

Business Computing: the Second 50 Years

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Business Computing 2001 - the State of the Art

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It really is a great privilege to be here on this occasion. It has a particular resonance with me because both my parents spent most of their careers working for Lyons. I remember my father back in the fifties being immensely proud of what was happening in LEO. If someone could have told him then that one day I'd be in the Guildhall addressing a fifty year reunion, he would have been gobsmacked.

I must say, too, it's a great pleasure for me to give a talk this week which isn't about directors' pay and severance terms, or even about the economy, but about what really matters, which of course is technology. That is not as facetious as it might seem. Let me give you, for what it's worth, my views on where we stand and where we are going in this field of IT, ICT — or, as I still tend to term it, computing. It's an intensely personal viewpoint. Many people in this audience could give a talk on exactly the same topic. It would be different, and not because one of us sees it correctly and the other doesn't, but because we are talking about something which is many-faceted, and which is very difficult, if not impossible, to put into any kind of perspective.

I became involved in commercial computing — business computing as opposed to technical computing, which I'd been involved in somewhat earlier — in the early sixties. Like many of us who were swept up at that time, it was an accident. I'd gone to a company as a management trainee. It was an engineering company with very complex manufacturing, whose management decided that the only way they could control the business was by the use of computers. They brought in a couple of very high-powered people from America, and then looked around the company to find anyone who had seen a computer. Having worked in the aircraft business I had, and so they drafted me in. I nearly resigned, because I thought I was being sidetracked. But it proved very exciting, because over the next two or three years they became one of the leading computer users in Europe, and I was quickly giving talks on the subject.

By the latter part of the sixties I had moved into factory management. The reason I moved out of computing was that we had done it. There was some tidying up to be done, of course, but we had computerised. That was the view. We had converted the administrative processes in the way they had converted the factory to using machine tools a century earlier. It would evolve, but the basic job was done. That was the perspective in business at the time. We did not understand that we were going through a sea change, from an environment in which systems never changed into one in which they never stopped changing. Anyone who was involved in converting systems in business at that time wasn't converting last year's systems, they were *the* systems. The stores record cards had remained unchanged since the company was formed the previous century. The same was true of the blueprints and the tear-off cards that accompanied each batch of components through the factory. Systems didn't change. So for a long time management was frustrated with computerisation, because, as they saw it, they'd spent great sums of money yet still had more to spend to get things 'right'. But the era of getting things right was gone. We'd moved into a period in which there was continuous change in the way we ran the business. That was a very big change indeed, which perhaps those of us associated with the computer world have taken for granted, but business took a long, long time to adjust to it.

The overriding driver of change was the technology itself. The scale of these advances is very difficult to convey to anyone not associated with it. When I was running Butler Cox, a consulting and research company, we invented a number of measures. For transmission speeds, instead of talking in megahertz, gigahertz etc, we spoke of FTs per second. We would say to a businessman that with optical fibre you could transmit every single item of data ever printed in the whole history of the Financial Times in two seconds. That immediately raises the question, how do we handle that? We talk about Moore's Law, that price/performance doubles every 18 months or so. Its scale, to the average person, is impossible to convey. My colleague, Professor Jim Norton, gives a good analogy. The story is told that when a court functionary developed the game of chess and showed it to the emperor, he was mightily impressed and said, you must have a reward, what would you like? He replied simply, one grain of rice on the first square, two on the second, four on the third and so on, and the emperor smiled and said, if that's enough to make you happy get on with it. Well, of course, by the time you get to halfway across the chess board you need a paddy field the size of Greater London, and by the time you finish you'd have to bury the whole of the earth two metres deep in grains of rice. In technology terms, we are now halfway across the chessboard. We've come from a grain of rice to a paddy field the size of London. That's what Moore's Law means. Incidentally, the story goes that the emperor then realised the scale of the reward, and executed the functionary for this cheek!

The interesting thing is that if you look at any aspect of computing or communications technology, the advances are dramatic, no matter which way you measure them, but they are nonetheless predictable. The curves are steep but consistent. I submit to you that technology hasn't thrown us anything unexpected, unpredicted, over the last fifty years. What we have failed to predict is what its impact would be. Our ability to forecast the impact of technology is dreadful.

