Eastern Standard Time, that was the formal announcement time. And I would get them in a room at about two o'clock in the afternoon. And I had placed people with opportunities to get in to different parts of the company that I was interested in to find out what we were going to announce. And at two o'clock I would say, 'OK, nobody goes out of the door, and I'm going to tell you what we're going to announce in an hour's time. And, on announcement time, at announcement time, I want to an order, for what it is, and that way we'll be first in the queue.' Because orders were time-stamped, and it was sequential delivery. And that's probably going to get me sent to jail. But that's how I did it, that was one of the things I did. And, coupled with that, it was, not to say so much, this is what it is, but this is why we've done it. We think that computing is going to need, for instance… Well, I think on mass storage system, which was the largest storage thing in the world, Rolls Royce was the only people who had three of these things, in the world. And I… But… And I had taken them to, Phoenix or, somewhere, wherever it was designed, and I got the designers to talk to them about, this is why we're doing it this way, and this is what we see, this is what we see is going to happen to data, and, all those sorts of things. So it became… If they said to me, 'Oh yeah, I can see why you're doing that,' they were selling it to themselves.

Yes.

You know, if their requirement was the same as the one we had identified, it was, well of course you bought it, that's what it's for. And, so, I stopped at… I, I'd never much enjoyed saying, 'Well you know, it's blue, that's why you should buy it,' or, 'It's six foot high,', or, 'It's got castors.' I mean, so what?

[1:32:55]
So in your time, 1973 to 2000, I guess, IBM went from a situation where they were kind of the, the market leader, the default choice, and it was all about hardware and big machines, through to a position in, at the end of the century where computers had changed in nature to much smaller machines, client server architecture, computer companies were solutions companies rather than hardware companies. And in the middle of that somewhere IBM went through a crisis.

Mhm.

But seemed to come out the other side of it. I mean, what was it like going through all of that, and how did IBM manage it?

Well I think that stated, 1989, 1990. I know the next couple of years I think we about halved the workforce, just about every country we operated in. The thing that made it relatively easy was that it was a voluntary separation scheme, which was financially very good, and people towards the end of their careers could, could retire with an enhanced pension, it was a good pension scheme anyway, there was, final salary pension scheme, with enhancements depending on years of service, and a lump sum and whatever. So, that made, that made it easier for people at that, at certain ages to say yes. The, the risk associated with it, I thought, was that, we were in danger of losing some of our best assets, and whilst I had always believed in promoting young people, and, I would often have people say to me, 'Oh, don't you think it's a bit early to give him that big job?' or her that big job, and I'd say, 'No no, the right encouragement, and…' And people never let me down. So, I was keen to be moving people, and I could see that opportunity, but also, especially on the… You need senior salesmen and senior systems engineers, because they are the guys who are nurturing the people in it. So I didn't want to cut our head off. And one or two parts

of IBM did exceptionally badly, and some executives we should have fired for doing what they did. So I was, whilst it was a, a voluntary scheme, my attitude was, I'll decide who I think I want to keep least, and I'll encourage those people to go, and to the people I want to keep, I will say, 'I am not offering you the opportunity because I would like you to stay,' for this, this and this reason. And, happily, most of the people I asked to stay, did, and the people that I suggested go, went. There were a few, there were a few individuals who disagreed with me, and… But, I think, you know, you've, if you're slimming something down, especially, you should never carry dead weight anyway, but if you're slimming something down, you've definitely got to cull. And, I did a, just before I took over banking in 1995, we did a cull of about ten per cent across the banking team, and I was given the job in my peer group of managing this. I think perhaps it was a bit of a test before they decided to give me the job in the January.

[1:37:07]

And, so I was negotiating with my peers about, about the ten per cent. And then, when I got the job… We, we did the cut, and I got the job, and the first thing I did, or very early in the year, was to persuade my European bosses and my UK bosses that I wanted to hire some people, because we had got rid of too many in the ten per cent, but by crikey I was going to get some cracking quality people in the place. And that, that helped me a lot with the management team, because there were people in the management team who had, I was the most junior of that peer group, and, there were at least three people in the team of ten who felt they should have got the job way ahead of me. And it took me some time to get them on board. But that was one of the things that got them on board. Because when I said, 'OK, now we're going to grow it,' 'Well, how are you going to do that?' sort of thing. And we did. And, I, I think it took me till about, October before the hardest man to persuade actually said, 'You know, I think you're right, I think we can do this.' Because the other thing, in, going in for the extra people, I had also gone in for a quota increase, which was, not quite unheard of, but you didn't generally volunteer for a quota increase. But my belief was that the business was there to be had; we had just to get better at doing it.

[1:38:37]

So were there people in your time at IBM that you, you felt particularly inspired you, or were great models, or mentors?

