Andrew Hopper

Born 1953.
Life story interview by Alan Macfarlane.
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1. My Early Life

I was born in Warsaw, Poland, of Polish parents in 1953. I came to the UK in 1964 and was just in the last year of primary school here. My parents divorced and my mother met an Englishman called William Hopper and we came and lived in London.

In January 1964 went to primary school in central London; as my mother was working I was looked after by my maternal grandparents. They had been middle class before the war but lost everything during the war. My grandfather was an administrative assistant in a church, registering births, deaths and marriages; my grandmother had been part of a family printing business before the war but afterwards was a housewife.

I went to St Peter's Primary School near Victoria Station. I couldn't speak English and had not taken the 11+ exam; I was rejected by all the private schools like Latymer and Westminster. We moved to Putney and I ended up going to a grammar school in St John's Wood which became comprehensive when I entered sixth form. I commuted across London by tube each day on my own.

My stepfather, William Hopper, is dead; he died almost exactly thirty years ago in 1978. He was a trader in pickled baby beetroot so he had been to Poland on business which was how he met my mother. He also had some retail fruit and vegetable shops and was a wholesaler of the same in Spitalfields Market. He made a reasonable living and was relatively well off. His first wife had died, and he was eighteen years older than my mother.

When we came to the UK I took his name and an English version of my Polish first name. I retained my fluent Polish because my mother would always talk in Polish when William Hopper, my stepfather, was not in the room. I am very pleased about that and still have an accent which rather suits me. At school, at first I did OK then not so well. When I was in lower sixth I was told that I was basically not very able and should do an OND (Ordinary National Diploma).

Earlier the school had recommended that I went to an applied psychologist who gave me tests which produced that recommendation. They got it wrong as they completely ignored my Polish background. When I had not done so well in my second year, Bill Hopper gave me a financial incentive to do better promising to give me £10 for the first ten places I went up and £2 for each place after that. I came first the following year so collected all he had offered. He was business orientated about education and this may be reflected in my own business interest.

I managed to get reasonable 'A' levels; not many went to university from this by now comprehensive school. I applied to university and ended up at University of Wales, Swansea.

I am reasonably close to my mother. Polish culture is sticky. I don't know about my real father but I believe he was some kind of academic. My mother was fairly ambitious, a woman with attitude, though not particularly pushy. Education in that culture is very important, achievement and attainment are also important.

I always enjoyed the more mechanical, engineering, train sets perspective of things. At school I was kicked out of history very quickly so my knowledge of it is weak. They put me into woodwork; in the late sixties and very early seventies, the first moon landing had happened, and I clearly had some interest in that stuff. You could not get a computer at home at that time and you had to go to university to use a computer.

I did have electronic kits at home, but in my educational context there was not anything to pull me up. I can't remember any teachers who really influenced me. The distance of my commuting meant that my school friends were narrowed to the area where I lived. I was a cox at rowing. The school was Quintin School, set up by Quintin Hogg who set up the London Polytechnic. It had access to the Polytechnic's sports ground and rowing facilities on the Thames at Mortlake. I am quite sporty and was in the skiing team for both the University of Wales and Cambridge University later on.

As I grew up in central London I had a good time with friends going to discos. My friends were a mixture of Irish, Jewish, some coloured. I send my own children to state schools for similar reasons.

At a time when computing was starting to get going at a more popular level my interest in electronics did set me up to apply to universities. I applied to Manchester, Lancaster, and Swansea. I didn't get high enough marks for the former but Swansea accepted me. As it turned out that was fantastic because I was good at computing and since then have been top of everything in some broad sense. Secondly, David Aspinall, who was from Manchester himself but got his first Chair at Swansea, set up a course called Computer Technology - I am now Professor of Computer Technology as was Maurice Wilkes.

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University of Wales at Swansea

That course was a combination of electronics, computer science and macro-economics; this was 1971 and at an early stage in the subject's development you could for the first time get computers. But it was still all to do, to discover, play with - train sets. It was fantastic; Gower, Swansea, wonderful beaches, and socially having been a London person I didn't find it difficult to have a good time.

During that time I got a car and with a friend drove to Iran and back. He was Iranian and we went to visit his family. The following year I went to Brazil by myself and toured. My son is thirteen and just this week is on his first trip to Germany with the school. It seems things were easier in my youth. So I ended up being on the right course, in the right place; it was rather different to Cambridge as I had never seen a gown until I came here.

I did well in Swansea and was still a keen skier, so was wondering how I could combine post-graduate studies with skiing. I was planning to go anywhere that was close to a big mountain so didn't apply to Cambridge. I applied to Lausanne and Grenoble but got no response; Professor Aspinall was aware of possible funding difficulties if I applied late in the UK and suggested Cambridge. He knew David Wheeler and suggested I go and see him. I came here in early July 1974 when I had an interview with Maurice Wilkes and Roger Needham.