This doesn't just relate to computing, it relates to many other fields. If you talk about the telephone there's a lovely quote: "my department is in full possession of the knowledge and details of the invention, and the possible use of the telephone is very limited." That was Mr Cully, who was Chief Engineer of the British Post Office in 1877. If you look at television, Darryl Zanuk stated: "television won't be able to hold on to any market it captures after the first six months. People will soon get tired of staring at a plywood box every night." Harry Warner, in 1927, on the film industry: "who the hell wants to hear actors talk?" And if we turn to computing, Fred Olsen, president of Digital and a giant of the industry, said in 1977: "I can see no reason why anyone would ever want a computer in the home."

There's only one long-term prediction about computers I've seen which is spot on. Popular Mechanics in 1949: "computers, in the future, may perhaps only weigh one and a half tons."

Now, why is it that we get things completely wrong, even when we understand the technology? I spent much of my early career in the aircraft industry. There was a study produced in the early sixties by IATA, the foremost body in air transportation, on the market for supersonic travel. It said that by the early seventies there'd be a market for 1,200 supersonic airliners. The view within British Aircraft Corporation was that Concorde could get 200 of that 1,200 before the Boeing 2707, bigger, slightly faster, and with longer range, took over from it. Everyone had doubts, both in the industry and I understand within Boeing itself, about the other product that Boeing was developing: a great, slow-moving, air-born barn, the 747. What happened? Fourteen Concorde were produced, the Boeing 2707 never flew, and the 747 is still in production today. Now, up until that time air travel had got faster and faster. It was obviously going to get faster still. Why should anyone want to spend any longer than they had to in travelling? But it stopped and actually went into reverse. Block speeds across Europe now are slower than they were in the

early sixties. Why? There were no serious technical setbacks with Concorde. It fulfilled all its design expectations. And I think this is where we get to the nub of the problem. We tend to look at technology in the light of what's possible, and not in the light of the other forces for change in our lives and in business — particularly the economic environment and the attitudes in society. What happened with Concorde was that it was developed at a time when fuel prices were not a major consideration in air travel, and when environmental considerations weren't an issue. Sadly — for supersonic travel - that was about to change dramatically and permanently.

But didn't space travel follow our projections? No. What we got wrong about space travel was that it would stop. Having been to the moon six times, we stopped going. It is not even in prospect now. We were going to set up lunar bases; we were going to go to Mars. It stopped, and not because technology couldn't do it, but because economic and political forces changed direction. So when we look forward we can't look at technology in isolation.

The other thing which goes wrong is that we tend to interpret technological developments in the light of today's circumstances. The Mayor of New York is said to have seen a demonstration of the telephone by Alexander Graham Bell, in which the Mayor spoke to a colleague at the other end of a corridor. The Mayor was mightily impressed, and said: "Mr Bell, that's a wonderful trick, it really is. Highly amusing and very surprising. When I next have a children's party, could you come and perform it for me?" Bell was greatly offended and said: "this is not a trick Mr Mayor, it's a practical device." To which the Mayor replied: "I'm an able-bodied man, I can walk along the corridor." Bell said: "no, you are missing the point. With this same device you could talk to somebody fifty miles away." The Mayor reflected on this and said: "I don't know anybody fifty miles away."

It still goes on. There is this great myth today that videoconferencing cuts travel costs. Absolute nonsense. Videoconferencing increases travel costs. Indeed, modern technology in general increases travel costs. Let me explain why. There was a time when, if you ran a multinational corporation, you ran it as units — each country manager had his fiefdom. The manager was visited once a quarter and explained what was going on, and the visitors disappeared back to corporate headquarters. Now businesses are run differently. Quarterly inspections have become daily interactions. There are pan-European HR programmes, pan-European marketing initiatives. You don't have a single physical design office anymore, you have people working on-line on the same 'drawings' in Belfast, Wichita and Montreal. Because of modern technology, businesses are run in a way which would not be possible if the technology wasn't there. But when you run a design team all around the world, even if they're electronically communicating on a daily basis, you don't keep them permanently physically isolated. You have design conferences where you physically bring them together. Because you run businesses differently the demand for business travel has gone up enormously. Technology doesn't take old ways of doing things and do them better; instead it opens up new ways of doing things, and offers possibilities for business we hadn't considered in the past. Extrapolation of what's gone before, and interpolation of today's needs, gives us a bad steer.

