



CSIRO Oral History Collection

Edited transcript of interview with Paul Wellings

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Interviewers: Professors Tom Spurling and Terry Healy



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**Paul William Wellings CBE, BSc (London), MSc (Dunelm), PhD (East Anglia)
FRSA**

Summary of interview

In the first part of the interview, Paul talks about his early experiences as a child of a British army officer serving overseas, including his time as a boarder at the Royal Grammar School in Lancaster from the age of seven onwards. He discusses his choice to study biology at Kings College in London, which included a new course on fundamental principles in quantitative biology.

Paul moved to Durham University for an advanced Masters course in ecology funded by the UK Environmental Research Council and then to the University of East Anglia in Norwich for his PhD supervised by Professor Tony Dixon. Paul talks about his recruitment to CSIRO in 1981 through the connection between one of his PhD examiners and the then Chief of the Division of Entomology, Dr Doug Waterhouse.

He describes his experiences establishing his research at the Division's small Sydney laboratory in Warrawee, a Northern suburb of Sydney. The Division closed that laboratory in 1987 and Paul moved to the Black Mountain laboratories in Canberra. He discusses his considerable research achievements in the biological control of aphids.

Paul tells of his appointment as the Assistant Chief of the Division of Entomology in 1994 and how, soon after, made a conscious decision to shift from science to leadership – 'I think '97 is the last paper that I wrote in anger'. He became the Chief of the Division in 1995. In the middle part of the interview, Paul recounts his success in restoring the scientific and financial health of the Division.

This success caught the eye of the Chief Executive, Dr Malcolm McIntosh, who arranged for his secondment to the Commonwealth Department of Industry, Science and Tourism. He gained valuable insights into the workings on Government.

Paul discusses what he would have done if appointed the Chief Executive of CSIRO after the death of Dr McIntosh and his subsequent career as a Vice-Chancellor at Lancaster and Wollongong.

The interview concludes with a discussion of Paul's view about the place of CSIRO in modern Australia.

NOTE TO READER

Readers of this interview transcript should bear in mind that some editing of the transcript, including additional material in the form of footnotes and endnotes, may have occurred at the request of the person interviewed.

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Introduction and early life

Thank you very much Paul for agreeing to do this interview. We're talking to Professor Paul Wellings, Vice Chancellor of the University of Wollongong and a former Deputy Chief Executive of CSIRO. We're in Paul's meeting room at the University of Wollongong. I'm Tom Spurling and with me is Terry Healy. So once again thank you very much for agreeing to do this interview Paul. We're going to be talking about your early life and experiences, your career before and after CSIRO, and your views on the evolving role of CSIRO and the national innovation system. Let's start at the beginning. The records say you were born in Nottingham in 1953 in England. Can you tell us a bit about your family background, what did your parents do, did you have any siblings?

My father was in the army, and my mum and dad both came from the same village in Cheshire in England. He'd signed up in 1939/1940 at the start of the Second World War, had gone with the Lancashire Fusiliers into India and Burma, and survived that and came back, and made the decision to stay in the army. So he'd gone in just as a normal soldier, had come out as an officer commissioned in the battlefield in Kohima. Made the decision to stay and came back, married my mum and my sister was born – so they married in '46, my sister was born the following year in '47 and they went off to Trieste and were part of the peacekeeping forces for the allies. So Trieste was a contested port on the Adriatic as the Yugoslavians were trying to take control of that. Came back to Nottingham, and I was born in Nottingham six years after my sister.

He's still in the army?

Still in the army. At that point we were in Nottingham and we were, as you were in those days, posted regularly. So I was nine months old and we were posted to India. So I grew up in northern India in Darjeeling and my father was attached to the British Gurkha Regiment at Jalapahar which is a Canton part of the Darjeeling area. We were there for several years, back to the UK to Manchester, and then we'd been in Manchester a short period of time and he was asked to go to Nigeria for Nigerian independence, and so we all moved out to Nigeria. So this is 1960 at this point, and saw the independence of Nigeria. Paradoxically that's the first time I met Princess Alexandra who became my chancellor in Lancaster but I guess we'll get to that later on. So that was her first gig as a young princess for the Royal Family for the passing of Nigeria to become a republic.