The next day they took me; I would like to think it was my brilliance but probably they had studentships and somebody had dropped out. This was how I ended up in Cambridge. I duly got offers from places near mountains but I had by then accepted the Cambridge offer.

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Cambridge University

I came to Cambridge in 1974 to start a Ph.D. with Roger Needham as my initial supervisor, then David Wheeler from the Easter term of 1975. The computer lab was at a stage where students were not building things which I enjoyed so they set me up with a hardware bench. I had a ski instructor's licence and I went off skiing in December and January; another thing I started doing was gliding. In autumn 1974 went to the Cambridge University Gliding Club at Duxford and have carried on flying ever since.

The Cambridge Ring was one of the projects that I was involved with as a Ph.D. student under David Wheeler and Maurice Wilkes. I was helping with the basic design in the days when there were no local area networks. I set out to design one that would connect machines. The Ethernet was just coming along which was a similar idea but done in a different way. My Ph.D. was called 'Local Area Computer Communication Networks' comparing the similarities of networks. I came up with the design of a chip which could implement many of these networks using the proposed hardware. This was in 1977 and I was going around explaining how the Cambridge Ring worked as there was a lot of interest in it. I set up the link to Social Anthropology to a Nova computer which was used by Alan Macfarlane's research project.

At one of the talks met David Thomas of the Rutherford Lab. who suggested developing the chip and offered money to do so. I went to see Maurice Wilkes who thought it was a good idea. I became a self-funded research assistant to work on the chip. The Department of Trade and Industry had an advanced technology scheme which also put money in. As a result, I did not finish my Ph.D. in 1977 but in Easter 1978. William Hopper died in June 1978 so I didn't actually take my Ph.D. until September. That is how I got into Cambridge University as an employee, and got into the business of doing chips and networks.

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Acorn and Olivetti

It was a good time to be doing such things in one sense, but the competition was DEC, Intel and Xerox who had got together and 3-Com with Metcalfe in the U.S. Nevertheless, in retrospect as compared to today, where what you do in university as a computer technologist is a little more challenging, it was a good time. It caused a type of technology to exist in Cambridge which later on became a variety of companies, but the roots go back to that.

The chain goes as follows: the Computer Lab. is doing the Cambridge Ring, the first time that local area networks are starting; the chip version. I find someone to make the chip so use Ferranti who have some hardware but don't know how to design it, which we try to design essentially by hand. We need some computer aided design tools to make these chips. We start a CAD project to make the tools to make the chip. Meanwhile companies are starting home computing so we started CPU Ltd., Acorn was the trading name until it became a public company.

CPU uses some of the chips used in the Computer Lab. for the Ring; the BBC Micro having chips inside it is related to that directly. Sinclair used the same chips. BBC micro had a network in it, not the Ring but based on it. Bill Gates came along and we showed it to him and with regard to the network system we were ahead of him, being plugged into the world design clusters. We as Acorn (I was a co-founder with Hermann Hauser and Chris Curry) started doing a microprocessor design which has become ARM, the world's largest supplier of microprocessors to mobiles.

For Acorn we needed a CAD system so we purchased the CAD project from the University and developed it further into ARM. In the 1990's another successful Cambridge company called Virata, creating DSL broadband for the home, a networking company that uses a chip for its implementation. All part of a direct line of technologies - Ring - chip for Ring - networking - high tech ventures and businesses.

Maurice Wilkes was my Professor and carries on relentlessly with only a brief gap in our professional relationship. He was coming up to retirement in 1980 but he still comes in and has an office next to me in the Computer Lab. When I was running the industrial lab., Olivetti Research Ltd., he had his office next to me there and participated in that. The man is driven; we all have this disease of hunger for success, for impact, a continual desire to achieve something with a proper intellectual basis. He is the extreme version - I call him my intellectual dentist because to this day he drills. It is good for me, I know, but it hurts a bit. You can't talk about football with the man.

I came in 1974 and he retired in 1980 and he still comes in with technological questions. I should speak about Roger and Karen Needham - Roger was part of the distributive system on the Ring and was a great systems guy. He was a good leader and had an effect on me. Karen was a little more distant until quite recently before she died as she had been involved with me in fundraising. She also made the first contribution to our fundraising campaign. She was a trustee of various things like the Thriplow Trust with Swinnerton-Dyer and that trust also made a contribution.

That was my immediate memory of her but more generally, she helped a great deal with the interdisciplinary nature of the Computer Lab.

