



Capturing the Past, Inspiring the Future

Stephen Temple CBE

Interviewed by

Richard Sharpe

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Welcome to the Archives of Information Technology, where we capture the past and inspire the future. It's the 3rd of April 2019, and it's Wednesday. We are in the Worshipful Company of Information Technologists' Livery Hall near the Barbican in the City of London. I'm Richard Sharpe, and I have been covering, researching and writing about the IT industry since the early 1970s.

[00:29]

Did you make a mobile phone call today? I imagine you did. Well if there's one person in the country that you should doff your hat to, if you have a hat on that is, because you're able to make that mobile phone, and perhaps phone friends or colleagues abroad, or, from holiday, phone in home, or wherever you are, make a phone call, a mobile phone call, and a mobile device, then it's the person who is making this contribution to the Archives today. It's Professor Stephen Temple CBE. Professor Temple, before we get into your many technical accomplishments, let's deal with your early life. You were born just outside Woking in Surrey.

Yes. I was born in the village... Well I was born in Woking Maternity Hospital, brought up in the village of Pyrford. My dad was a market gardener, he had a sixteen-acre holding. Worked all hours of the day, sometimes seven days a week in season. My mother was, both a housewife and also a, a business partner to my dad. And, I was brought up in a very loving family. It was a mixed marriage, in religious terms, but I still went to the local Church of England school.

So, your parents were not civil servants, as you became. They were not technologists, as you were. They hadn't been to university?

No.

Right.

No. No.

Very different background.

Very different background. I, I would sort of characterise my father as immensely energetic. Sometimes very, very creative, sometimes too much so that, he would often change his business processes just to be different. [laughs] And I'd say, 'Dad, why did you do that?' 'Well, you know, I was just getting bored, you know, sowing up the greenhouses,' you know, a particular way. My mother was sort of, far more logical in the way she sort of, thought, and often they would sort of clash with each other in, in terms of the business. My... I had two older sisters. I, I think I lived a little bit in a world of my own, I would say, up to about the age of fourteen, largely because, geographically we were a little bit isolated from the rest of the village, we lived on the holding; partly I think just in, in sort of social structure terms, there was a sort of, a middle class, you know, that commuted up to the City of London and so on, and then there was the working class, and, somehow we didn't quite fit in either social groups. So, very much sort of, self-contained. But that sort of gave me a little bit of a, an ability to, you know, be, work things out for myself.

[03:19]

I failed my Eleven Plus, and I went to the local secondary modern school.

Was that a shock?

It was a surprise to everybody. But I had a... I'm not sure I've got the right word here. Congenital, or... [laughs] I just could not spell for the life of me. So that if I didn't know how to spell a word, I'd spell it two different ways in the same, [laughs] in the same message, to sort of try and get... And that's lived with me throughout my whole life.

This would be known now as dyslexia.

As... As... Well I, I'm not sure quite I would sort of, characterise it. Because I, I was sort of, quite literate in the sense that I could, you know, read, you know, quite fluently, my maths was good, reasonable memory. But I just couldn't spell for the life of me. And I've got a feeling that that took me down on the Eleven Plus. Anyway, went to a secondary modern school. It was quite an enlightened one that was trying to bring the kids up to be able to take O Levels. I think, I was probably about the third or fourth age that sort of, went into the O Level; before that it was, I think, I think

they were called RSA, I think, the exams, then, for the people who were not academically inclined. My mother wasn't quite sure what sort of career I would have. I... I didn't know either.

[04:42]

Were you given careers advice at school?

Absolutely not.

No.

I bumped into a boy in the playground and he said he was going to be a solicitor. So I went home and said to my mum, 'I want to be a solicitor.' She said, 'No no no. Handling messy divorces, that's not for you.' [laughs] And, I think it... I used to sort of mess around with radios, play around with them, along with playing around with other things. So she decided, well maybe I had a, a bent for radio, which I think was a bit of an exaggeration. But she wrote off to Plessey, wrote off to Marconi's, to try and get me an apprenticeship. Plessey's wanted GCSE chemistry, which I wasn't doing. Marconi's were prepared to offer me a technician apprenticeship with the particular GCEs I was doing. Surprise surprise, I took my five GCEs, you know, passed four of them with flying colours. I failed English. My spelling. [laughs] So... I actually stayed on an extra year to, to re-sit, and I did additional maths and one other subject as well.

[05:43]

Where was Marconi based then?

Chelmsford.

Chelmsford.

It was the real Marconi, the old Marconi.

Right. Yes.

I, I... I thought it was a great privilege actually, joining such a venerable company as Marconi.

What was Marconi like then? This is in 1961.

It was a fantastic company, it really was. They invested in training, they invested in their apprentices. They were expanding into everything and anything, in microelectronics, you know, space communications, you know, you name and they were expanding into it. And to some extent the apprentices were actually quite a critical part of the workforce. I mean you really were thrown, you know, into stuff. So, I went through my apprenticeship. Well I did a year full-time at Colchester Technical College, and we did second-year Ordinary National Certificate.

You had to move away from home then?

I was living away from home.

Right.

I lived in a Marconi hostel for a few months, and then I, I found a friend, and we shared a flat in Colchester. And then, back in Chelmsford, I was sharing houses, various Marconi colleagues.

[06:56]

During the apprenticeship, some of it was really, absolutely dire, boring. I remember I was in one test department, and there were television, television relay racks, and my job was to stick a screwdriver in plug number 64, pin one [laughs], socket number 64, pin one, buzz. [laughs] You know, two, two, buzz. And a whole day just, you know, circuit-checking. And I was just bored out of my mind. But I, I met a very good friend, from the Bahamas actually, he was from the Bahamas, Bahamas telecom, also doing Marconi apprentice, training, and we shared a house together, and we built up a fantastic social life around Chelmsford. Some of the best parties in town was, was at our place. And, meanwhile it was night school, and day release. Night school was really quite hard, you know, quite hard just to stay awake, and particularly some of

the boring subjects that... I remember applied mechanics. I was trying to keep my, [laughs] my eyelids open, it was so, a sort of mixture of tiredness and, you know, trying to follow what the chap was saying.

[08:08]

And, I was in a test department, and I met a chap that I had encountered in an earlier part of my test department, and again it's one of those chance encounters. And he said to me, 'Well, what...' I asked him what he was doing, and he said he was in Technical Authors. So I said, 'What's that?' He said, 'Well we write handbooks.' I thought, well that sounds fun. I was a bit cheesed off with what I was doing. So I went down the, the personnel office, and they were very good. You know, they really did go out of their way to try to find you a slot that you were interested in. And I finished up in Technical Authors. For someone who had failed his O Level English, I thought that was, [laughs] that was a sort of, strange place to sort of, make for. But, I, I, you know, I was given my own handbook to write. You know, it was the, I remember it was, *Distance-from-Threshold Indicator*. It was a new radar system.

Right.

And you went and you talked to development engineers, they would tell you... And you had to listen to how it worked, and you had to write down the descriptions and put it all together. And it was a nice project. You had to deliver a book at the end of it.

Oh.

[09:12]

And then, as I sort of moved from that, I remember a particular, a kindly chap, he was an ex-petty officer for the Navy, Marconi's had a lot of ex-military people, you know, working there, and, again, you know, reaching, putting out a nice sort of, helping hand to a young person, he said, 'You need to get into systems,' he said. 'Systems,' he said, 'that's the place to be.' [laughs] Because, you know, and equipment's changing all the time, but systems, you know, it's sort of, it's quite a reasonable sort of timescale, and, you know, it's interesting. So I thought, systems. Right, I've got to go down to the personnel office. I want to get into systems. [laughs] And, I was

given a, I got a job in, in systems, radar systems, Marconi Radar Systems. And they were doing...

Were they good?

It was... You know, I... Yes, yes it was... They were doing a Swedish air defence contract. And, you know, again, I was just sort of, pitched straight into sort of, you know, doing stuff. Help, you know, helping with this particular project.

[10:17]

But I reached a sort of watershed where I had done my Higher National Certificate. I took a year out to... I did my graduate, the IE exams, but the IET were sort of trying to raise the status of engineers, to make it a degree-only profession. And I thought to myself, well although I 've got, inverted commas, 'the equivalent of a degree', maybe later in life I might come to regret not having a degree. You know, a door would be closed to me, just for the sake. And you know, I had time on my, I felt I had time on my side. And, so I, I... I went out and sort of tried to work out how I would sort of, get myself on a degree. And I, I'm not sure how I finished up at Southampton, you know, going to Southampton University, but there was a chap called G D Sims there, Professor Sims, and he said, 'Look, we could take you in on an honours degree.