Then a whole suit of things happened very quickly for the family. The Congo Civil War broke out, my father was then attached to the Nigerian army from the British army and went and joined the United Nations for a double tour back to back.

With the blue hat on?

With the blue hat on in the Congo. My mum stayed in the family house in Lagos, and I was then back at boarding school at just under the age of eight years old.

Boarding school from the age of seven

That was the Royal Grammar School?

This was a prep school in England first and my family by the time I finished at prep school had come back to England, and I was fortunate enough to get a place at the Boys Grammar School, the Royal Grammar School at Lancaster, but as a boarder. So I was at boarding school essentially from just before my eighth birthday to 18.

So did you have any primary school in Nigeria?

Briefly at an American international school -

Probably very good.

So I'd had some primary school experience in the UK before we went to Nigeria briefly, an international school in Lagos, and then back to a very nice boys prep school in the next village to my grandparents in Cheshire. That was small, that was sort of 80 boys –

You were boarding at the prep school?

Boarding the whole time from the age of seven onwards. So Julian Cribb actually was at the same prep school.

At the same time as you?

Yeah, he was older than me so we must've overlapped by two years. We only discovered – at Julian's retirement party we were talking about family histories and discovered that we'd been at the same prep school. So it was a very weird CSIRO moment.

Yes. So when you were at primary school or even at the grammar school can you remember was there somebody who made you interested in science, or did you have an influencing teacher that inspired you to do that?

Yeah. Certainly at secondary school it was a classic selective boys school. So there were 200 boarders, there were 800 day boys. It was a selective grammar school in the way grammar schools were in the UK and science was very important at the school. So there were separate streams in advanced maths, maths, chemistry, biology et cetera by the time you got to our equivalent of year 11 and 12. If you looked at the staff list every single person had been to university who were teaching, they were all specialists in their subjects, and a man called George Briggs was head of biology. It was the era where schoolteachers were cruel but fair, so they're all tough –

Disciplinarians.

Disciplinarians and wanting kids to succeed. There would've been 100-120 boys in the last year at school, and maybe a dozen of them would've gone onto Oxford and Cambridge, 95% of the kids would've gone on to university. So it was the sort of school that on the first day when you arrived it was, "Tom, which university do you want to go to?" rather than, "Why

are you mucking around?" So it was one of those places that was an academic hothouse, sporting hothouse and all those sorts of things. For some kids like me you thrived but I suspect for other children it was a stress. If you weren't sporty or you were artistic or musical it may not have been the right school.

And you had a sister?

A sister, yeah.

And did she go to a boarding school as well?

She was at boarding school elsewhere in Lancashire in the north west of England, and in the way that girls did in those days she didn't go to university, she became a state registered nurse and trained in one of the big hospitals in London. So that was a path that young women took in those days.

And your father left the army eventually?

Yeah. He retired in '69 from the army, so he was 50 at that point, and his last gig was the investiture of Prince Charles in North Wales. There was a very big trip movement for that and there was a camp that was set up for several months as you can imagine before and after a ceremony like that in a remote location because it was a sort of tent city. He led some of the logistics and payroll for that because he'd left the inventory. He retired at 50, he went banking into what became the NatWest Bank in the UK, and then sadly died at the age of 59. He had an aneurysm; went to work on morning and died in the bank. That was '79 and I was still doing my PhD at that point.

And there's some discussion about when you came to CSIRO you had to go back to England for family business.

Yeah. What had happened was that my mum had breast cancer from about '74 onwards, it appeared to have gone into remission, my dad died and then she subsequently died of breast cancer in '81. So I'd joined CSIRO and then had to go back at short notice, and I have to say CSIRO, Arthur Blewitt, who eventually became very senior at Limestone Avenue but was the head of admin for entomology at the time bent over backwards to make sure that I was able to do that and not dislocate my career with CSIRO. So that was a very human moment for me because I realised that once you were in CSIRO actually it was a family in that sense.

