A STRATEGIC THINKER

Professor William Webb FREng

William Webb FREng kick-started his career by changing the way wireless communications carry data. He soon found that understanding strategic and business issues appealed to him as much as the physical processes of engineering. He talked to Michael Kenward about this before taking up his new post as President of the Institution of Engineering and Technology in October 2014.

While working for Ofcom, Webb took part in a BBC programme with Richard Hammond that illustrated various uses of the radio spectrum

When you walk around with wifi-enabled devices, you take it for granted that the wireless system adapts so that the nearer you are to a transmitter, the faster your connection will be. But the idea that the wireless system adjusts to its circumstances did not become a mainstay of wireless communication until William Webb devised what is now known as variable modulation. He did this while still working on his PhD at Southampton University,

Webb's supervisor, Professor Raymond Steele FREng, had invited him to join Multiple Access Communications, the consulting business that the academic had set up. Steele's research students could conduct their work while earning a living working on projects for clients. Thanks to these parallel activities, says Webb: "When I finished my PhD on the application of quadrature amplitude modulation to mobile communications, I could do theory, simulation and actually build some hardware as well".

It wasn't just his engineering skills that Webb honed while working for Multiple Access Communications. He rose to become a director and concluded that, as good as the company was at engineering, it had limited experience of growing its business. Webb added a part-time MBA at Southampton to his list of degrees, a move that he says, "definitely developed my natural bent towards strategic planning."

IN THE GENES

Webb's father was an eminent electronic engineer working on radar. "My father came up with some quite groundbreaking new radar algorithms," he says. However, apart from the occasional unexpected electronics kit as a Christmas present, he felt no pressure to follow in his father's footsteps. He just gravitated into the same field of engineering as his father.

He spent a year working for Ferranti before going to university to begin what was

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then a common 'one-three-one' engineering degree which consisted of a year in industry, three years at university and a final year back at the company. In his pre-university year, as part of a series of placements, Webb spent 10 weeks in Ferranti's marketing group where his task was to catalogue weapons systems, and to see how they might fit in with the company's portfolio. "Of all of the things that I did at Ferranti, I found that one the most interesting, having to think strategically."

For his university course. Webb chose the one that demanded the highest

entrance grades in electronic engineering in the country, which at the time was at Southampton University. However, it took some time, until the third year in fact, for the degree to grab his attention. "The wireless communications course was the one that really sparked it." He puts this down to Professor Steele's lectures. Webb made his mark with his lecturer by pointing out that he had got one of his diagrams wrong: "Afterwards, he said 'I have been using that diagram for years and no one has ever mentioned it.'" This eventually led to

Webb's PhD and his role in Multiple Access Communications.

When Webb started looking for a full-time job – somewhere reasonably near to Southampton, where he was still working on his MBA – he looked to the consulting sector, landing a position at Smith Systems Engineering in Guildford. The business, which already had a lot of work in the military sector, was keen to move into communications, especially for large public sector organisations, such as the police and ambulance services.

Smith Systems also had as a key client the Radiocommunications Agency, then the UK's regulator of the wireless spectrum and its use. Webb provided engineering support for a team of economists who were studying how to manage and price the radio spectrum. They worked out that the spectrum added a substantial amount, about 3 to 4% of GDP, to the UK economy. His team's second task was to look into pricing spectrum so that users would value it as a scarce resource.

SETTING STANDARDS

At Smith Systems, Webb also worked on a radio system that European railway operators could use as they crossed national boundaries. This work brought it home to him that introducing new technologies isn't just a case of getting the engineering right. The operators opted for the GSM system that is also used in mobile telephony, but GSM needed a lot of tweaking for the railways, says Webb. He then spent a couple of years persuading the European Telecommunications Standards Institute (ETSI) to accept his 'tweaking' as a standard so that railway operators, regulators and manufacturers could develop a market for hardware and systems.

"I learned a lot about GSM, about standards bodies, and the way that governmental institutions worked," says Webb. "That is probably where I started to become a lot more aware of the art of politics in this kind of space." Frustrating as this might seem to most, Webb says that: "I like the challenges it throws up. I like having to convince people, and then trying to understand them; to understand where they are coming from and what makes them tick."