Maybe we'll give you an exemption of the first year, so you've got two more years for your honours degree. But on the other hand, if you did a conversion year, maybe you could do an MSc in the second year, and for the same two years you'll come out with an MSc rather than a BSc.' And he said, 'I don't think I could put you straight onto an MSc, because your maths really wouldn't be up to it. You know, the maths you were doing, a little bit more handle turning, you really wouldn't cope with the theoretical basis of maths.' So that was his recommendation. So there was another one of life's choices, do I do a, a first degree, or do I sort of, be seduced by this idea of, same two years, coming out with a, a second degree, a higher degree? So I thought, I'll do that. Next problem was funding. You know, how did I myself? My parents were not well off. My father's business was always a, you know, bumping along on the bottom, as a sort of market gardener. And, I applied to Essex County Council. And I'm eternally grateful for Essex County Council, because, you know, I made the case that, they had taken me so far, but I needed this extra step, this gap, you know, this gap year. And I got a, I got a full grant. So I got a living grant and a...

Tuition grant.

Tuition grant.

This is when county councils were, county councils, and they paid for such things.

Indeed. But Surrey, which is where I was born, turned me down, but Essex, you know, gave me the grant. And you know, I, I don't know who the official was, you know, never, [laughs] ever said. But whoever it was, you know, you think of the kindness of somebody, you know, sort of, just helping somebody, you know, get through that door.

You get some good advice, don't you?

Well, that was just kind... You know, that was, I thought, very very generous of Essex.

Mm I meant the, I meant the professor and your mother for instance.

Yes. Yes. Yes, yes. But, but in a way you know, I, I guess, a little bit I took after my dad. He was always, said, if you don't know, go out and talk to somebody. You know, people are always prepared to, you know, be kind and share. But...

[13:23]

So at 22...

So, I...

...you went to the University of Southampton.

I went to the University of Southampton. Essentially I was put on the honours course, which was the, you know, the conversion year, although I wouldn't get anything at the end of it. It was the biggest struggle of my life. There was a, came a point where I

thought, I'm not going to make it. I'm really losing. I... The stuff's coming at me faster than I can absorb it. A bit like a sieve, you know. [laughs] You know, push it in the top, I was, you know, out of the bottom. And I, I reached... I thought, I've miscalculated, you know, I've really, really really miscalculated. I'm not going to make this. And I sort of sat down, and I, I just sort of, did several things, you know, that I think were sort of quite, significant of managing to pull me out of that trough. The first one is, I, I organised my learning. Not, I wasn't just learning; I had to organise it. I had to just, I had to, you know, decide. I wasn't going to absorb it all, so what was I going to focus on and what was I going to drop? How was I going to spend my days so I'd spread myself across the subjects? So, the temptation is, you do the subjects you know well, and the ones you're struggling with, you just tend... I, I had to sort of, spend as much time on the ones I was struggling with as the ones I, you know, that I, I was absorbing quite well. I did an extraordinary working day, you know, where, you know, getting up at sort of, quite a reasonable time in the morning. Everything was scheduled, when I was going to eat. I was always going to get an hour's exercise, you know, go out for a walk. And, I was working into the night, and I was just keeping up continuously, I guess in the three months run-up to the exams. And I managed to scrape through. But I have to say, it was, it was, you know, just one of those moments when I really had to sort of, call on all of my resources to sort of, pull myself through. And the thing I skidded most of all with was maths. Because, on the HNC, it was handle turning. You know, this was the problem, this was the equation. You had to unscramble the equation. A bit of practice, you learnt how to unscramble equations. I didn't have to prove something existed. I just took the lecturer's word for it, it existed. [laughs]

Mm.

But there I was, at university, you know, trying to prove something existed. And, and sort of conceptually I had just no part of my that could, could sort of, sort of quite sort of, handle, you know, that...

[15:54]

That's... I think that's very interesting, because it shows a method, and in reading your, your book Casting the Nets: From GSM to Digital TV, in all good bookshops

around the globe, this is one thing that crops up again and again, and we'll come to this later on as well. It is, where did you get this notion that a method is important for things, as well as the outcome itself? Let me just explain that.

Mm.

It wasn't just the knowledge you needed, but you realised you needed a method of getting that knowledge.

Yes.

Where did that come from?

Well, you know, to some extent, you know, and, you know, I suppose I would say this, wouldn't I, to my mind that's what an engineer does.

Right.

You know, you're faced with a problem, and generally if you're in the leading edge it's a problem you've never faced before. So you've got to work out, how do you, you know, how do you take it apart? So, you know, you, you've got to have some sort of structure to take something, you know, something complicated apart, and then, you know, synthesize, you know, some sort of way through. So, you know, I, I would sort of claim on behalf of all engineers, that's what our, we're in the profession of doing, is to work out what the method is, you know, when you're faced with something sort of quite new. I guess people who have gone to university will always say, 'Well you're taught how to think.' You don't, you know, you're not just taught, you know, to recycle knowledge. You actually have to sort of work out from first principles, you know, how to get into something. So I, I would say that would sort of, come into it. I think the third thing really is, is, you know, sort of, going out and listening and observing and watching, and just picking up little tricks and tools that, tools of the trade which you put in your mental toolbox. So something unique comes up. You say, what's the nearest thing I've got that can solve that problem? You know, and you sort of, you know, put that in. And I guess, the last one I would put,

and again it's one of these chance things, but the very first job I had after I left university was in Marconi space division. I joined the Ground Station Systems Group. And I remember, not my immediate boss, but the boss above him, coming in once with a completely new job that no one had done before, and, I, I just watched him. And he said, 'Right, we've got to make a list of things to do.' And, and everyone's brains were on, right, that's one, that's two, that's three. OK, that needs to go one, two. And it finished up just with a very simple list on a bit of paper. And I thought, well, that seems sort of, pretty straightforward to me, you know, it all starts from a list. OK, it then goes into computers, and project management, all sorts of elaborate things, but the starting point was, just simply make a, an ordered list of all the things you had to do. So that was another thing that just caught my imagination, that, you know, no matter what you do, you start off making a list [laughs], of what you might have to do to, to solve it. So I guess all those things gets merged into a sort of, a, you know, my approach to how I, I do things. But you could sort of, track back and find different sources and origins of where I got it from. I, I wouldn't claim that I had sort of, you know, have come up with a, [laughs] a totally inventive way of ever doing something.

[19:07]

So you got a Distinction...

Yes.

...for the MSc, from Southampton.

And that was, again I, I... I just carried over the same ruthless study method in the first, every subject, you know, I catalogued it. I had the most fantastic notes you've ever seen. In fact, you know, after, I don't know how many years, would it, 50 years, I was busy clearing an attic out, and I came across my university notes. And I thought, well I'm never going to need those again. And I thought, I knew, I don't want to throw them away, because I had put so much into it. [laughs] I was there in front of it. In the end I did sort of, throw them. I had stuff about valves I had written [laughs] that go back to sort of, you know, useless, and nobody would ever want to see it again. But I mean, those notes, I thought, I'm going to, when I come to

revision, I'm going to write my notes in a form that makes revision exceptionally easy.

Yes.

And that's what I did. I just went lecture by lecture, I just wrote up these notes meticulously. So, if I revise, you know, what do I need to have got on that bit of paper to come back and revise on it? And did that right across the subject, same discipline of, of... I used to have a sort of routine that, September-Christmas, I'd just have a good time, go to all the parties, all the clubs et cetera. I'd then stop to, to pare down on my social life between Christmas and Easter, and after Easter, everything just went, you know, girlfriends, over the side of the ship. Everything. [laughs] It was just, you know, total one hundred per cent on, you know, getting through those exams.

Do you have a good memory?

[pause] For some things, yes. Some things stick well.

[20:44]

So you went back to Marconi.

Yes.

But a different operation. Space Division.

Yes. And the reason I went back to Marconi's is that, I applied for a holiday job in my, end of my first year at university, to Radar Division, and they took me on and sent me down to Ventnor Radar Station and up to Neatishead. And then, while I was down there, just out of the blue, the personnel office offered me a, industrial scholarship. And in fact, I had applied for an SRC grant, and this was offered, and I finished up with two. And then Essex asked me if I wanted a grant as well. And in the end I sort of took the industrial scholarship. It was like being on a salary.

Because you're on the second year. And, in return I, in a sense I was, in theory legally contracted but morally contracted to go back and work for them.

Yes.

But I would have... You know, it wasn't a hardship, because it was a company that was expanding, it was a fantastic brand, you know, it was one of our premier, you know, really fantastic companies.

Gone. Now gone.

And sad... Greatest of all sadnesses.

[21:50]

Why do you think it went?

Well I, I... I, I think the, the merger with GEC was bad news. I think the, the subsequent merger between Plessey and GEC was bad, or... It was all driven from the City, you know, there was no long-term vision of the company. So, I would say... I think Arnold Weinstock, you know, was starved of investment. I mean to some extent he was a very good manager for the shareholders, of making sure that it got returns, but, but he wasn't going to sort of, take any risks. And I think the, the turning point for Marconi's was when the Thatcher government came in, and said, why should the taxpayer fund these companies? If there's business out there, they should fund themselves. And it was in a world where in the markets that Marconi were in, all the rivals were being funded by governments. So when Mrs Thatcher took the rug away, and the British Post Office as then was said, 'We'll just go out and buy from anyone, we're not going tie ourselves to British industry,' they were just hung out to dry. And I just, I, I think that was the, the death of them.