And people will look after you.

Yeah.

Kings College, University of London

So when you went to the Royal Grammar School in Lancaster and they said, "What university do you want to go to Paul?" did you say, "Kings College University of London"?

Well eventually I did because you had to pick institutions and I knew that I wasn't going to go to –

How did you know about Kings College University of London?

Interestingly my sister had done a midwifery degree there, would be a masters degree in today's terms. So once she'd done her initial training and some practice she'd gone to Kings so I knew a little bit about London University. Because most of the boys at the school that I went to, if they weren't going to Oxford and Cambridge would've gone to one of the great northern universities like Manchester or Liverpool or Sheffield or Leeds or those places because they were all technical universities. Because I'd been at boarding for 10 years I wanted to see the capital city of London, you know, see the capital city of England, and to be in a slightly more cosmopolitan place than Lancaster. So I was attracted to the London colleges and so my first two choices of university, because you had to pick five institutions in those days, were Kings and Queen Marys, both which had very strong biology in the area that I was interested in.

Tom, I'd just like to ask Paul, your upbringing up to this point in time would be seen by modern day standards in children as being a pretty tough background for a child growing up, separated from family and in institutions in the nicest possible way. What are your overall impressions about that on how it formed you as a person?

It's interesting, because my father was a professional soldier it was the norm for every child that I knew that if you were on a posting overseas that you got on the plane, you flew back to the UK, BOAC in those days there were things called lollipop specials, so if you were an adult and unlucky enough to get one of those, well you had a miserable time because there were 150 kids and maybe five adults on the whole plane.

So you were just like all the other kids?

I was like all the other kids. So you had long vacations wherever your parents were posted like Lagos. My mum travelled backwards and forwards for the Christmas and Easter holidays, so it was quite wearying for her because international travel in those days was longwinded. There was a huge expectation on the boarding schools that you were in actually that you were effectively looked after in a nice setting, and I was very fortunate that both the prep school that I went to and the boys boarding school that I went to in high school had fantastic reputations and with hindsight there were no predatory adults and those sorts of things. So I think I was very lucky that all of that just seemed to happen very seamlessly. It didn't seem tough to me at all actually. It was the norm of the '50s and '60s that kids went to boarding school and little children age of seven would go to boarding school.

Did it make you more independent do you think?

Yeah, I'm sure it made me independent. It made me like institutions a lot so if you talk to my wife she thinks I'm sometimes very regimented in how I like to do things because you live to a routine in some way. Great discipline as a scientist I have to say because it makes you able to be very clear about the design of things and all of that. So it didn't seem odd to

me, and with hindsight of course now you say you grew up in India and Africa and people think that's a very exotic thing to have done, but it made me interested in people and it made me an internationalist from a very early age.

Of the countries that you lived in what is your fondest memories of those Darjeeling and Lagos and –

It's interesting because –

Trieste.

Well I'd never lived in Trieste, I went back to Trieste – they certainly lived there. I think the post war experience was very different of course because rationing in the UK and no rationing in Italy at the time. In India I was a very small child and so I was in a privileged setting because my father was an army officer that we lived in, by Indian standards, a large house and had a house full of servants. I think there were 10 servants for every family in those days because of the way that roles were stratified in India. So I only have fantastic memories of India, all of which are as a small child. Nigeria, the thing that I realised afterwards, I remember reading Ben Okri's *The Famished Road*, the novel, he would be my age, his life experience as a young Nigerian boy was not my life experience in Lagos. I was in a compound with security guards around even in the 1960s. So while I had friends, American, Malaysian, British, we were all hermetically sealed from the African population.

So was the American school on the compound or –

Elsewhere, you travelled on the bus to go to that but it was only half an hour away in those days.