But hype is just as bad. The Internet is a very interesting example. Here was something which had been under continuous development for almost a quarter of a century, and yet two years ago it suddenly hit the business scene as if it had just been invented. All of a sudden there was this incredible thing that was going to change the world. Then the backlash set in. Now people say, oh well, they got it wrong. Not true. I believe that the Internet, e-commerce, e-business, call it what you will, is the biggest business change in my lifetime. I can't put it more strongly than that. But when I make that statement at conferences with business people you can see them think, well, he would say that wouldn't he?

What does the Internet mean? Just this. Anybody in the whole world, individual or company, can get in touch with, seek out, exchange information with, and trade with anybody else in the whole world, any time, day or night, cheaply and easily.

Life-changing concepts don't come any bigger than that.

What we've seen here is what we've seen in so many developments. We get the hype quickly; people charge in; the capability builds up. But by the time it is really starting to move you can't mention it. You go through this wave where expectation exceeds what can be delivered, and then no-one wants to listen to you. I've got a videophone. I don't have any friends with one, so it isn't doing much for me. But you don't reject it and say, this doesn't work. There are certain trends in society, such as people's familiarity with accessing information electronically, which you can do very little to accelerate or influence. You can only intercept and take advantage of them.

So having given that assessment of the difficulty in looking forward, let me talk about where we stand now and where we might be going. As I said, the current mood within business is that technology isn't as important as we thought it was. Put that to one side, that's a mood. The impact is enormous already, and the future advances which are certain to happen are quite amazing. Consider the power of the thousand dollar PC in relation to the power of the human brain. I know that the human brain works differently, but in terms of connections it's not a bad comparison. Where we stand today, maybe a million PCs would be required to have the same computing power as the human brain. By 2010, it's a thousand. By 2020, if we continue on the current path, they are on a par. By 2030 the PC has a thousand-fold advantage. By 2040 it equates to a million human brains and by 2050 to a billion. Now I don't care if I'm out by a factor of ten or twenty, it's stunning in terms of what that power means. I haven't got a clue what it means in terms of impact and neither, I say with great respect, has anyone else here. But the technology is not going to stop. Whether we would like to turn it off or not, the technology is driving forward.

So let's look at the impact on business. One of the great impacts is to require greater agility in organisations. The ability to move quickly.

Let me give an example of this. I sit on the board of LIFFE, the London International Financial Futures and Options Exchange. Now LIFFE isn't some old fuddy duddy organisation. It's dynamic. It had grown to the point where it was challenging Chicago to be the world's biggest derivatives exchange. Sitting on the board, which I joined some seven years ago, I argued that we had to go electronic. My colleagues said, "well, we would expect you to say that, but George, you've never traded on the floor. If you went on the floor of LIFFE you would find two thousand people shouting and waving arms; it creates liquidity and provides genuine markets. You can't replicate what goes on here electronically". We did eventually agree we would invest in technology, but simply for back-up, out-of-hours trading and smaller products. Even to do that was a difficult, contested board decision. At the same time, the decision that went through on the nod was to take a new building in Spitalfields for more trading floors. This was four years ago. Then the Deutsche Bourse, which used electronic trading, became very predatory on pricing. And LIFFE's business started to decline dramatically; over a matter of months, we were not fighting to be the biggest in the world, or to maintain our position as the biggest in Europe, we were fighting to continue in business at all. It was frightening. Fortunately LIFFE's electronic system was well developed and we underwent a great conversion and completely replaced floor-based trading. A total transformation, and the speed with which it took place was stunning.