I think of her work on language; she and Roger were quite good sparring partners; I remember the great party when Roger got his Chair and he went off to do Microsoft. Since I used to run an industrial lab for many years, we used to talk about how to run a lab. The Microsoft situation was different. Mine (Olivetti) was a much more independent entity while his was more corporate.

Yet we could compare ourselves with other distinguished labs. and how we could achieve more than they did. David Wheeler was my supervisor with whom you have a special bond. For the first year I couldn't understand what he was talking about. There was such a gap between what I could offer and where he was, he having done major bits of EDSAC and more. I would pose a question, and he would give an answer that I didn't understand. So I had to work out the whole context which gave that answer.

In time I could talk his talk. He was very smart and good at detail; he used to scribble on little sheets of paper which we keep in our archives and in my personal archive. It would be difficult in the world today for somebody like that to exist where promotion, recognition and distinction are more formulaic. He became a professor, an FRS and published about three things. But it would be more difficult for him to have become a professor these days. I would have a barbeque at home sometimes and he would turn up on the back of his daughter's motorbike; his daughter wore black leathers which amused us.

The first company I was involved in with Hermann Hauser was the company I sold to Cambridge Ring, one of four companies that were sold to them altogether. That started about the same time as CPU, the company that most people know as Acorn started as well. It was started by Hermann Hauser and Chris Curry. They were in the same place in Market Square as a company called Orbis that I had set up to sell the ring technology. We amalgamated these companies into one very quickly; I was the smallest shareholder; there I switched to doing work on chips for the computer company rather than working on the ring.

Acorn did very well at first then Olivetti came along and took a majority stake; I was one of the directors and they asked me to start an industrial research lab. for them directly rather than work in Acorn. Meanwhile I had set up a company called Qudos (quick design on silicon) which had some CAD software for designing chips so was actually a manufacturer of simple chips by using electron beam prototyping onto a surface, each chip one at a time. That joined the living dead though it still exists at the Rutherford Lab. It could have been a spectacular success but not every one of your companies is so. The thing that we missed was that the hardware side was a very capital intensive business and quite hard and the volumes weren't there as you wrote each chip at a time.

The CAD side of the business could have gone global but we didn't prioritise that. Now it is a company called Cadence, nothing to do with us; that was about 1985. Olivetti Research Ltd. was set up as a separate company though the budgets came from Olivetti much of the time. I was the C.E.O., the only time I have been; this

was all in parallel with my University work first as an assistant lecturer, then lecturer, reader and professor.

In terms of my academic colleagues here in Cambridge my career is the most industrial parallel one. When I have started something I have gone with it and done it for a reasonable length of time rather than designing the technology, launching it, and leaving it to others. The research lab was going very well but Olivetti was not doing so well.

We decided we had better do something about returns otherwise we would be dead. We started spinning out companies. Where you get some research and do it, you assume your team is good enough so you have something that is exemplary; you then offer it to the sponsor, the business unit, and if they don't use it they get a cut. But you try and licence it or open source it to keep it going in some way. Technology should not be hoarded. We fell into that cascade of maximizing opportunity by doing all this stuff and at the same time we started getting other sponsors for research in addition to Olivetti.

We were not competing with the University. I said to everybody who worked for me (there were about sixty) that if they wanted to be academic they could do the same thing that I did and work simultaneously at both. We didn't pretend to be part of the University but were an applied lab. with more resource, that worked very well. Our funders included Digital Equipment Corporation and Oracle.
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The Spawning of Companies

We had quite a few suitors and eventually Olivetti sold the company to AT&T and we became the AT&T lab. The lab spawned Virata - Telemedia Systems (which helps with fast editing of multimedia materials), Adaptive Broadband (a wireless company), which spawned Cambridge Broadband (another wireless company of which I was chairman) started in 2000.

The industrial lab was shut by AT&T in 2002; the bad news was that the closure was completely unnecessary as two people wanted to buy it and it was trashed by its American owner.

The good news is that the work carries on in several companies, three of which I am chairman, and director of a fourth, because the projects in that industrial lab. were strong and the teams were strong. The people have stuck together, not competing with the University. There was a great premium on teamwork in that place; my three companies are RealVNC, a software company, Ubisense, a location technology plus software company, and Solarflare, a chip company.

They in turn have spawned Aventiq of which I am chairman, which is another chip company. I am on the advisory board of yet another of these spawned companies. I was directly involved in about a dozen companies in my career and about four at the moment. There is a culture that does go back to Acorn and to the Olivetti Lab, which lasted rather longer than the Acorn culture in its own way.