Right. Right.

But...

[23:02]

You spent three years as a satellite systems engineer.

Yes.

From '68 to '71.

Yes.

And, what specifically did you do there?

I think the, the one bit of specialism was, the reliability of space systems, just working out the maths of reliability, how much redundancy did you put in to meet the customer's requirements? So I got into a little bit of a, a sort of, doing a little bit of original work myself. I was sent out to Singapore. Marconi had a contract that was getting behind with the Royal Air Force. So, they wanted a site engineer. So I went out to Cyprus for a week to get trained up and then went out to Singapore, and I was the site engineer out in Singapore. So that was a great adventure. There's a little picture in my book there of when I was in Singapore, just, a picture there. I worked on a project that actually got binned, but it was called Moon Bounce. This is, you know, bouncing radio signals off the Moon. But that was, the Government funded, but then they axed that. So that was one of those...

What was the purpose of doing that?

Just using the Moon as a relay.

Oh I see.

Passive relay. Just, one of the... Instead of bouncing off the ionosphere, you know, which is the traditional high frequency ray, you bounce off the Moon. [laughs] Do you know, it was the sort of company that, you know, anything and everything, it was just such a creative company. I mean, you know, the, the level of ingenuity and creativity and expertise. And, just as an aside. The other thing I learnt, you know,

when I was in Marconi, in any organisation there's somebody who knows something about something, and everyone goes to him. [laughs] He carries the organisation in that specialisation. But around that you had all these people dotted around and they could... Marconi could do anything with that expertise. So, an absolutely great company.

[24:53]

Who were your... Who were the clients then, who were the customers?

The... Well, the satellite earth stations were all, all the telephone companies, you know, around the world. I did a couple of months down in Goonhilly satellite station, seconded into the Post Office, to look at their operations and methods in their Goonhilly satellite station. And that was a very seminal experience, because I, I worked for a chap in British Telecom, I'd better not mention his name, in terms of what I'm about to say, but, he reckoned his boss was absolute rubbish. [laughs] And every time his boss appeared, he'd say, 'This chap doesn't know, hasn't got a clue what he's, what he's doing. He's a complete bluffer.' And, I tell you that story, because, when I decided... My friend from the Bahamas, we'd had this idea that, if you were ambitious you had to sort of, change, change jobs, every two or three years you had to change jobs, and with any luck you zigzagged up the tree. That was the sort of, theory of it. So got to my two years and I thought, well OK, I'd better start changing jobs. So I put a lot of feelers out for job applications. I was quite happy with Marconi's, but I, I sort of put, put some feelers out. And one of the jobs was in the Civil Service, in the old Ministry of, what was then the Ministry of Post and Telecoms, had just become hived off from the Post Office, which was going to become privatised. And therefore the regulatory function, including radio spectrum, went to the Ministry of Post and Telecoms. And they wanted a satellite systems engineer. And I, I had another feeler out for the European Space Agency, I think, the South African post office I had applied, and Portuguese post office. Because they all needed to acquire satellite earth stations, so I thought they might want my expertise. And interestingly enough, the Civil Service was so efficient in recruiting, that I, I had been shortlisted, I had had my interview and had the job offer, before anyone else from, the other people who had applied. But, who should be on my interview board but this chap who was a complete waste of space. [both laugh] And I had such

confidence in that interview that that chap wouldn't be able to ask me anything I didn't know the answer to. [laughing] And, it was probably my first revelation, realising that the chap above me didn't necessarily know more than I knew. Always up to then, I had assumed my boss knew more than me, and his boss knew more than him, and his boss knew more than him.

[27:14]

So you've moved from the private sector.

To the Civil Service.

Although it was a company deeply involved in supplying the public sector, you moved from the private sector to being a civil servant, with a completely different culture, in the Ministry.

Yes.

And you are now a Technology Officer Grade 1.

That's it. Yes, PTO1, Professional and Technology Grade 1. Had a small team, three people.

So you're managing people now?

First time, yes.

Where did you learn that?

Er... Didn't. Just, on the job.

Are you a good manager?

[laughs] You'll have to ask one of my staff that. I... Let me, if I may, sort of, sort of come back to that.

Cool.

Because, the first thing I was pitched into, literally, almost in the first few weeks, I was on the delegation, put onto the delegation that went out to the 1971 satellite, satellite space conference. And that was to allocate spectrum for the whole new exciting field of satellite communications. And, because there was no existing allocations, it meant they had to share spectrum with other services, particularly for example microwave radio relay links. And I was made the specialist, and I knew absolutely nothing about it, of how satellites and radio relay links share spectrum together. And I became the spokesman, and I was on a little working group. And it was another one of those nights where you sort of stared at something and thought, I'm going to sink. But again, that, you know, that reserve of, I know how to do this. I know how to tackle something I don't know, and pull it apart. And before the end of the conference I was arguing with the best of them, generally the French, in terms of how we should sort of, frame the regulations and so on. And that, I didn't have any staff, I was literally in the team, and, you know, I had a very nice boss, you know, but he just let me, you know, cut me loose and let... And, I, I think that was the first taste of realising I was quite good at being in an international, almost diplomatic environment, in a technical specialist field. I was actually sort of, I could achieve things, I could persuade people, I could get... You know, my boss said he wanted this achieved; I could go out there and get a consensus for it. And so that was the first glimpse that I actually might have the talent that, you know, that I would come later in life to sort of recognise, and actually achieve some quite good things. But anyway, that, that was the sort of first.

[29:44]

Then when I got back, then I, I built my teams up, and, and working on various spectrum sharing and future things. In that job, the Department of Industry were starting to invest in satellite communications, they were looking for expertise, and my boss and I became advisers to the Department of Industry, and I started to develop an idea that I was interested in industrial policy, helping British industry, as opposed to just the more abstract world of radio spectrum. And, the really big shock horror in terms of suddenly being given awesome responsibility was that, a big dispute had arisen in the '71 space conference between the countries who wanted to make sure

their radio relays were protected, and the counties who wanted to introduce new satellite services in a particular band, which was the 11.7 to 12.5 gigahertz band, was under dispute. So the resolution was that the satellite people would be given an opportunity to make an orbit plan, and then all the gaps left would then be available for people to run their domestic radio relay services. And, for those conferences, the way, this is a little bit pre-European Union, that today would organise a European opinion, but in those days the CEPT, the European Conference of Postal and Telecommunications Administrations, had a sort of, a loose club of people, of administrations that would come together and try to organise and orchestrate a European view, Western European viewpoint for these conferences. And, it was a... A sub-group was set up called R28. It was decided it was the British turn to provide a chairman, and a couple of administrators put my name forward, without me realising it, and when I came home they said, 'You are now chairman of this sub-group R28.' And, and that really was quite a sort of, a life-changing experience. Because broadcasting, you can't be in broadcasting without all the politics coming out of the woodwork, which as an engineer was a total revelation of the disputes, you know, and, and blatant tensions between countries, you know, around Europe.

[32:05]

It was the time we had the Iron Curtain, so, my boss and I went out to Moscow, you know, to see if there was a possibility of the Western Europe and the communist, Eastern Europe, coming together and finding a common ground.

Was there?

Yes. Yes, they, for different, for all the wrong reasons. You know, they, they wanted to control satellite broadcasting along tightly national lines, and we wanted to do it for other reasons, because you get more use for radio relays if you, you know, did that. So, in a sense, we were arriving at the same reason but coming from quite different directions. But, you know, that was a whole different world, going out to communist Russia. I was taken for a briefing with MI6, told all about honey traps. [laughs] And, you know, you literally, the embassy had to know what flight you were on, in case you disappeared, you know, have a stopover. But they were very nice to us. You know, the plane arrived at, literally at the foot of the plane, as soon as we came off, a ministry car was there to whisk us, you know, through a special place. And we

met some British businessmen, you know, at our, later at the hotel, who said, 'My goodness you had an easy time. Our bags were ripped apart, and we were...'
[laughing] Taken down to our underwear. You know, I mean, it was... And they were, they took us to the Bolshoi Ballet, the circus. I kept saying to them, 'Well when are we going to talk about the conference?' [laughs] 'Oh no, we need to get the, we need to get the relationships right.' My boss, you know, who was a sort of, quite a diminutive sort of chap, with a slightly high-pitched voice, and every time he opened his door, this chap with tight pants used to come out of the door and say... [laughing] He thought... It was... Anyway. Strange...

Completely different world you were...

[33:55]

It was a completely different world. And when I got into the conference itself, I really had got a, a fantastic plan organised, because, everyone came in with outrageous demands for the number of the channels they wanted. Certain countries wanted beams extending well beyond their territory, Luxembourg being one of them. The Scandinavians wanted a big Scandinavian beam. And then, you had this competition between large numbers of channels, you know, people wanting these big beams. And all our technical calculations showed that if people kept tightly to their national territories, we could get about four or five TV channels of good quality. And there was no way that we could accommodate all the requirements. So, I set this plan, you know, before everybody... Oh, I've cut a bit out. I was elected as chairman of the working group to make the plan.