So business needs to be much more responsive now. Many of the things we thought of as being permanent are becoming transient, and things we might have thought of as being a bit soft and incidental are becoming enduring. The values, the reputation, the culture, the mixture of attitudes and behaviour that exist in a business, together with its knowledge base, its manageability and its ability to respond to change, are the things which are key to future success and, I submit, now become core to the business. Things which have become transient are its systems, its processes, its organisational structure, even its products and its markets. All these will change and change continuously. Look at the way Virgin moved from being a pop music company to being an airline and an insurance company, and look how difficult many of our established organisations have found it to change at all.

It's wrong, too, to look at business development in isolation from developments in society. We have moved into the field of cheap, easy, distance-independent communications. It's going to have a massive effect — massive. Moreover, it isn't just in terms of communication person to person. Do you realise we are the last generation where the concept of getting lost will have any meaning? If you go back a century people didn't know the time. Unless you were near a clock, or one of the wealthy people with a pocket watch, you didn't know the time, other than by the sun or by how hungry you felt. Nowadays everyone knows the time. The same will happen with positions. I used to be quite a keen glider flyer. I'd take my glider down to France and I'd fly around. I was a fair flyer, but not the best of navigators. Not because I didn't understand the theory, but I got too wound up in staying up in the sky and avoiding other aeroplanes. When you are lost in the air in the middle of France, you are lost. You look at your map and you think, oh, there is a little town I recognise, it has a church and a railway station and a river running through it — but they all have! So I'd end up in a field at the end of the day and go across to the local farmhouse and ask in my schoolboy French, "where am I, because I have just dropped out of the sky?" It just doesn't happen nowadays. The modern day glider pilot would think that's bizarre, because he knows where he is to within a couple of metres at any time in the flight. And cars, of course, now have this capability. If you hire a car in the States it has a moving map and it talks to you. It says, as you drive out of the airport, get into the left-hand lane, take the second on the right and take the first left. It's marvellous. If I miss a turn, it just corrects the route.

We all have a fear of children getting lost. In future, it won't happen. You'll have a device on their wrist and you'll know where they are. The concept of getting lost will lose any meaning, whether you are in the middle of the Atlantic, in the air, or in some city.

We are also having to deal now with information on an unimaginable scale. Gartner says that by 2004 the average company will have 120 terabytes of customer data. Now a terabyte is 38 miles of filing cabinets. That's four and a half thousand miles of filing cabinets of customer data for the average company! I don't know how you handle all that.

We are also likely to see a diminution of government influence. Government is already losing its power to censor, if it hasn't already lost it. Do you remember when Jack Straw's son was charged with a minor drugs offence? All the newspapers the next day said, "Minister's Son On Charge" and didn't name him because the judge said, quite rightly, you cannot name a minor. It didn't matter; you could get it on the Internet. You cannot censor now. There is a threat to taxation. Taxation depends on a physical transaction which you can locate. When you download music where did that take place? Where was the profit made? Or it depends on the location of companies. But in Unisys I could easily have relocated our European headquarters without physically moving anybody.

I think you are going to see a changed interface between government and business. You are going to see interfaces in terms of intermediaries, or infomediaries. We talk about joined-up government. It's not what you want. You want government joined up with bodies in the private sector. When I had some trees cut down recently, getting permission from the local council to cut them down was done by the tree company. When I buy my new car the registration is handled by the garage. It's links like these that matter. Moreover, most information we supply to the Inland Revenue or to Customs and Excise has been through a computer several times. Why are we forever extracting it and supplying it to them? Believe me, putting in an electronic submission for your tax self-assessment is not e-government. We are going to see a whole change of communication structure between government and the public.

There's also going to be a changed role for third parties in the world. You can see people filling the vacuums. There was a time when, if I travelled, the most valuable thing I could have was my British passport. To hell with that, what I need now is my Amex Gold Card. If I get mugged and lose my money, who gets me home? Or if I'm taken sick, who gets me home? The British Consul? Forget it. Amex does. When I buy something off the Internet, I buy something from anywhere in the world; what guarantees it? Is it the consumer rights in that country? No, it is my credit card.