So Paul, you go off to London to Kings College to do biology and your record shows one of your subject specialities was animal ecology. Was ecology as newish discipline, were you one of the pioneer students of ecology as a separate sort of discipline?

Yeah, well I think the whole of biology was going through new explorations in those days. So by the time I got to London University the colleges, because it was a formal federation of colleges in those days as universities, they'd gone to unitise all subjects, and so there were courses that were either 24 weeks long or 12 weeks long and they carried credit in our jargon today and it was very modular. I'd made the decision that I wanted to go to Kings because it had strong whole animal biology, Kings was very strong in parasitology for example at the time. As a result you did a base first year, lots of choices in the second year and by the time you got to the third year you could specialise and then there were complex ecological courses that you could do, and I knew from a very early point that that's what I wanted to do.

So I think when I'd been 17 I'd gone, funded by Lancashire County Council, on a field studies trip which were kids from all sorts of different courses and we'd all go off to Somerset for a two week immersive course down there. I'd actually got very interested in that because it was partly experiential and doing experiments in the field, and then because we were all under 18 and we couldn't go to the pub they put on lectures in the evening and so they

bought in all sorts of interesting people. So it was that connection between here's the biology and here's the systems consequence. At the time the Aswan Dam had recently been built, there was a theory that said water was going to be available for all.

What actually happened in Egypt was a whole series of health disbenefits because the snail populations took off and all of the parasitic diseases in snails that go into humans caused a huge collapse in productivity in workers in Egypt. So those sort of complex system things at the time, so this is really before advanced computing, very hard to conceptualise those sorts of models, and of course if you're 17 or 18 and you start to say, "Actually there's a lot to unpick here at the interface of hard science and how that has a social consequence", those are really interesting spaces. So that's what attracted me.

Ecology had been around since 1912-1914 as a formal discipline, kicked off in the 1930s within the Americans, by the time you get to the 1970s modern computing is starting to arrive and these big system type questions. So the divergence for me is that cell biology and molecular biology were also kicking off at the same time, and I happened to be in an area where there was a Nobel laureate Maurice Wilkins, the structure of DNA had been elucidated in part at Cambridge and in part at Kings College London. So that drive to molecular biology was also in the academic community at Kings. I was left with a choice with my tutor in the second year saying, "Please come and do biochemistry" and me thinking actually my chemistry is not strong enough, I want to do whole animal stuff.

Paul, the records say that you had good mathematic skills, so did you do mathematics at all? Obviously ecology requires a lot of modelling and systems thinking and mathematical thinking, did you do any mathematics?

I did. At the boys grammar school in the time I was there, they don't do it now but at the end of the first year, so you'd be 13, they would take a quarter of the cohort and get them to skip a year. So this was an alpha class or whatever, and I was in that group of boys that skipped a year. That meant that by the time I got to finish school I was a year young, and because I wasn't on the Oxford and Cambridge circuit I had a spare year. I made the decision to stay on at school an extra year and I did A level maths in one year right at the end. And I didn't have that choice; in England you only do three subjects for Year 11 and 12 and so I had to do biology, chemistry and physics as the combination, and then I stayed on and did maths.

So I was okay at maths, and then by the time I was in my third year at Kings, so finishing my honours degree, Roy Anderson was on the staff there who went to Imperial, then to Oxford and was defence scientist for the UK eventually. So Roy had come, he was a junior lecturer and he was a quantitative biologist at the time and no one knew what one of them was. So he set up this second year course as an experimental course on fundamental principles in quantitative biology. Because I was in my third year and it was the first year it had been run there were only six of us who did it. I took a risk and did that course in my final year, so it was a half unit of three units that you had to do.

So Paul the honours degree was a three year degree –

Three years, you started –

And so the honours was awarded on the basis of results and so on - did you have a dissertation?

Yeah. There was a project that you had to do, so that was a third or half of your final year that you had to do, and I worked on marine invertebrates. So I worked on a small echinoderm, a cushion star, looking at its energetics.

And that was 1975 you got that degree, you were in your early 20s, 21 or something?