Right.

Yes. So we, I then had the East Europeans, Africans, everyone on this working group. The Americans decided they didn't want a plan in North and South America, so I was responsible for Asia, Africa and Europe. And, it was, it was a, an incredible six weeks of my life. The first part of the conference worked very well. I had a plan that, we'd make one plan limiting everyone to five channels, and one plan where everyone's requirements would be put in it. And then my theory was that, the interference would be so catastrophic, you know, that everyone would scale back their

requirements towards the five. And, you know, if you like, the numbers would do the talking. You know, we wouldn't have to make a fight of it. And that worked a treat, you know, everyone was horrified how much interference there was, and that, I left the diplomats to sort of, you know, scale it back. And I thought, oh this is going like a dream. And then it all started going wrong. Everything went wrong. The ITU, because the Americans didn't want a plan, hadn't prepared the computer support facilities, because they didn't want to upset the Americans until the conference had decided there should be a plan. And by the time, you know, they decided there should be a plan, they didn't have time to put the computer facility together. So, the conference agreed we'd use the French government's, TDF's facility in Paris, just to do these comparative things, while the ITU worked on their software to get it ready for analysing formally the plan. When it sort of came on, it didn't work. So...

[laughs] The ITU chap had to get the World Health Organisation to lend us their computer facilities. And then it was taking 25 hours just to analyse every plan, it was taking 25-hour continuous runs. So that was all, all that was going on.

[36:37]

Then, I thought I'd do something safe for the communist guys, you know, I'd give them something safe to do, and that was to check that everyone's test points were inside their countries. You know, because they were, everyone had seven points that the computer would, they were supposed to put round the edges of their countries, to test that the interference levels were fine. African countries were putting their points everywhere. [laughs] I mean just everywhere. And there was a very nice chap, you know, communist Czechoslovakia in those days, and he hadn't got a clue what he was doing. So when we put all these points there, the thing just crashed, you know, and the conference was in consternation. And you know, and, and, then, had a West German chap, he had forgotten to put a Russian beam in. [laughs] And, everything was just falling to pieces.

[37:25]

And, at that point you know, this little team of European colleagues I had, we came together, we worked literally about 20 hours a day, you know. I had someone from the BBC, a chap called Dr Phillips. We set him up as the doctor's surgery, you know, Dr Phillips, that was good. And he was sort of, dealing with all the customer complaints. [laughs] And a couple of Swedish guys, you know, working to try and help us clean up these test points. And then the, the German chap was trying to sort

of find a way of working the beam in, and I was doing diplomatic exercise. One of them was getting between, I think it was Russia and China, you know, they weren't talking to each other then, to try and, one of them, to scale their beams back. I had an altercation with the North Koreans, because, the South Korean beam was going along the 38th parallel and was going to fry their troops. [laughs] It was, as a young engineer it was just a... And then you, you found all sorts of local tensions. The Yugoslavs were looking at the Italians; you know, the Belgians were looking over their shoulders at what the Dutch were getting. You know, all the little local tensions, who were the, you know, started to sort of come, you know, bubble to the surface. Luxembourg sneakily tried to get their Radio Luxembourg and television.

[38:39]

And... And, and why I tell you that story is, is that in that sort of, 36, 48 hours, whatever it is, I suddenly felt I was a European, working with those European colleagues. As a team we really, we actually worked so well together. And we delivered a plan, and it was a great plan. You know, literally, at the enth minute, you know, the conference was able to adopt a really good high quality plan. And I just, just remember that time of just that little team, and everyone was just working for each other, you know, to sort of get, you know, get the thing through. That was a beautiful experience.

A real sweet spot, that.

[39:19]

And, it was in the 1977 run-up that I actually had another life-changing event, which I mention in my book. There were three regional seminars to try and prepare the developing countries, to get them up the learning curve. So there was one in South America, in Rio, there was one in Khartoum in Africa, and there was one in Kyoto, in Japan, you know, for the different ITU regions of the world. And in Japan, so I was told, if you're a civil servant and you're ambitious, you want to get to the top, you can't have a single failure. You know, if you have any failure attached to your name, that's it, you sort of plateau out. So the guys who really get to the top in Japan, they've got this absolutely impeccable, 100 per cent track record. And this top civil servant, who was running, you know, in charge of organising this conference, had the feeling the conference – sorry, organising the, the regional seminar, had the feeling it

wasn't going too well. [laughs] So, so... At least, that's why I think he invited me out, you know, because that's a topic of conversation. 'It's going all right is it? It's successful is it?' And he took me to a, a bar in Kyoto, you know, sort of top Japanese official, and, walked into this place, private room, squatting on these sort of, rice mats. Two very pretty girls came down and sat beside us. And I thought, I've just had my training on honey traps, [laughs] so I was going, what's going on here? [laughing] No, this is Japan, it's not Russia. I hadn't got a clue, you know, what was happening. And, these girls, you know, were lighting his cigarettes and pouring the whisky, and, he was onto his fifth whisky when I was still sort of, trying to eke out my first one. [laughs] And he was, as he got more glasses of whisky, he became every more boastful. And this was the, his sort of thing about, 'We civil servants, we run Japan, it's our privilege. Politicians are either stupid or corrupt; we don't let them get anywhere near decisions.' And this, as a British civil servant, you know, where we're servants, yes, we are civil, we advise, you know, and, but ministers decide, and then we have to implement, the idea that we would just discard this shower [laughs] and get on running the country was, a total revelation to me.

[41:33]

But, I think the thing that really was an intellectual game-changer for me was, that until that time, at every point in my career, I could only see the person above me. You know, the limit of my ambition was that, you know, I could perhaps do the chap, the job above me, and maybe, if I was really good, I might get to, get to his job. So always there was that roving thing. Always the feeling that, until later I realised just how, you know, stupid some of the top people can be, that, it doesn't matter, you know, what field, you know, you get some people in just the wrong place [laughs], the wrong job, they're out of their depth, you know, they're over-promoted or whatever. They don't know what they're doing. You know, so these, the presumption that people at the top knew what they're doing, I, I gradually realised that wasn't true, that sometimes it's the chap somewhere down the middle that actually has everything, he knows the detail, and actually, can see, you know, where the thing should be going. And, so, there was that feeling, you know, that sort of feeling that, actually, I could see the sky. I could see the light at the top. In my chosen field, I could actually set the destiny of my country. And...

The destiny of your country?

The destiny of my country. In my chosen field. Not in the, you know, not writ large, but you know, I'm a telecoms engineer, it's about our future telecoms networks, our policies, et cetera. You know, I knew the ministers, you know, came and went, and, you know, most of them were, all of them were non-specialists. I realised the top civil servants were, were the people who came out with history degrees and economic degrees. They knew absolutely nothing about telecoms. And in point of fact, you know, that providing you understood the political environment, you know, providing you in a sense knew your place, and, you know, what you had, you know, constraints, you had enormous power, because you were the only person that knew what needed to be done, and you had the, you know, the resources underneath to sort of get the detail right, you understood the politics, you understood the economics, you know, you understood the, you know, the international dimensions, you could uniquely have this power of knowing what needed to be done. And, and, you know, if, if you could communicate, and you had the right relationships and had, you know, good teams, you could change the country. And, that stemmed from that 1977 experience in the Kyoto bar when I suddenly realised that I had much more to give than just the job above me. I could actually do a lot more.

[44:09]

So I, I... I had a bit of a, a sort of... Let me just take it in, in... In '78 I, you know, I thought it was time to look for my next promotion. And a job came up in the Home Office Directorate of Telecommunications. And it was completely a leap away from what I was doing, from international spectrum; it was all about managing the police, fire and home defence services. But it was promotion. And, I realised with retrospect, that was not a sensible decision. You know, just going for promotion for its own sake, you know, grabbing the next job up, without realising I was sort of going off a little bit of a detour.

Yes.

So I finished up in a job where, I had literally hundreds and hundreds of projects, a lot of them very small, going through different police forces and fire brigades. I had a lot of civil servants who you couldn't sack. So there were good ones, but there were some really bad ones as well. But, you know... So something was going wrong

somewhere; you just had to catch it fast enough. But something was going to clatter. It was a real treadmill of a job. The, the police and fire services lost the radio spectrum at a world conference. Went to sound broadcasting. And my job was to totally re-engineer the whole networks into the new frequency bands, and that was the project I had to get going. I was involved in the Civil Defence Review, and I got some money, you know, for revamping the home defence et cetera. That was an intellectually strange job, because you had to imagine the unimaginable.

Mhm.

You had to be in a really abstractive position to know that if such a terrible thing occurred, you would need some sort of organisation to pull things back together. And communications would be vital, you know, to get different bits, fragments that were left to sort of, pull together and, and gradually help, you know, this dire situation. So I was motivated, you know, that something had, you know, something, I had to think through what needed to be done, but it was in a very, you had to have the discipline to stand back from the awfulness of it, and sort of, just go out and, and sort of, do a good job.