Yes. Yes. Marshall Wood was the, he was the branch manager in charge, who, I, his decision to take me on in the first place, in 1973. He was the chap who told me I didn't want to join as an SE. And we still see him and his wife for lunch every year or so. He… The thing I learnt from him, he was one of these very approachable, understated characters, not flamboyant. Some managers in IBM were deliberately flamboyant. And I was in regard to shirts. I used to wear brightly coloured shirts, with stiff white collars. And my attitude, well if you haven't got any talent, you've got to be remembered for something. Everybody remembered me for my shirts. So did the customers, funnily enough. Marshall was one of these understated guys, very sincere, the sort of bloke you would trust with your life. And the thing I learnt from him was walkabout. I was based in Cardiff, and the branch office was based in Birmingham. And every now and again there'd be a meeting in Birmingham, and you'd be in the Birmingham office for the day or something. And I noticed whenever I was there, that Marshall wasn't in his office. If he was in his office, he was in a meeting; if he wasn't in a meeting, he was out talking to people. And, and that always struck me as a very powerful thing to do. And, from the minute I became a manager in IBM, and you have a secretary managing your diary, I can remember one of the first things I said was, that I always want a couple of hours free, at least an hour in the morning and at least an hour in the afternoon, while I want to go to talk to people. And I always did that. And you find out more about what's going on. You know, well, 'How are things going today Tom?' And, 'What's happening with such-and-such a bid?' 'Oh well we're…' whatever, you know. 'There's this part of the company, you know, we're having trouble with the software division,' and, something. And I'd just go back, and I'd call the guy in the software division and say, 'Look, this is what we're trying to do here. Is there anything else we can do?' You know, what's… where do… 'Let's get your objective and mine lined up in this.' And I also used to spend, once I got the banking job, I used to spend time going to the, the routine meetings of all the other bits, the product businesses and the service business, just to say, 'Look, this is what we're doing, this is how we're doing. Thank you for your help with this,' and whatever. And these are the big things we're working on at the moment. I was, my attitude always was, if someone from banking asks you to do something, I'd like the answer to be, 'Yes. Now what can we do to help?' Not, 'No, you can't do that.' I learnt that, that was something I had… We had

a finance director at one point, before Peter Crudd, Peter someone. We had a finance director who, whenever you asked him something, said, 'No.' And then Peter came along, whose surname I've forgotten, and his attitude is, 'Yeah, we can do that. What's… I'm not sure we can do it, but what do you want?' And he'd arrive at a solution.

[1:42:06]
What about Lou Gerstner, did you deal with Lou Gerstner when he was…?

Well I met him two or three times, and I had the customer call. I did one customer call with him with a customer, I had dinner with him with a number of others not long after he was appointed, and, I met him on one occasion… He was brilliant with customers. He, he would not do coffee calls, as he called them, and, all the customers wanted to beat him, just because of who he was. And they'd met all the other chief execs at IBM, so they were sort of entitled to it. And all my customers were the big banks, and, guys who felt they were entitled to meet him. And that's fair enough, they were giving us large amounts of money. But he didn't want to waste his time. And, there was a briefing package that you had to complete if you wanted him to do a customer call, which was very detailed. And, the first time I did a call with him he, we gave him the brief, I picked him up in the car to take him to the customer, and, and the routine was, you talked through the brief on the way. And we talked through it. And he got, we got halfway through it, and he said, 'That's not what it says in the written brief.' And I said, 'No, that's because I did a call last night and I now think we can win all the business, whereas, in the case I put, we thought the best we could do was half.' And, I explained to him why I thought we could now do it all. And he patted me on the arm, and he said, 'Don't be greedy.' And, I said, 'No no, [laughs] there's no question of greed. I've just read your contract.' [laughs] And, he said, 'Touché.' And I said, 'No…' And, he said, 'OK, I'd like a couple of minutes to think about it.' And, I said, 'Well before you start thinking about it, let me tell you about the man we're calling on.' And I explained who this chap was, about his personality, about his family, about his career, what made him tick. And at the end I said, 'And thank him for his business. Because I'm sick of taking, seeing senior IBMers not say thank you.' And, he said, 'OK.' Very low-key. We, we did the call, and your job in the call is to stay quiet, but just keep an eye on the clock, and signal when you've got

five minutes to go or something. You're not there to contribute anything other than an answer to a direct question from either of them. And with a couple of minutes to go, I was willing him to say thank you, and when we stood up at the end of the call, and they shook hands, he said, 'By the way John, thank you for your business.' And, John said, 'That's OK, you win some, you lose some. You win it when you deserve it, and you lose it when you don't.' And Gerstner said, 'Yeah I know,' he said, 'but I was a customer of IBM's for 20 years, and nobody ever said thank you to me.' And I just thought it was a brilliant, absolutely brilliant way to play it. So I thought he was a class act.