Yeah, 21 and then –

Masters degree at Durham

Then you went off to Norwich.

No to Durham.

To Durham, yes sorry.

So I went to Durham for a year and there was an advanced course in ecology that was funded through the government through the Environmental Research Council. They had courses in Aberdeen, Durham and Bangor all slightly different, and I wanted to go to the Durham course. That was 12 students for a year –

That would've been marvellous.

- in an advanced course in ecology. A small number of people got scholarships to go on that and I was lucky enough to get a government scholarship.

And presumably you were boarding then?

Yeah, I lived in –

In Kings College were you a boarder somewhere or -

I lived in residences and then I had a group house in south London with a group of friends. I shared a house with two guys down there. There was a network of friends, some of whom I still know. Actually you've just missed her because she's gone but there's now an emeritus professor who's an expert on distance learning in dentistry, and she's just been here because of the haptics work at Wollongong. So those sort of networks persist in people's careers for a long time, and I'm sure you've found that out in people's conversations. I left London, went and lived in Durham for a year and just rented a room in the back bedroom of somebody's house, did this course, and did another project on another marine invertebrate, because you had to do a project for that, so I was looking at phosphorous budgeting in edible mussels that formed big clusters on rock platforms.

So that whole thing about cycles like the carbon cycle and the phosphorous cycle, people were starting to get interested in that, and phosphorous is quite a rare material if you're a marine animal, so looking at that. Two-thirds of the way through that course there was a

series of master classes where distinguished people came and gave six lectures at a time or whatever, and a man called John Norton from York who again became a very eminent ecologist doing government roles in the UK, gave a talk about herbivore plant interactions and one of the examples he gave was the work of a man called Tony Dixon who had moved to Norwich from Glasgow. So I wrote to Tony having read all his paper and said, “I’ve just seen all this stuff, do you have any vacancies for a PhD scholarship?” And so I joined Tony’s lab.

That was a fantastic move actually for me because it was a very large group; he had one supervisor, he had somewhere between 10 and 14 PhD students at any time and two postdocs. So it was a very large group looking at long term population studies which is what I was in, there was an applied group looking at crop damage, and then there was a group of other students doing other things because it was convenient.

The question I was going to ask you which you’ve partially answered was Durham had expertise in ecology, it was you said one of the three universities that the government had selected to have this course, was it a particularly good university for these sort of things?

Yeah, well it’s still an outstanding university and biology is strong there and was strong at the time. There were a series of very eminent people, particularly in bird populations which wasn’t my thing, and also water ecology. So it was very strong in both of those areas and some human disease vexes and things like that. So it was an interesting group of academic colleagues there, and of course –

Germaine Greer was there wasn't she?

Was Germaine at Warwick? Warwick I think.

Warwick, not Durham.

Yeah. Durham’s a very conservative place, I’m not sure that Germaine would’ve been at Durham. But I was only there for a year and it was pretty brutal actually because you turned up in mid-September, went on a field course, I think there were 80 lectures, you got examined in April and then you had half a year to do the research and write up the dissertation, you had until the end of September to submit, if you didn’t submit you failed. So it was a sausage machine in the sense they were trying to get the students through and not leave a lag of dissertations –

And that was a masters degree?

And that was a one year masters degree and it was full on from the moment you stepped into the university.

PhD at the University of East Anglia

So then you went to the University of East Anglia at Norwich and I said why there but you’ve already answered that because Tony –

Tony had moved there from Glasgow and so he was a professor there.

We note in the correspondence that your future wife Anne was there as a student at East Anglia.

Yeah. So we met two-thirds of the way through my PhD, formed a relationship, she was working on William Morris doing critical theory there, so she was in humanities. Then when the Australian –

She had come there to do a PhD?

Yeah.

From Sydney was it?

From Queensland. She was there and then when I was offered the job in CSIRO she came back to Sydney and finished her thesis and then went back with that to have it examined in Norwich.

So were you attracted to come to Australia because of your family connection then?