[46:27]

You were five years there.

I was give years there.

In the Home Office. And now we get the big move.

Well that... Yes.

1984.

Yes.

To the Department of Trade and Industry. Director of Technical Affairs in the Telecommunications Division.

Now, that is an interesting story in its own right. Because, I got to... I was in a job where I was competent but not outstanding, as a project manager. You know, I wasn't, you know, going to change the world being a project manager. I applied for two promotions, and I got turned down. I didn't get them. One was for a job back in the Radio Regulatory Division, and, I think I should have got that job but didn't get it.

Do you know why you didn't get it?

[pause] I... You know, I can, I can come out with explanations, but, I think one particular... I think, on those boards, if they don't want you to get the job, you won't get it, basically. And I think the chap who actually got it, you know, was pre-lined up for it. And in a sense I was a little bit interview fodder. I would have... And I, I just remember one chap asked a particularly stupid question on the board, and I, I gave him perhaps an overly trite answer [laughs], which probably didn't do me any good either.

Right.

[47:49]

But, I, I just think it wasn't, wasn't to be. My own boss died, in post, he died of a heart attack, so I went for that job. And I think I was seen as a little bit too young for the job, and they brought a Royal Air Force, air commodore in, you know, which I think sort of gelled, dealing with chief constables et cetera et cetera. So, I, I thought, well, you know, this is not, I'm not going anywhere. So I actually went back and asked myself fundamentally, what was I good at? And I went back to my 1971, you know, that, and I thought, that is what I'm good at. I need to get back to that. I looked at the privatisation of British Telecom, and I theorised that, BT couldn't represent Britain, you know, on behalf of all the rivals in the international standards and other affairs. So I thought, the detail I've got to need, if they're going to introduce competition in cellular et cetera, they're going to need someone to handle international things on behalf of everybody. So, literally, I just, out of the blue, wrote to the Under-Secretary and said, 'I think you've got this need, and I'm the person I think can do it.' And, it was a chap called Jonathan Solomon. And, a very very

creative thinker, and he recognised instantly that he will actually have that need. And he had a twelve-month battle to get his establishments to, to create the post. Because I actually said I want a promotion out of it. If I had just come across laterally, it would have been quite straightforward, but I thought to myself, well, you know, if you're going to go for it, just go for it. So I said, look, I needed the status, because if I was going to represent the country, you know, they would know, you know, what my, you know, my position was in the organisation. So it had to be a directing grade. And the Civil Service couldn't contemplate a specialist being at that level. You know... It, it... You know, you had to be a generalist to get up to an assistant secretary type level. So this under-secretary had this huge battle with his establishments. Then a General Election got in the way. Then he had another go. And eventually he got the post established, and then the chap fell out with Kenneth Baker and went, [laughs] and a new chap came in, who didn't understand all the background. And I came across. And I actually had to compete. I came across as a level transfer, and I actually had to compete for my own job in there. So...

Right.

And I got...

But you go it.

I got the post.

[50:18]

*And swimming around in Europe at this time, 1984, a crucial year, was an idea that...
We've already got analogue mobile phones.*

Yes.

Many of them in cars. And, the unique position of the UK is that, we've got competitive networks for mobile phones in the UK.

Mm.

Whereas, the other countries don't, in Europe. In Europe there's this idea, Groupe Spécial Mobile, which means that this is a, the group that's specially going to look at mobile phones.

Mm.

So the development of mobile communications. And, so it's called GSM.

Mm.

Just to keep the French happy.

Mm.

And this notion is beginning to emerge, and it's being driven at the moment by this troika of Germany, France and Italy, yeah? And you begin to look at this, and think, this is quite interesting, this GSM stuff. BT, as you say, can't represent the nation, because, there's other companies now...

Mm.

...competing with them, Vodafone for instance, the Racal subsidiary called Vodafone.

Mm.

And, also Mercury, who are in landline competition with BT. So, it's got to be the DTI, the Government.

Mm.

[51:47]

You've found your own role again haven't you.

Yes. I, I... When I walked in to that post, I really had three things that I could have veered off in. One was domestic liberalisation, and all the work that needed to be done there, and often had just been set up. And it, at that time I think they didn't really have a lot of technical expertise. The second was, was Europe, you know, and the Single Market. '84 was, that was, the first proposition was put on the table for the table for the Single Market. And the third was the ITU, and the developing countries, you know, and all the things there. And, I very very quickly... I mean two things sort of made up my mind. The first was the chap in the telecoms division, who was responsible for Europe and international, walked in and said, 'Look, the Single Market's starting. I'm out of my depth on the technical side. Would you pick that up and run with it?' So I got involved in the Single Market, opening up the European market, creating the Single Market in telecoms. And the second thing is, the UK was just down to hosting the next meeting of GSM. So literally, in the first few months I found myself as the host of a group called GSM. And, I, very surprised that I couldn't... The group had been running, you know, for three years I think, '81 I think it was set up. I couldn't find any papers on what our objectives were for that group. And, there was just a very vague idea that we needed a pan-European cellular system. At that time it was a hangover of the failed attempt to try and find a European analogue version. It had fallen apart quite spectacularly. But that was still overhanging, that maybe we could, you know, find an analogue system. So when I joined, it was at a point where, maybe we ought to be pushing our analogue standard, which was TACS, and trying to get the rest of Europe to...

TACS.

TACS. The Norwegian, the Nordic countries had their own version, NT. The French had their own peculiar French version, and Germany had a peculiar French version, all different frequency bands. It was a real hotchpotch. So one, you know, thing that was still running was this fight to try and get your analogue standard. And then you had some research people who were chasing some crazy idea that it should be digital. And it wasn't that obvious, that digital was the right way to go. Because the mobile environment is very very harsh, you know, where the signals get broken up and chopped and bounced off buildings et cetera. And analogue signals tend to be a little more tolerant, at least they were in those days, than digital signals that get disrupted,

destroyed. And... So, it was a little bit open when I had that sort of first meeting. The British Telecom chap who had been leading in it said it was going to be digital, and I said to him, 'I haven't made up my mind yet.' So he went and complained to his boss who complained to his boss who phoned my boss, who told him, 'Sorry, you're not running the game any more.' You know, 'Stephen's running it, so, he must decide.'

[55:01]

And, I, I started to get sort of drawn into it sort of, quite sort of, thoughtfully, listening to what everyone was saying. I bumped into a Racal engineer, a chap called Ted Beddoes, who, they had a military radio background which had gone digital, and he was very enthusiastic about, that digital could be made to work.

Was that Tarmigan?

Er... Probably. Yes. I... Although... I think they also had their own private, you know, preview version as well. And so I, I started to sort of think fundamentally, well, analogue or digital? You know, what is the thing going to swing on? And I called the two technical directors in from Cellnet and Vodafone to say, you know, 'If we're going to take a decision, obviously the digital has got to be better, but better in what way, would make you decide? You've just invested in analogue; what would make you...'

[outside storm noise]

Here you are.

What would make you invest in digital? And we, we quickly got a list of things, you know, that were important. Voice quality, you know, the cost, you know, investment on base stations, and so on. And, I said, 'OK, so let's agree a set of criteria, that if those criteria are met, then we'll go for the GSM system. If it's not met, we just walk away. And none will blame us for walking away with a system that wasn't better than the one we had got. So of these five criteria, the criteria was that it had to be at least equal to any of those, and significantly better than one of them, was the, was the criteria.

You see method again.

Yes.

This is what you've got. You've got a method. Not just, let's stick a pin on a board somewhere, as in, put the tail on the donkey.

Mm.

Or, let's have a big row about it round a table.

Mm.

What you're able to do, Professor Temple, is to devise a method which people can agree to in a neutral way, because it is a method.

Mm.

Unknowing really what the outcome's going to be, but to trust the method to get somewhere.

Yes.

Why aren't you handling the Brexit negotiations?

[laughs]

No, sorry, that's an aside.

I... I... I'll come to that at the end.

Yes.

But... [laughs]

[57:11]

So you, you do ultimately decide, it's got to be digital.

No no. I'm, I'm... I'm putting, I'm putting a point around which the decision can pivot.

Right.

And it will pivot around, if the digital research people can show everybody, demonstrate to everybody, that there is a reason to invest in digital, and bin your analogue, then that will, the decision will swing around that. The icing on the cake then is, you've got a system across Europe, you've got scale economies et cetera. But the starting point, you know, to get my, you know, get my constituents, my industry, you know, to, to buy into it, I have to bring them along with me. So the way I brought them along with me is, right, let's decide what the criteria will be for your decision.

Yup.

Now the easy part was, I was talking to the technical directors, and I guess if I talked to the commercial people, the list would have been a whole lot longer, you know. And... So, that was actually sort of, quite germane. I actually had a very big battle with the rest of Europe to accept those principles, because they saw me just being negative, trying to shoot analogue down – trying to shoot digital down and trying to sell my TACS, you know, to everybody. But eventually, they, they added a sixth criteria, needed to handle digital I think was the, the sixth one. And that, that became the, the thing that the whole group accepted.