Looking for his next challenge, Webb fancied working in North America. Once again, Webb took a strategic approach. Rather than applying for jobs in the US, he tapped into his network to find a job in the UK that might deliver a posting. The plan succeeded: he joined Motorola and, after working in a group that helped customers to deploy their own internal wireless cells, his boss was redeployed back to the States and invited Webb to join him. So Webb and his family moved to Chicago, Motorola's HQ.

The late 1990s were turbulent times, not just for Motorola, but for the tech sector in general. "What I was doing seemed to change every six months or so. But that made it more interesting." As Director of Corporate Strategy, advising senior management on new ideas, Webb's job title now officially acknowledged his way of thinking. Then the 'dot-com explosion' forced Webb to rethink his own career strategy. Webb explains that he could see that Motorola was not going to make the changes that he suggested. For example, the world of wireless was changing – wifi was catching on and Bluetooth was emerging. "I was really interested in where all of this was going," says Webb. Motorola's business though, was selling radio systems and telephone handsets, and Webb felt that the company didn't want to invest in

new wireless technology. He could see the writing on the wall and his visa to work temporarily in the US was running out. He had to think about the education of his two young daughters who were just coming up to school age. "If I had stayed with Motorola I would have been a US employee after that. So my free ticket back home would have disappeared."

BACK IN THE UK

He tapped his contacts in the consulting sector and PA Consulting in Cambridge made Webb "a very good offer". These were interesting times for wireless communications, with a booming mobile sector and plenty of clients seeking advice. The government, for example, faced the challenge of how to manage the explosion in the number of operators and the competing demands for bits of the electromagnetic spectrum. It wasn't long before Webb was headhunted to be a core member of the management team at the Office of Communications, Ofcom, the new regulator and competition watchdog for telecoms.

Webb joined Ofcom as Head of R&D. But he had to stop and think before recalling that he went on to become Director of Technical Resources. The slight confusion is understandable. "What I did at Ofcom was so broad and so ill-defined that there was never going to be a perfect title, so it didn't really matter what title I had. What I did was to bridge the technical, strategy and policy arenas at Ofcom." As Webb puts it, he found himself in a position where "I could take ideas from the technology and strategy side across to the policy side." As a part of this activity, Webb drew on his work on the economics of the spectrum at Smith Systems, and wrote the strategy

for managing the UK's radio spectrum, a strategy that is still in place today.

These were heady days at Ofcom. The new regulator had "broken free from the civil service" as Webb puts it. "Regulation had been a boring business, but we were going to do things differently. The first three or four years really were a lot of fun. We engaged in groundbreaking stuff; we were encouraged to push the boundaries in every direction." Even the telecoms sector was onside, with plenty of goodwill towards Ofcom. "It was a new organisation and people felt that it was innovative and doing good things." But he admits that that was partly because the regulator hadn't yet made tough decisions that would upset people.

Life at Ofcom changed when those decisions began and cuts were made to the R&D budget. That meant an end to writing studies that looked at where technology was going. These studies had helped Ofcom know the likely direction of new technology and helped it to inform industry. "If there was a technology out there, for example, that could improve the efficiency of the use of spectrum, then it would be a good thing for Ofcom to let everyone know that this technology existed."

Webb may have been at the forefront of understanding wireless technologies and where they are going, but admits that he hasn't always got things right. "The biggest mistake I made was that I never believed that we would have a 4G communication wireless system." This mistake was partly due to people thinking that it would not be possible to come up with anything faster than 3G or with more capacity. Nor did he expect mobile operators to drop the voice capability from 3G. In other words, he didn't anticipate the shift to data.

Webb sees the 'generation game' in mobile communications as a marketing phenomenon. "There is a cycle around which the wireless communications industry evolves, and its business cases are predicated on this working. This is why people now talk about 5G. Having done 4G, the global wireless community has switched straight into 5G. It didn't even need to think about it because historically that is what has happened with every previous generation." There is only one problem, says Webb: no one knows what 5G really is.