[1:45:21]
OK. We, we're kind of, moving into I think the reflections on, on the career now. What would you say have been your greatest successes in the steel company and IBM, and, you know, and indeed life?

[pause] Well my greatest success is my family I think. [pause] I think my greatest professional success is the steel company system. I think it's, to be able to grab, a word I hate, but to be able to grab that much responsibility when you are, 22 or 23 years old, and, and drive it to success, it's wonderful to think that people can, you know, that I was able to do that, especially with the limited background that I had. And it sort of proved that if you are determined, and you've got the capability, that the sky's the limit, really. And I, I didn't… I never… Because there was this ethos of innovation in the place, I wasn't surrounded by people who kept saying to me, 'Well you can't do that, you can't do that.' One of the reasons for that was, nobody had ever done it before, so, there wasn't anyone saying, 'Well it didn't work out last time.' [laughs] Yeah, well that's obvious, you know. So I, that's the, that's the IT achievement of which I'm most proud by, by far, I think.
[1:47:07]
And then I think I was, I was very lucky in IBM that, I turned out… I was aware that I was good with people when I was in British Steel, but I became really aware that I was pretty good with people when I joined IBM, and, the thing that they, they did both have in common is, they're both meritocracies, really, and apart from one blip when I became branch manager, the chap who was the sales director, who was introducing me to the branch the day I was appointed, said, 'What university did you

go to?' I said, 'I didn't.' And he was horrified. He didn't know. 'Well what can I say about you?' I said, 'Well…' [laughs] So we talked about that a bit. But that was the only time that I ever sort of bumped into, into that, and most people in IBM had been through university and had, for a long time it was predominantly Oxford or Cambridge, you know, they were top quality people. But I think… My objective was, in every job I had in IBM, whether it was a marketing manager or a branch manager, or a director, I wanted to be the best, but I… And I wanted to, I wanted people that worked for me also to be the best, and, but not to get there by bullying or whatever. Because I had… You asked the question about managers. The best manager, the man I learnt most from, was Marshall Wood, at such a critical, formative time. And then the last manager I had, Barry Hurst, I learnt a huge amount from him. He was, he knew when to intervene and when not. And a thing that I learnt all the way along, as long as you are prepared to take opportunities, and take responsibility, and make decisions, and just do it… In IBM what I found was, whenever I got a new job, I, I would suss out the team, who have I got, who's on my side, for sure, who is not on my side, and who are the guys I've got to persuade, who could go one way or the other. If they're not on my side, they're not on my wavelength, and they're not doing the right sort of job, then I am going to move 'em out. I want a set of people around me who have got the same motivation as me. And, and I will take responsibility for what I do. And I can remember saying to an Italian boss I acquired at one point that, 'The deal is, you and I can agree a quota, and we can agree a budget, and then you leave me to it. You don't poke your nose in. I'll tell you what I'm doing, but, don't interfere. I'm going to do it my way.' And, some people find that sort of, hard to take. IBM's not full of micromanagers. It wasn't the time; I think there are too many of the buggers now. And I said, 'So that's, that's the deal.'

Yeah.

'Now, I'm here at your pleasure. If you don't want me to do the job, that's fine. I don't have to do this, I don't have to work.' I used to create the impression with some of my managers that I was financially independent, because that was a useful tool. 'So I don't need to do this. It's up to you. But if you want me to do the job, that's the deal. And, this particular Italian agreed. Every… They always agreed. The Italian was the only one who after a couple of months started to dabble, and we had words on

the phone. He was based in Paris. We had words on the phone one day. And, I took the Eurostar to… We ended acrimoniously on the phone. I took the Eurostar to Paris that night. I was in his office at 6.30 in the morning, sitting behind his desk. He came in about half past seven in the morning. So shock, 'What are you doing here?' And I said, 'This is very straightforward. We sort this out now, or I go and do something else.' And he spent the next hour trying to get me out of his chair. [laughs] But we ended at about ten o'clock with him agreeing to keep his nose out. And, I had… My attitude was, I've got a lot of leverage here. I was on quota for 24, 24 years I think, and I made my quota 21 times. There were people in the company who had better records than me, but my last year, my quota was one and a half billion or something, and the year I left it was two and a quarter billion. It takes a brave exec to look someone with that track record and say, 'OK, well I'm going to replace you with somebody else.' And I counted on that. And it, it served me well.

[1:52:10]
Good call. Well, is there any piece of advice that you would give to, going back to your position age sixteen, and, you know, at that pivotal point where, where you were leaving school, for one reason or another, you know, what would you advise somebody to do now? To, to stay on and do their A Levels and go through university, or, would you advise them, go into the IT industry? You know, what's your life advice for a sixteen-year-old?