So, there are a number of developments which will change the structure of society as well as the structure of organisations. Globalisation is happening, and it is altering the power structures in the world, though whether a company is more accountable to its customers than governments are to their voters is a moot point. It's a world full of business opportunities. For start-ups, or for the companies that can move fast enough, it's an enormously exciting time.

People use the term 'the IT revolution'. The term is appropriate, I simply think that the revolution hasn't even started yet.

Thank you very much indeed for listening to that highly personal perspective on technology, where it has come from and where I think it might be going.

Discussion

Chairman (Anthony Giddens)

We've got about a quarter of an hour for questions and discussion, so I'll just immediately throw this open to the floor for anyone who would like to ask a question or comment on what George said.

John Gosden

John Gosden (LEO, 1953 to 60, and since then in the United States). I stayed with my brother last night. He runs a small, 50-bed hotel, family business. He thinks the greatest thing that's happened in the information revolution is the fax machine. He still doesn't want to go up to a PC. He wants to just shove the piece of paper in. He doesn't have to worry whether it's a graphic or not. And he thinks that's revolutionised his business.

George Cox

That's perfectly understandable. I think one of the things we've failed to recognise is the value of paper and hardcopy to people. I predicted in a paper in 1975 the imminence of the paperless office. Oh God, how embarrassing. I mean, I should have been advising people to invest in paper companies, because the use of paper was going to explode. It does at my home. We have reams of paper. I take big packs home. One of my daughters, on the machine, gets through dozens of rolls of paper. People actually like physical media. And the fax is another of these things where, for a long time, there was a technology which had been described and demonstrated, but its capability lagged the hype. If you go back to '75, you couldn't talk about fax to people: "we've heard all about that. So slow, it's not going to work". But it was to have a big impact. You are quite right, the high-speed copier and the fax have had a huge impact on people's lives.

Derek Grover (BCS)

An interesting point about the PC being equivalent to a thousand human brains, and ultimately a million and so forth. A danger clearly is that the PC is copyable, and any errors in the original program are going to be propagated, whereas at the moment we have debate amongst people, who can't actually transfer their thoughts completely to another person. Do you think that's a danger?

George Cox

Yes. I think that's a worry. One of the things that has bothered me quite a lot is how we assume the technology will displace communication skills. In the consulting company I helped set up, when we brought in the first word processors they were tremendous in preparing consultancy proposals — putting in the boiler plate and all your credentials and that kind of thing. But one of the problems we had was their effect on thinking, and on the structure of reports. The assumption was, dump something down quickly and you can then polish it up with a bit of wordsmithing. People were writing before they'd started thinking and had structured the document. And we had to insist on, and train people in, the basic disciplines. So I think modern technology doesn't in any way diminish the requirement for clear communication skills. My belief is that it actually adds to it.

Colin Palmer

A couple of thoughts occur to me. One is on the communication skills, because one of the implications of technology, especially in the home, is that children now have technology in their rooms. I don't know what the figures are, but how often do children speak to parents and siblings, compared to how much of their time they spend on computers? And what effect will that have on them socially over the years? The other thought is that the governance structures of the world have potentially come under the most enormous pressure. If you can't censor things then how does society handle this? And that's only the very tip of the iceberg.

George Cox

You are quite right about children. One thing which is of concern is that if you speak to teachers they will talk about how they can spot the children in class that have access to computers at home, by the quality of their work and research. That's a worry. You could get a division there which we never sought. I've always thought that the availability of cheap access to information was one of the great levellers in society and a great thing. But how we apply it has got some concerns.