Previous 'Gs' have delivered roughly a tenfold increase in communication speeds with each generation. "Some people are now saying, 'Hang on a minute, that's all well and good, but do we really need all this extra speed?'. In any case, these days when people want speed, they can usually connect to a wifi network."

INTERNET OF THINGS

Maybe, says Webb, we should think about 5G differently. "A number of people are saying that rather than just being faster, it is actually about bringing different radio systems under one banner so that we have faster wifi, 4G and machine-to-machine (M2M) communications." M2M is a subset of the much hyped Internet of Things (IoT). The IoT would allow just about any 'thing' to communicate with other things over the so-called 'white space' spectrum, unused wireless channels set aside for TV broadcasting.

Webb is an enthusiast for the IoT. "A lot of the home automation ideas can be rather fanciful," he adds. "However, there is a vast number of basic productivity applications for which there are already business cases. For example, monitoring water pipes to check for leakage and flow rate, which can save money for the water companies and be less wasteful because they can spot leaks much quicker. There is a wide range of possible useful applications."

In 2011, Webb put his belief in the IoT to the test and teamed up with two fellow engineers from the wireless business. He left Ofcom to form Neul. The business didn't need any new underlying technology, says Webb, who devised wireless chips for the M2M links. "It just took existing technology and packaged it together in a different way."

At the end of 2012, some of the industry's leading lights, including the chip businesses ARM and CSR, set up the Weightless SIG (special interest group) to turn Neul's technology into a royalty-free open standard and Webb moved across to become its CEO.

In this way, Neul could share a massive business opportunity rather than taking the lion's share of what might turn out to be a tiny business. At Weightless, Webb wants to persuade the world that, as he puts it, the standard is going to be "the next Bluetooth". Webb has a part-time role running Weightless SIG, which now has members from across the world.

Webb uses the "washing machine test" to explain the need for an open standard. "If you are a manufacturer of washing machines in China and you decide that it would be beneficial for your washing machine to be connected – perhaps that you

William Webb making his way up a long steep climb in the Dolomites, on a mountain pass routinely used by the Giro d'Italia as part of the Cent Cols Challenge in June 2014 © Rapha Cycling

When he isn't working on the future of wireless communications, William Webb rides one of his upmarket, high-tech bicycles. "I probably cycle between 200 and 300 miles a week, depending upon the weather. If I have a meeting in London, I sometimes cycle there and back from Cambridge. I find it a great way to unwind."

Local cycling, in flat Fen country, isn't enough of a challenge for Webb though. "I discovered that I was very good at cycling up hills," he says. Earlier this year, he took part, for a third time, in the Cent Cols Challenge, a gruelling 10-day ride over 100 mountain passes in the Alps, riding an average of about 130 miles a day. Typically, of the 30 or so elite cyclists who attempt the challenge only around 20 succeed – Webb has been one of those who made it on all three occasions.

can have maintenance information about it, or update its programme when new washing powders come out – you have got to put into it some kind of communications chip." For the Chinese washing machine manufacturer, the choice of the chip technology "needs to be a no-brainer," says Webb. "That is the role that Weightless aims to fulfil."

Once again, Weightless SIG is about the sort of strategic thinking that is also going to be an important part of Webb's next big challenge. He is about to take on the presidency of the Institution of Engineering and Technology (IET).

Webb has "fairly fundamental" ambitions for the IET. "The IET and most institutions like it broadly do two key things. One is societal influence, the other is things that it can deliver to members." For a long time, he explains, many institutions focused on membership. "I want to say to people that you are not joining the IET for what you get out of it, you are joining the IET to tell society what it can get out of engineering." He makes a comparison with an organisation like the World Wildlife Fund. "You don't join it because you want the magazine. You join it because you believe that it is doing good things in society that fit in with your beliefs and motivations."

Another important role for bodies like the IET is influencing and helping governments to make sensible decisions, by offering advice to ministers and senior government officials. Here Webb hopes to work with other organisations, like the Royal Academy of Engineering.