[58:30]

And, then I think the sort of, the, the sort of, intellectual turning points in my mind was that we, we funded, we gave out small research grants to small companies, and we had funded a company down in Woking called Technophone, and they were building a, they were trying to build, reduce the brick to something that would fit into a shirt pocket. And, I bought two, one for my boss and one for myself, just to carry

around, to get a feel of how useful they were. Was it just a gimmick like the hula-hoop or the yoyo [laughs], you know, it'll be a one-year wonder and consumers will be on to something else, or was there something about this that that was actually important? Because you have to just imagine, at that time cellular phones were car phones. They were called car phones, you know, and a hand portable, I think the first two, there was only about ten or fifteen per cent of the market were the hand portables; everything else was in cars. And I carried this around, and I, I realised when I left it at home, I missed it. And that told me that there was something... You know, if you had something, it was irreversible, there was something in that that was important, that... And I think the second thing was, I was in an immigration queue in Heathrow, you know, EU and UK citizens, and I saw this massive great long queue. And I thought, do you know, I can imagine everyone finding one of these hand portables useful when they go to Europe, you know, as a sort of business tool. And I think those two things started to sort of make me become of the view that this was something that was actually quite useful for the country.

[1:00:05]

You saw this as well, eventually, as a consumer market?

That came later.

Yes.

OK, I started off really seeing it as the business market, as, as a useful tool. At that time cellular phones, I mean the one I bought was £2,000, cost the department £2,000, so that wasn't going to be a consumer market. The... And then I think the last point was that the... I... One particular row I had, you know, a famous sort of thumping of the table [laughs] session I had with the... I went for a walk with the Italians, and he said to me, 'Look, Stephen,' he said, 'the reason it has to be digital is, it's neutral. We'll never get a European agreement, you know, if we're trying to sort of, do down someone's analogue system and some other person's analogue system's going to win, you know. It's got to be, you know, it's got to be something where everyone can come to it.' And I, I thought, well actually, that was quite clever. Because I could actually diplomatically see that people can always agree to the longer-term point, but

the near term meant real pain for the person who's going to lose. So I added those three things together. I decided, this was something I wanted the country to have, and for it to happen. Huge mountains to climb to get there, but, I was on the journey.

[1:01:21]

And you had a method, according to page 67 of your Casting the Nets book. A method. 'The top plane was the political level. The political will had to be generated to make it happen, since markets were all out of phase across Europe. The second plane of activity was to get the commitment to the cellular radio operators to purchase the new digital networks, and open a service on a common date. The third plane of activity was the technical standardisation effort in GSM. Failure to agree a common technical standard would leave Europe with nothing.' Again, what you have there is a method.

Yes.

And more than... Other people would have just thought about the technical level.

Mm.

You realised the, the actual network operators, they had to be involved.

Yes.

And the suppliers to the network operators, they had to be involved. And at a political level as well, they had to be involved, and endorse it. And, you put things to the Cabinet, and, they don't accept it. Not all the time, but...

Yes. I, I accept your description of method as an outcome, but in a sense the bit before that is, try to work out from first principles, you know, how should it work?

Yup.

You know, how is this going to work? And, it, the book explains, it was a little bit of an accident. I sat down to think about it. But, it seemed to me that, the mobile operators were the, the people who drove the market, because they had bought the networks, invested in the networks without a single customer, et cetera. So, if... You know, they, they were sort of, quite pivotal. And then the whole food chain.... So, it's no use just talking to the suppliers, as a number of my continental colleagues were talking, you know, France, would talk to Aibel, or Germans talked to Siemens. You know, it's the mobile operators that really had to be engaged. And, it was that realisation that the mobile operators, you know, were the people who were actually going to, first of all make the market, make the network markets for the network market, make the consumer market, which then other people can then come in and supply. That, that was the, the point, that was the, the thing that was going to determine whether the thing took off or bombed. And, I sat down and realised, and, I can go into a little detail. It was a study we had done, you know, by... There was a dispute between broadband and narrowband, and we thought broadband was more complicated and narrowband was simpler. And that was the first time I realised, with modern chip technology, it doesn't matter how complicated it is, because once you've laid the chip out, it's just volumes that count. And I realised that volumes counted for, for... So, a single country could no longer in this brave new world of silicon chips have a big enough market, you know, to, to be generating the million a year of chips that make the whole thing finish up as £200 item in people's hands.

[1:04:24]

So, my working out from first principles is that you had to have at least three big countries, or the equivalent, getting that size of market, you know, to create the volumes that would enable you, you know, to, to, you know, create, generate the volumes. And that's how I came across this memorandum of understanding, which was probably one of the most important documents that created the global mobile industry, was, it was a document that said, 'We the undersigned all agree to procure GSM networks by 1991.' And, I put a threshold that, you know, GSM wouldn't happen unless three, equivalent of three operators signed it.

It's only seven years though from '84, from your starting to work on this. It's only seven years...

Yes.

...for this huge investment to go ahead, for the thing to be worked out. That was unbelievably ambitious, was it not?

Well, I, I think it was... [pause] It... I do, I didn't believe then and I don't believe now that, that you can trickle in, you know, small numbers, and ever achieve these massive scale economies. You had to go in at a certain scale, you know, a certain size of scale for the thing to even work. And that's what I had worked out, and no one else had worked out, you had to, you know, had to actually structure, it had to start at that level; you didn't start at the bottom and, you know, gradually get there.

[1:05:45]

And, when we, I got, I drew up that memorandum of understanding with, you know, and we, colleagues, and we went out to Copenhagen to sign, to my surprise, pleasant surprise, you know, I think it was fourteen operators from thirteen countries signed it. And eventually everyone in Europe signed it. And that, that single thought created today's global industry. Because from then on, individual operators couldn't go off and do their own thing, because you had this massive juggernaut I had created of all the operators working in synchronism.

[1:06:23]

And something happened a little bit later, as you'll sort of see in the book, where, when I became Chairman of the ETSI Technical Assembly, and GSM came in as a group, you know, under me, out of the European research programme was the embryonic third generation, so-called, it was called UMTS, Universal Mobile Telephone System. And they wanted to rush in and compete with GSM. And I thought, no, that doesn't look, you know, like... That's going to split the markets, you know. So I, I put that group under the GSM chairman, and agreed between the two of us that he would slow the pace, until GSM got in the market. And that established the generational sequences. So you had, you know, 1G to 2G, ordered, 2G to 3G, 3G to 4G, and it's still going. 4G to 5G. And, and none one's been... You know, people have tried, Intel tried, you know, with, with WiMAX; the Koreans tried with WiBro, with proprietary systems. They just couldn't compete with the system I had set up, that had every mobile network operator in the world sitting round the table, and all more or less being obliged to commit to procure the next generation.

And the sheer scale that that's created, it's, it's a trillion-dollar industry. And that just came from that one afternoon, sitting there in the DTI thinking, how is this going to work?

[1:07:48]

What was that date? Do you remember it?

It, it's in the book.

OK.

1986 was the year.

Right.

It was the run-up to the European Council that Mrs Thatcher was chairing.

Right.

And, the Cabinet secretary, or, I think the Cabinet Office, European chap, in charge of the European part of the Cabinet Office, had said he wanted to see a strategy before he would agree to Mrs Thatcher putting it on the agenda. I hadn't realised he had a completely different meaning of the term strategy. He meant diplomats running in and out. But I thought he meant a grand strategy. So I went back and thought about this grand strategy, which is how I finished up thinking about it. And I remember my boss saying, he said, 'God,' he said, 'the French will be proud of this grand strategy.' [laughs] He said, 'We're not allowed to think about strategies in the Thatcher era, of, you know, British strategy.' But it was a fantastic discipline, because it, it, I got, it made me work out what needed to happen, and then I was able to share that with colleagues in Europe. And because I had great relationships with those colleagues, you know, they, they could see, yeah, this, this was, was the way to do it.

So the fact that you can make a mobile phone now almost anywhere in the world work with almost any, any other mobile phone or any...

Yes.

...or any other type of technology, was due to an afternoon of your work in 1986.

Yes. Yes.

[1:09:09]

GSM was a great success. Why was ISDN a failure?

[pause] I... [pause] I've got a whole list of things. Because I was involved at the edge of ISDN. I wasn't centrally involved. You know, there was a Commission group set up for ISDN called GAP, and another one set up for GSM. I led on the GSM one; the French colleague that I was working with, GSM, Philippe Dupuis, you know, on that. On the GAP one, the Commission essentially led, it was led from inside the EU rather than, our thing was more or less led from the outside of the EU. And the Commission did their level best to try and pull everyone together. So first of all there was a political tension between the Commission trying to get Europe pulling together, and a, a political backlash, not just in the UK, you know, but all the monopoly telcos didn't want the commission meddling in their back yard. So, there was... I, I could sense this, you know, we want to do our own thing, as opposed to the GSM where, we were all committed to throwing everything into the pot. So there was, I could feel that tension. And because of that, a lot of the national ISDN, first implementations, were not compatible with each other. The ITU had left lots of gaps in the standard, because, there was a political tension and they just stood back and left it blank. So nations filled in their own, you know, filled in their own solutions. So, so they missed the first window of getting volumes, because they had all got incompatible systems. So what the game was all about was to try to move to another generation, you know, to try and bring it, you know, bring, bring Europe together. And, you know, ETSI played a role, and, and there were all sorts of programmes for doing that.