This issue of the alteration in global roles and global power - not driven by technology, but facilitated by it - is a massive one. The commercial power of big global businesses, both to influence economic policy and to exercise economic power, can outstrip that of governments. It already happens. The Caux Round Table recently discussed the role of business in alleviating third world poverty - because it's only business that can do it. Government doesn't have the economic power. The GDP of Argentina is the same as the second largest bank in Pennsylvania. America gives a tenth of one per cent of its GDP to international aid. It won't go up. That's not going to transform anything. If you look at the development of the Chinese economy, so far about a billion dollars has come from world aid, about a billion in loans from banks, and thirty billion per annum from business. Despite the excesses you do get from some global corporations - and they are not beyond criticism - most of them spread things like health and safety standards. Third World governments don't have health and safety inspectors, multinationals do. So I think the power of those organisations will grow. And that becomes a worry. They are accountable to their shareholders, and they are accountable to their customers, but they are not democratically elected. So I do think we are seeing a shift in power, which in some ways is very exciting, and in other ways worries me. The thing that worries me most about September 11 is the effect on developing countries. The willingness now to invest in those countries has become an issue. I chair a charity called Merlin, which sends doctors and nurses to nasty places in the world, and I was at a forum recently of their field managers. A team was going back to the borders of Afghanistan. You say, you are going? And they say, well of course we are going: that's where the need is. Now, let me tell you, if it had been a company, not only would I not have encouraged it, I would not have allowed it. And if you don't send managers you won't invest. I think globalisation isn't the best hope for developing countries, it's the only hope. And if it's badly impeded, as I think it might well be, by the events of September 11, that's a major concern.

Gordon Davies (University of Minnesota)

You talked about the Internet. One thing you didn't mention was the effect of the Internet on the boundary between work and not work. With the Internet I can work from my bedroom, I can work from my bathroom, I can work from my living room, I can work in my car and in the train. I have access, which means my employer has access to me, any time, anywhere. I have a feeling we've gone back two hundred years to the cottage where the whole family worked together and there was no difference between work and not work.

George Cox

Yes, that's a very good point. I think the whole question about work being, in many cases, location independent is important. May I make one or two comments on that. My wife, when we had our second daughter, stepped down from her job as editor of a magazine for a property company in London. She said she would carry on with part of the job working part-time. She had all the necessary communications kit - but after about three days she was getting on the train. I said, why? What she missed was the people. So I don't think that communications technology is going to mean that people all work in physical isolation.

I think this trend of being able to access anybody, any time, is very worrying. In some ways it gives you a nice flexibility. I appreciate that. But I find very hard to come to terms with the thought that my time is somebody else's no matter when they want to call on it. I think putting telephones on aeroplanes is a dreadful development. I used to love that feeling, when you got on the plane and the door was shut, you would think they can't get hold of me now for seven hours. I had a colleague who worked all the time. We would get on the plane and I'd get out a book and he'd get out a laptop. So I banned him from working on planes. I used to give him novels to read on aeroplanes, even when I wasn't with him, and I'd test him afterwards, like a schoolteacher. Getting your work/life balance right in this world is very difficult. I don't know how you feel, but when I go to a restaurant and there are people who have got their mobiles on — come on.

D.K. Matai (mi2g)

In the last fifty years the challenge has been to develop faster and faster computers. Now we have a lot of computer power and a lot of information. I'm getting as many as six hundred emails a day, and it's very difficult to manage the knowledge. There's a lot of security risk too, because of all the people connected to one large machine, which is the millions of computers and the telephone wires in between. So what are your views about knowledge management and electronic risk management?

George Cox

I think that knowledge management isn't just technology, it is also down to disciplines and culture. There is management of other people's knowledge too. As for risk, the ability now to spread misinformation is massive. I'm not greatly worried about someone fraudulently using my credit card. After all, I'm prepared to give it to people over the phone.

Technology will reduce some risks for us, with some loss of civil liberties. Sooner or later we will end up with a driving licence in the form of a card. If you don't have one your car won't start. A bigger risk is that crime is getting more complex, more sophisticated, particularly when it leaps boundaries: you can make a transaction in London and actually, for a fraction of a second, it goes through New York and comes under their regulations. That issue is being addressed but it's complex. The risk that also worries me is electronic terrorism, which could have a far more drastic economic effect than putting white dust in envelopes. Once again, we've invented these wonderful technological powers, but they will give us great issues in society.

Chairman

The conference is now going to adjourn for coffee, but can you join me in thanking George for getting us off to such an interesting and entertaining beginning.