I think the first thing is, if you, if you can't read, and you can't write, and you can't spell, and you can't speak, you are doomed. I think that's the first thing. So, I would advise getting the best and most appropriate qualifications you can up till you're eighteen or something. Because I think that's the key. And after that, it might be that… I'm a firm believer in technical apprenticeship, I think the country is losing those sorts of skills. I don't think university is suited to everyone. I think the Blair idea of half people going to university was arrant nonsense. And, I, I think you, you've got to have a, a good education that's relevant to what you're trying to do. I can understand someone at sixteen or seventeen not knowing what they want to do. I certainly didn't. So for some people it's going to be a discovery by accident, it'll be pure serendipity that it happens; or other people, they're very driven. Our elder daughter decided when she was fourteen or fifteen she was going to going to be a

doctor, and we never managed to persuade her, and, off she went and read medicine at Edinburgh. But most people are not that single-minded. So you've got to stand out from the crowd. You're going to be in a very very competitive marketplace. There are always going to be more people looking for whatever you want to do than, than you expect. So you've got to distinguish yourself in some way. And, I think schools advise people now to do charitable things to boost their personal statements and all this sort of thing, but the personal statements are written by a piece of software, they're indistinguishable one from another. So you've got to find a way of distinguishing yourself. Every time you meet someone, or whenever you apply for something, write something that's different, and write about yourself. Most people I think, consciously or otherwise, they're hiring people, and they want to hire people who maybe think the same way, or the way they want them to think, or would like them to think, or whatever. So make yourself stand out from the crowd. But I think if you are bland, colourless, without an opinion, with no sense of history, what the hell.

Tale a position.

Take a position. I… That's one thing I used to say to my, always used to say to my salesmen, 'Have an opinion. It doesn't have to be the right one, but if you're going to my customer, have an opinion.'

[1:55:10]
Good. And what about the industry, do you think there are some big challenges for the IBMs and others of the world today, in the next ten years?

I suspect that, in what we regard as the… If you exclude… I mean Google is in the IT industry isn't it, and, Facebook and all these sorts of guys. That's a different game I think. But the IT industry as I used to think about it with the, the hardware, software manufacturers, the services, consultancy companies, I think their challenge is, hiring super quality people, and doing the old-fashioned things of motivating them, but being clear about what they're trying to do. The thing that disappoints me today, and I have put a lot of effort into it, so this might be unjust, but I do not understand what IBM is trying to do. I understand what's happening to the share price; I understand what's happening to earnings per share; I do *not* understand what they are trying to

do. If I went to the IBM website, I think, what are they up to? I don't think I could tell. And, it's muddled. And I think that's true of a lot of services companies, consultancy companies, and some software companies. If you… Just reading the business pages of the, of the *FT* and the *Times*, and, and whatever, the *Economist*, and you read that somebody has just bought such and such, and you get fifteen random words put together which includes logistics, benefits, and all this sort of thing, but I think, now if I were thinking about buying something, why would I approach these? I don't even know what they do.

Yes that's an interesting observation. Do you think that is because, it's not entirely clear what the IT industry is any more?

I do.

Because, you… You mentioned Google, and the, the social media websites. I mean so much of the IT industry is, is not about devices and coding; it's about, it's about using IT as a channel to, the, the populace.

Yes. But that, that's… It's a media business, in a way. But, you still, you have to have applications that make companies function. If we're not making things, or selling things, or… It doesn't have to be hard things, it can be soft things. But, organisations need to be organised to produce, and to produce to a quality level, and to sell, and to get money from people. And it's those sorts of applications that at the moment keep the world running. The software that we wrote in 1969 for the steel company still runs. We passed it today. You know, that place only functions because of that control system we wrote in 1969. It's still there. They're thinking about replacing it with CICS for about the seventh time, but they, whether they'll do it or not, I don't know, and, and I, frankly, you know, I simply don't know. But, there is an industry which is, whose function it is to help the rest of the world function, and there are players in that who, some of them have been around a long time, and they're big and successful and all the rest of it. So I think there's a huge opportunity for people to join that industry. And there's big opportunities obviously to join the social media business. I think perhaps the difference between the two is that, the social media business is driven by people who have ideas about new ways of communicating

or, or whatever, and the people who are in the business of keeping the world functioning are more in the business of understanding, what do you have to do to make it function, and how do I make that better? So their drivers are different. And depending on what sort of person you are, you can take your pick.

So you need clarity on what it is you're trying to…

As long as… I… Without clarity, you've had it, I think.

That sounds a good message on which to finish. Geoff, thank you ever so much for talking to us, that was very interesting.

My pleasure.

[End of Interview]