Well it was a possibly wasn't it, and if the truth be told, this is 1979, '80, '81 the conservative government had come back in in the UK, so Margaret Thatcher had come in, there were a whole series of structural changes that then took place in the economy as a result of Thatcherism flooding through including a reorganisation of the British scientific civil service, so that sort of got blown up and desegregated in some way, and the funding for universities started to get reduced pretty dramatically. So my generation of young PhD scholars were all on a track to finding it very difficult to finding secure employment in universities. It wasn't really until about '83 to '85 that there was a series of new blood appointments that went back into British universities. So there was a valley of death to cross. A lot of people I knew took jobs in the commonwealth and Sudan or Nigeria, places like that. So there was a rotation of academics going out there.

Can we just go back to the way that you supported yourself from the time you went to Kings College to Durham and to East Anglia, you were presumably on scholarships and –

Yeah.

- self-supporting?

Yeah. So the British system at the time for undergraduates was that the fees were paid for by your local council, so if you got a place at university they had to pay the fee, and the living was a means tested amount. I think the first year I went to London it was £440 or something like that, and that was an assessment made by the tax office of what would the state pay and what would your parents notionally pay? My parents were reasonably well off but not hugely affluent, they paid about 40% and were happy to do that, and I had a bit of money on the long vacations and then the government paid the difference. So that would've been true for every undergraduate, and that was a means tested process. When I

went to Durham the Environment Research Council paid for that, both the fees and my living. Then when I went to Norwich NERC paid for the first two years –

NERC?

National Environmental Research Council. So they paid for the two years. Because I'd spent a year in Durham they would only pay three years, so for my final year as a PhD student the University of East Anglia had a scholarship scheme and I got some money from –

It was called the Dowager Countess Eleanor Peel.

No that was –

That was something else?

It's interesting, the boys grammar school had a fund that came from the Dowager Countess Eleanor Peel as in 'do you ken John Peel' and they gave me £1,000 as well. So I managed to put together my final year funding both from the university and by winning money through the separate scholarship scheme. That gave me the full three years of funding that I needed for the PhD.

There are two questions I'd like to ask you about your PhD, and I'll ask both of them and you can answer them any way you like. In your PhD what do you think was your main contribution to knowledge, and the second question is Tony Dixon or AFG Dixon obviously was an important mentor of you, what sort of influence has he had on your career?

Well Tony's still around, he's in his 80s.

He's still publishing.

He's still publishing. He did a number of really important things in terms of both predatory prey biology, long term studies of individual species, and then a whole range of other insect plant type interactions, so he's worked in several areas. I worked on the long term studies work and at the time all his data was saying the control of these populations of herbivores is a bottom up process mediated through the plant, and the fashion if you read the nature papers of the days was to say these are all top down processes because predators and parasites and things like that exert downward control on that, the biological control type stuff that I went on to do.

Tony, because he had all the data, we were continually visited by bureaucrats who wanted to try and say, "Why are you doing this and not doing the top down stuff?" and he held his ground, and that told me a lot, both then and with hindsight, about if you know you're in a zone with the data and you can see what the patterns in the data are, not to be distracted just by fashion or by bureaucrats or by senior university figures who might be saying, "It might be more fashionable to look at it this way." I think you do have to empower people to allow their ideas to run.

And when you say he had the data, what was the data? Was it field data, laboratory data or a combination?

Field data. So he'd done something which now you wouldn't get funded to do, so that while he was in Glasgow he'd set aside some portion of his time and had just gone and monitored populations of two different species of greenfly on trees, but on lots of different trees in a woodland. So he had these unique data of individual trees through time with these herbivores on them for a 10 year time series, and then moved to Norwich. That data set, now we would think of it as a bit of big data, of course allowed you to test lots of ideas –

Why wouldn't you get funded to do that now?