[1:11:01]

I think the second thing that was a factor was, there was no competition to, to accelerate the pace. So, the monopoly operators had no compulsion to go out and, and invest before they had to. And they didn't have to if they were a monopoly.

[1:11:21]

The third thing that happened was, the telephone modems were starting to really come on apace. So when the Internet broke, you know, as a, as a consumer experience, the choice was between a very expensive ISDN, I forget the figure, something like £250 a month, I think, was typical, whereas, you know, the telephone modem was free. It might tie up the family telephone, you know, aggravation for mum and dad while the kid was on the computer [laughs], but it was very, very very cheap, and, you know, you got up to, 56 kilobits per second, and, ISDM was offering 64, maybe 128 at, you know, couple the two, two together.

[1:12:00]

So, I, I sort of, would sort of tend to sort of, put the thing in a general term, there was a window. They lost the front edge not getting a standard, and they lost the back edge because they didn't move out fast enough before the next wave was coming through. And the killer of course was the broadband Internet, which I, when I was in the private sector then, I led out of then NTL, now Virgin Media, but as soon as we rolled out our cable modem service, it gave, 256 or 500 kilobits per second, or, I think we were offering one megabit in that first wave. First is the 64 plus 64. We were offering £30 a month; ISDN was £250 a month. And so, in a sense the window closed. And so you could say almost there was a lost decade where the consumer suffered because the environment wasn't right, because the telephone was being locked up and, you know, the family fighting over it, et cetera. Whereas had the ISDN been rolled out in a mass way, in the same sort of way that I had created for GSM, where it was cheap and plentiful et cetera, you know, one... Effectively there were three paths into the home, because you had the, one 64 could be used for the telephone, another 64 for, you know, Internet. There was also a 16 kilobit per second channel that could also be used for packet data. So that would have been a very very good solution. And I think the Germans did very much better than we did in that regard at GSM – at ISDN.

[1:13:34]

How much does your networking communications background fuel this process of actually pooling intellectual property? Many of the people on the computing side of IT, just think of two sides, if we could simplify it...

Mm.

They've got their R&D labs, and they're pumping out patents as fast as they can, and they're ring-fencing their intellectual property as fast as they can.

Mm.

And they'll go to enormous lengths with lawyers to fight it and so on.

Mm.

And what you seem to be constantly doing, Professor Temple, is saying, 'Look, put it in a common pot and it's to everybody's advantage.'

Yeah, I, I wouldn't profess to have been any instigator of that, because, long before I came on the scene, most of the research in telecoms was done in the telco research laboratories, you know, certain private sector, you know, extant examples like SDL and so on, but, Dollis Hill and Martlesham and CNET in France, and, Bell Labs in the States. And the telephone company made their huge fortunes running telephone services, not, you know, protecting patents. They didn't need to anyway, because they had a monopoly of the domestic markets.

Right.

So the tradition I came into was that the, the patents would tend to be licensed royalty-free to their chosen suppliers.

Yes.

[1:15:02]

Then, with GSM we were still in that environment where the presumption was that the patents would all be put into a pool and be, according to the Italians royalty-free, but most other people were content with fair and reasonable terms. And then, you suddenly started to get this collision between the computer companies coming in, and particularly Motorola, that tended to wrap patents round proprietary solutions. And there was a collision. And I don't... I, I think, although a solution was found by ETSI, that sort of works, but it sort of doesn't work as well, because you still see these billion-pound patent disputes going on between Apple and Samsung and so on. So, so... And I, I know with GSM for example, I think we calculated that something like 25 per cent of the price of a GSM phone was royalties, because you had the accumulation of patents. So, we tried to solve that problem in ETSI of having a cap on accumulative royalties and arbitration, but I lost that battle. I went into DVB, I was one of the founders of DVB, and I managed to persuade them, you know, through a, call it a process [laughs], that, that they would either be bound by binding arbitration, or they would form a patent pool. And they so hated bind arbitration, they rushed off and did a patent pool. So DVB never had those problems that GSM, and later 3G, had.

Mm.

So, so I, I think that, the swing issue for companies like Samsung et cetera is that they realised at the end of the day there's a certain part of their business, they're going to get far more money sharing their patents, which is the creation of this huge global market, and in certain features they'll patent and hold to themselves, Apple and, and so on. And there's a lot of arguments around the edges. And I think the friction today is between some of the people who have got these patents that are pooled, getting ripped off by the guys who have got these private patents, and they can't fight back, because they're caught up in these fair and reasonable terms. So, I think there's, that's still a problem to be solved. I, I would count it as one of my failures of my great projects, that I didn't manage to sort of, you know, actually get that one put to bed. That's set out in my book.

[1:17:22]

And when the first GSM calls were made in 1981, you got a promotion to Grade 4, and head of sponsorship of the telecommunications, radio and broadcasting industries in the DTI. And throughout this period you're getting closer and closer to working with politicians. Who were the best and who were the worst?

Well I would go back to 1984, when I first joined the DTI. Before then, I, I didn't see a politician, as a civil servant. It was boss's boss's boss, the stuff was travelling up and down.

Right.

Very much at the operating levels. But every single job I had, from that point on, I was dealing with a variety of politicians. And they were churning through the DTI; about every fifteen months we'd another secretary of state. And some of them came and went, and you'd hardly know they were there, they had so little impact. I... I'm trying to think of the name. You see how memorable he was, [laughs] I can't think of his name. But the first...

Well you had to work with Tebbit.

Norman Tebbit was the one I had a real brush with. And that's really where I saw, in a sense the first absolutely... I'm trying to find a sort of, a, a right word for it. Ideological obsession, against the European Commission, and European Union. [pause] I mean Tebbit was a very intelligent man, and I was working on a, a project where, instead of having to test telephones, I think, the EU was twelve countries at that time, twelve different times, it would just be tested by one laboratory in one country, and every other laboratory would have to accept the results. And, there was to be some sort of group that was sort of set up, you know, to oversee this. And, it was going to be under the European Union. And Tebbit and Mrs Thatcher had just come back from the Rome summit where Mrs Thatcher had had a clash with Kohl and Mitterrand. And I remember... And... I'm getting this story slightly out of sequence. But another, another part of the DTI was responsible for standards, and they thought that I was giving sovereignty away in allowing this committee to be set up. The Commission were effectively chair. And, I thought to myself, but, isn't that

what it's all about? We pool our sovereignty. You know, we have a, we have a, we have ten votes, you know, and, and it's something we want. We want to open... I mean, surely the Conservative Party's all about opening up markets, and liberalisation. And he said, 'Oh no no no, sovereignty's much more important.' And much to my shock horror, a note went up to Tebbit, you know, saying that this, there was a big issue, that this official was about to give this sovereignty away, and he'd like to take a view on it. So I, I was called up to see Mr Tebbit, and, this colleague who thought I was doing entirely the wrong thing was there to put his case. And I walked in with such self-confidence. I thought to myself, what on earth is it about, you know. This is so common sense, you know, we want to open a, we want to liberalise the market; the consumer benefits, they'll be able to buy the telephones they want, you know. It was a piece of cake. And, in the European Union now we, you know, we've got our, you know, we've got our ten votes, we've got our shout. And, not a bit of it, Tebbit said, you know. And I remember the famous expression, he said... He said... The Foreign Office said... Oh no, what he said was, 'Who is in charge, who represents the UK in the European Union?' And I said, 'Well I suppose you do,' you know. He said, 'No, wrong.' He said, 'The Foreign Office. The European Union, the Foreign Office leads for the UK. And they'd sell us down the river for asbestos mines in Greece,' he said. [laughs] So furious were they, because, I presume the Foreign Office were flapping around in Rome trying to sort of, sort it out.

Lord Young, you worked with him?

But let me just sort of...

Sure, yes.

If I can just sort of finish up on, on the Tebbit story. He then said to me, 'Well, who leads in CEPT?' He said, well... I said, 'Well I know you...' You know. 'We do.' He said, well OK, he wants the job done in CEPT. I said, 'But in CEPT, they've got no voting mechanism.' He said, 'Well go away and invent one.' I said, 'But you know, if we did, it would be, Lichtenstein would have the same vote as us.' You know, he said... He wanted weighted voting. And I, I staggered out of the office thinking to myself, not only sort of, shock horror, you know, at his whole ideology,

but I've dug a bloody great hole for myself. I had to go away, get this club of monopolies, you know, to agree to a voting base, and weighted for... Et cetera et cetera. And, I went, literally it took me twelve months of diplomacy to get round and create a whole fabric. It was the first time the European Union has ever lent its, its legal powers to an external body. Not only that, a club of monopolies. [laughs] Totally unique. But I pulled it off. And when I came back, I put the note up to the minister to say what a fantastic job I had done. And... But anyway, Tebbit had moved on. And the other chap didn't know what I was talking about. A note came back from his department saying, 'Noted.' And that's when I learnt, you know, that, one of the skillsets [laughs] in the Civil Service is, wait for your minister to move on. [laughs] So, that, that came...