In summary, Acorn did very well and went public; Virata went public and was very successful. Some joined the living dead, nothing wrong with that. And some are at the races, and who knows; the ones in play right now are a very motley lot of wonderful companies. What I am talking about is the diversity of each one. So for example the 10Gb Ethernet chip company has over $120,000,000 of venture capital. Ubisense has extracted a lot of angel capital and as far as I know is the biggest funded angel company in the UK. £8,000,000; angel capital is personal investment by individuals. RealVNC was originally open source material. We now sell a version of VNC technology for which over 100,000,000 licences have been taken.

Real VNC was profitable from the beginning and we have kept it small; all this runs in parallel to the University. There is a price to pay on both sides for doing the two; on the University there is not any accommodation for doing the other though I think it is important for the University. On the industrial side you tend not to go with it right to the top level which you could do if you only did that. You are offsetting your risks and enjoying two different worlds.

I also do some farming which is quite different. Through the University it is non-techie friends, who are just as important as the techie friends, but there is a price. You surround yourself with good people and build a level of trust where delegation works. In the University the Computer Lab takes no time at all compared to running a company. I have just done my fiftieth Ph.D. student and have good post-docs.; it doesn't always gel well in a university system at large, but does in Cambridge where you have a strong team group. On the industrial side I was only C.E.O. of one company, although I did it for sixteen years. You have a broad University radar

screen where you can see what is happening in cognate disciplines. Your immediate research group which, if healthy, is producing results. The company is focussed but also part of a multinational side, financing side, knowing how to raise capital.

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Flying

I started flying in my first year as a Ph.D. student and that takes a lot of time. I like skiing and flying. I have very good spatial awareness and geographical memory, and a strong sense of direction. I like tinkering with things mechanical; that matches rather well with flying. The trouble with flying is that it is pretty expensive. Fortunately I have made a few bob so I can afford it. I am as professional as I can be about my flying; I've just under 5000 hours flying experience right now which is quite high for someone like me.

I fly a single engine Cessna with six seats; I have an airstrip at home, essentially a piece of grass 600 yards long. Even though it is a small plane, I can take off and fly to Poland. I don't do aerobatics or racing but I do adventure flying by which I mean travelling. I often land in small places where you are as much entertainment for them as they are for you.

For example, I have flown all over the Arctic where it is all like that. You can go to some little place in Northern Canada in which case it would be military or a weather station. I have been all over South America and Africa, the U.S.A., Canada, Europe, and with luck I'll take it to New Zealand as we are going there for three months next year. For Africa, in say Namibia, you can fly to Skeleton Coast which is 700-800 miles at 50 feet all the way down; I have all the 'coms.' so can always phone my mum and check the weather.

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China and Africa

I have not spent any time at all in India, though I would like to. I have been to China on a lecture tour with Gabriel Horn and Tom Blundell; from a business point of view, China's cultural gap is so great that for me, whenever I think I understand what is going on I pinch myself. So I haven't gelled with China in any substantive way. I have been there a number of times with my wife, Alison Smith, who is Professor of Plant Biochemistry. I went to China first in 1977 when it first opened.

I have been more frequently to Japan; the cultural gap is still large but at least I don't have to pinch myself. At the moment I am developing links with Africa. The good, the arrogant times of technology have moved on; everybody takes the sort of things that I do for granted and assume it will continue. That may not be the case but at the same time more and more people are encompassed by it, have a view and maybe need the technology to develop their standard of living without affecting the planet as their predecessors, us, have done.

I am building links for non-charitable reasons, professional business reasons, with Africa. Shortly I am off to Cape Town and Kampala where I have personal links. I have had a policy of trying to admit Ph.D. students from the developing world for some time if they are good enough. I have one from Cameroon, who has just got a research fellowship at Trinity, Tanzanians, Kenyans. They have to be very good but then they give a perspective on these technologies. For example, we can offer cheap phones to Africans but they want the very latest models and want to be able to afford them. They assume that this will happen and though I think the technology isn't necessarily coming you have to give a positive slant to have an impact. It is also an excuse to travel and Africa is great as there is no jet lag!

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Reflections

Cambridge is getting less good because of Government pressures, competitive pressures. I am established but a newcomer is confronted with the situation as it is. With my immediate research group it is OK as I can fix consulting etc. for my post-docs. and without that they wouldn't exist in the University. It will be interesting to see how this develops in the next ten or twenty years. This is compounded by the subject moving on. When I started there weren't hundreds of companies. We are still in the University able to do stuff but it takes a little more thought. In the Computer Lab. we have a theme in my own research 'Computing for the future of the planet'.

On my family: my wife, Alison Smith, her time is just coming with biofuels and how to do it and what does it mean. GMO organisms and growing things that are appropriate for energy is one of her lines. We have two children aged thirteen and twelve, a boy and girl. We also have a farm with wheat and barley of about 180 acres which I manage.

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