Once again, Webb is looking to the future and thinking strategically. He is realistic enough to understand that there is only so much that anyone can do in a year's presidency. So, as well as consulting past presidents, Webb is talking to his expected successor, Naomi Climer FREng from Sony "to make sure that we are aligned, and so that at the end of one year there is somebody else to pick up".

As Webb points out, he will be the IET's youngest president in a century. "This isn't a nice swansong before retirement. I want to make a difference."
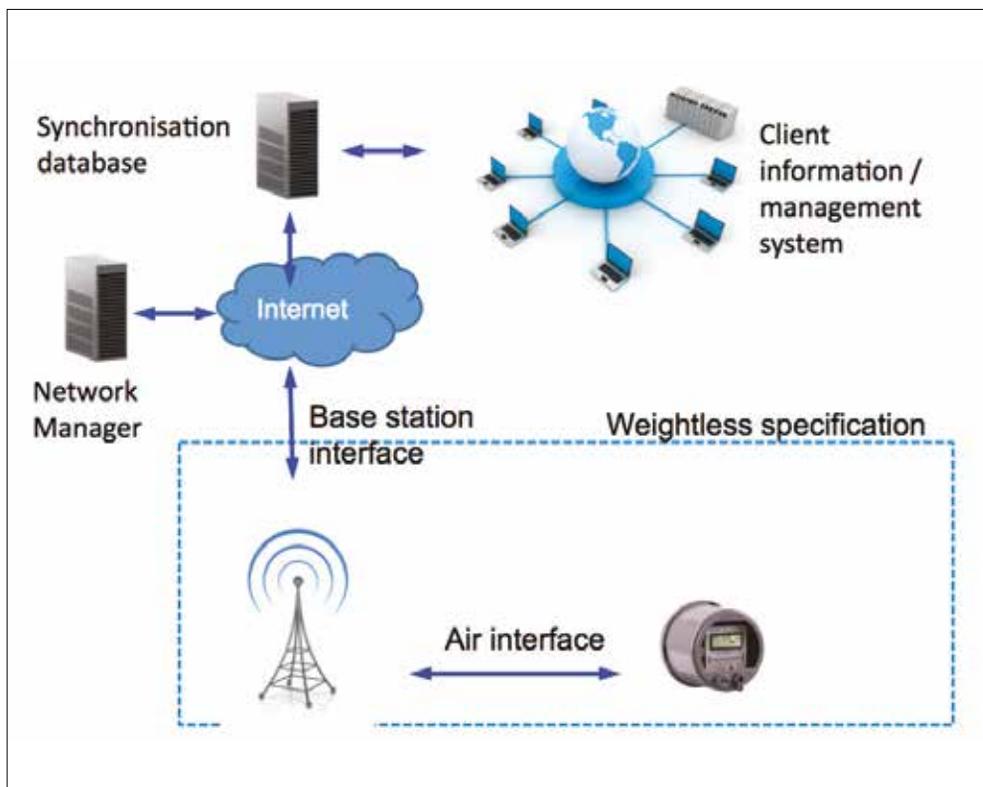
The Weightless standard, of which Webb was the lead architect, is a custom-designed technology for connecting devices like smart meters into networks using cloud-management techniques

BIOGRAPHY
Michael Kenward OBE has been a freelance writer since 1990 and is a member of the *Ingenia* Editorial board. He is Editor-at-Large of *Science|Business*.

CAREER TIMELINE AND DISTINCTIONS

Born, **1967**. BEng Electronic Engineering, Southampton, **1989**. Director, Multiple Access Communications **1989-1993**. PhD, Southampton, **1992**. Principal consultant, Smith System Engineering, **1993-1997**. MBA, Southampton, **1997**. Director of Corporate Strategy, Mototola, **1998-2001**. Managing Consultant, PA Consulting, **2001-2003**. Visiting Professor, Surrey University, **2003**. Director of Technology Resources, Ofcom, **2004-2010**. Elected Fellow of the Royal Academy of Engineering, **2005**. CTO, Neul, **2010-2012**. CEO, Weightless SIG **2012**. Elected President of The Institution of Engineering and Technology (IET), **2014**.