[1:22:52]

You were quite praiseworthy of Geoffrey Pattie.

Geoffrey Pattie was a fantastic minister, absolutely wonderful.

Because he did what you asked him to do?

No no. He, he... He genuinely was... He was a European, committed to the European Single Market. He could see the, the... I mean he, he came to the same view, independently, that I came to, that this was going to be good for consumers to be able to go across Europe. And if you think of a market, it needs good communications. So businesses are going to be travelling everywhere, and they've got communication on... So he could see, he could see. And he really did take a lot of heat, because, at one particular point Reagan wanted to borrow the GSM frequencies, and everyone thought that, you know, they'd never see them back et cetera. And he stood the ground, and, Reagan had a lot of sway with Mrs Thatcher, and so he took a lot of heat from that. But he stood the ground, and we managed to keep the frequencies in, on, you know, reserved for GSM. But, so he, you know, he was very very supportive. But he had a fantastic charm, you know. You put him into bat, I mean you were so confident, you know, he'd charm the other, you know, the other ministers, and, you know, and really get on well with them.

[1:24:00]

Heseltine?

Oh, absolutely. I... I'm an absolute fan. He's one of my heroes, Michael Heseltine. I mean I learnt so much from him. When I first went in to see him, you know, with my team, we had a bit of trepidation, because he had this sort of, swinging the Mace around, and, he had written a book about, 'I would intervene before breakfast, dinner and,' et cetera. We didn't know what to expect. You know, we sort of, had to put on our mail suits and go out and tell the industry what to do, oh, God knows what, you know. And he was so nice and so charming. He said... We asked him, 'What do you want us to do?' And he said, 'I haven't got a clue,' he said. 'I want you to tell me that. I want you to go out and talk to a lot of people in industry and then tell me, tell me, you know, what, you know, what you want me to do.' And, you know, very very thoughtful, very very courteous, you know, in terms of a minister to deal with, you know, very very courteous. He, he really did listen. He would argue, ask questions, but you know, you could hear him listening.

[1:25:01]

But the great fun I had with Michael Heseltine, the big achievement, was in the broadcasting space. And he wanted to get his hands on broadcasting, from his publishing background. He thought the BBC brand, God, what a waste. He could do a, you know, he could sort of, do, help the BBC, you know, achieve really great global things. But it wasn't his job. Peter Brooke was the DNH, you know, was the Secretary of State there. And I came back from Europe, having got the standards set for digital television, DVB standard for digital television, and the people who were rushing at it were BskyB, Rupert Murdoch, and Canal+. And, I thought to myself, this is going to be terrible. You know, Rupert Murdoch not only has got control of all the press, you know, politicians running at his beck and call, but I could see the digital standards were so powerful, you know, in terms of changing the whole market, multi, you know, hundreds of television channels, and, and so on. And there he went across to Luxembourg who granted a national licence across the UK, just... [laughs] I mean, you had the cable companies being constrained by the Treasury. They were paying out £600 million just for a franchise in Northern Ireland. The ITC were putting regulations, nine o'clock watersheds. They were deciding exactly what channels, you know, the public, were good for the public. There was Murdoch given

a completely free, you know, do whatever he wanted, put whatever channels he wanted, whatever condition, et cetera. I thought, you know, how's this going to work? You know, you put five, six, seven, eight, nine, ten years, and bit by bit, you know, there will be a complete up-ending of the market. And, at that time the DNH, big prize, and ITC, was to get out the fifth television channel. And I was worried they were going to take the frequencies away and there would be nothing for additional broadcasting.

[1:26:49]

So I put up to Michael Heseltine, you know, that, you know, we needed to encourage all the three medium of, satellite, cable television and digital terrestrial TV in particular, should all go into the market. So we, we'd got, you know, a competition and plurality and, you know, consumer choice. We never, the word Murdoch never got exchanged any time between any of us, or the junior minister, you know, who was also very keen on this, and he had his own input, which was very constructive. But I'm sure that was in the back of everyone's mind, that we needed to put something in the market to counterbalance BskyB. So how this played out was that... DTI had the expertise on frequencies, but the broadcasting, you know, which was DNH, actually set the policy. Suddenly, you know, Ian Taylor got Michael Heseltine to write to DNH to say, 'I don't think we can let you have the frequencies for Channel 5 until you can show us there's enough left over for digital.' And we threw this almighty great spanner in the works. [laughs] And suddenly, DNH realised that they weren't driving the policy any more. You know, we controlled the frequencies, you know. And, so, I, I helped to get Michael Heseltine into the game. So, you know, he wanted to get in, and I was showing him, you know... And I, you know, obviously wanted the UK to get the additional infrastructure in to make sure we didn't get this, this awful spectre of just an external foreigner controlling all of our broadcasters for no great good intent that I could see.

[1:28:26]

And what appalled me, and I, maybe I, it's good to get this on record, but, there was a level of corruption that went on between Murdoch and our ministers that didn't take the form of suitcases of pound notes, or money in Swiss bank accounts; they just did it for nothing. They were so frightened of his media power, that all he had to do is indicate his displeasure, and they were rushing, running off, you know, doing his bidding. And I was appalled that, you know, someone externally should be, you

know, having such a malign influence on public policy decision-taking. So that was really my motivation to...

[1:29:04]

You've got a conscience, haven't you?

Well, you know, you... And working out things from first principles. I just think as a policy-maker, you know, and, and feeling that responsibility, that I uniquely have got this opportunity to get things right for the country, I have to work out what is right. You know, working it out from first... What is actually right? Because that's very often a difficult thing to, to arrive at. And it seemed to be absolutely right, there had to be a counterbalance to Rupert Murdoch. He had a platform, it was going to be very powerful. I wanted him to succeed; I didn't want to do a negative and make sure it didn't happen. But something else had to come in, and I had to rally round enough people in the market, the BBC and the TV companies, so there was a counterbalance.

[1:29:43]

And, I think one of the great satisfactions in life is, you look back 25 years and you say, what did I get right and what did I get wrong? And I look at GSM, and I, I had a medium ambition, and I didn't get it right, because it was massively more successful than ever I dreamed of. [laughs] I mean I set a global industry, but I didn't set out to do it. With digital audio broadcasting, I was trying to sort of get a national thing. That undershot, you know, it's still, DAB is, it's good, it's struggling but it's, you know, it's not going anywhere. Digital terrestrial television actually hit the target. If I looked at the market shares, you know, all those years later, you know, it was almost, I got a bullseye. [laughs] A positive bullseye. I wanted everyone to win, and that's how it panned out, you know, all the free medium, you know, all sort of, got their place, got their space.

[1:30:32]

And there are hundreds of the stories as well. We just don't have time for them Professor Temple. You must go out and buy Casting the Nets: From GSM to Digital TV, by Professor Stephen Temple CBE. It's available in good bookshops. And if they don't have it, demand that they buy large numbers of it, and promote it. Thank you very, very much for your contribution today. It's an inspiration to other people.

Can I put a little PS in?

Yes.

[1:31:00]

If I was putting two little footnotes for prosperity. I think it's very important for people in the public sector to feel they can take a risk. And there's all sorts of reasons why you don't take risk in the public sector, because you're judged, politicians are always judged by failures. In the private sector you're judged by getting enough things right. But I think you can't be going into the future, try to change the future, and have, in any sort of way of knowing it's going to succeed. So you have to try. And I think the, the measurement has got to be getting enough things right. Some things you try, you know, will win, sometimes big time; other things won't win. But you've got to have that, that courage and that conviction that, go out there and get enough things right.

[1:31:51]

And I think the second thing, which I, when I wrote my book I sort of put in for my grandchildren if they ever discover it, I've not told them where it is, but it's all right to fail, if you can actually learn from the failure, of, and learn lessons from the failures. And one of the failures I've written in my book is that, that great orbit plan I made in 1977. Was never ever implemented. You know, I won the war, but I... Sorry, I won the battle but lost the war. But if I hadn't been involved in that, if that hadn't failed, I wouldn't have met that Japanese gentleman in the bar in Kyoto, and all the rest would never have happened. And, and so I, I, I think that's the second thing, is, you know, is, if you do, you know, something does fail, you don't sort of think, that's it, you know, draw a line, life's over. There's something around the corner that's going to come, and if you pick, you know, and, and choose, and select, and, get it right, there are some fantastic things still to come.

Those are very inspiring words. Thank you very much Professor Stephen Temple CBE.

Thank you.

[End of Interview]