Because it'd be seen as stamp collecting because you're doing something without a particular hypothesis but knowing that in the absence of a large data set over a long period of time with the spatial heterogeneity you couldn't actually address any of the theoretical questions. So assembling those sorts of data sets now is a hugely problematic thing in science because you don't normally get that leeway. So it's that sort of how do you still have a skunk project in the background just collecting data while you're doing other things, knowing that those data will have utility later? So that was Tony as a mentor. The first question which is what did my thesis say? Well I was asked to look at the plasticity of individual herbivores.

So if you know anything about greenfly, the vast majority of greenfly populations are all female, they have telescope generations, they have virgin birth and they're parthenogenetic, so their offspring are genetically identical to their mums, everything's a mum in the population. So you can ask these questions very quickly and the problem that we could see was that the body weight of the individual mothers varied between 300 micrograms to 3,000 micrograms, so an order of magnitude, and that drives fecundity in the population. So trying to understand –

Let me ask you a question, you said the mass of the mothers varied from 300 to 3,000, did you go out and measure those?

Yeah.

So you went out in the field with a little –

Or bought them into an electro microbalance and put them on there because we were looking both at the adults and the weight of the offspring, so the offspring were mostly probably –

So you were involved in fieldwork?

Fieldwork and then lab based practice and theory. So I spanned all of that but trying to answer theoretical questions. So the paradox that my thesis ended up trying to deal with was that the literature still says there are broadly a spectrum of life histories that individual species can exhibit, some of them are selected so they have very rapid birth rates and they have a set of characteristics to do with that, some of them are case selected and that means they live at the asymptote of the population, and they've got different attributes. Those are seen either as species attributes or genetic attributes within a population if you read the literature. What I was able to find actually was that you could have one genotype that

started in the spring and went through to the late autumn and different strategies were evidenced within the same genotype at different times and they were synchronised to the environmental quality that they were expected to encounter because of the seasonality.

At the time, still is, that's quite a radical idea that you can have multiple expressions of strategy within a single genotype. So the punch line – in those days you had a viva voce example for a PhD and my external examiner who has now passed away, Michael Way who was instrumental in actually me joining CSIRO I think, went to the final page and said, "I'm not going to look at anything else Paul, we're just going to concentrate on this because it's such a radical idea, you've got to tell me exactly why we've arrived at this conclusion in the thesis." So it was an interesting examination for two hours to get picked over on that.

And then you published presumably?

I then published. So in those days you wrote a thesis and then you destroyed the thesis and pulled papers out of it, and I did all of that.

How did those papers go in terms of how they were received over the years?

There's a journal of animal ecology which is most probably one of the top 20 ecological journals in the world, and I had a series of papers in there co-authored with other people. So that was interesting to do that, and off the back of that work I applied for an NERC personal fellowship. There still are a very small number of personal fellowships available to early career researchers in the UK, and the Environmental Research Council had some in terrestrial ecology and some in marine ecology and some in other types of ecology. There were two in terrestrial ecology the year that I was awarded one, the other one went to a man called Bill Sutherland who's now a professor of conservation biology at Cambridge. So I was interviewed for that and wrote an outlined project. Started that in the October of 1980 and then had to drop it in order to join CSIRO.

Research Scientist with CSIRO in Sydney

We come now to your applying for the CSIRO position. Why did you do that, how did you become aware of that?

I'd won the postdoc, so I'd finished my thesis, I'd written it up, so in May '80 I was writing up stuff and working part time for people over the summer, deliberately synchronised my fellowship for the start of the academic year in England for the October, and over that summer had gone to the library as you did in those days –

Looking for jobs?

Well I was reading papers and it was a copy of Nature, and there was an advert at the back of Nature looking for a research ecologist to join entomology. The brief was very interesting because it was somebody with the understanding of contemporary ecological theory and its application to the practice of bio control, if I'm roughly quoting what it said, and it was written for me. It wasn't obviously written for me back in Canberra, but I would've been

one of a handful of people around the world who could've really made that argument. So I thought I've got to apply for this even if it's just a practice run for a job application.

What I now know of course is that CSIRO entomology used to look at the main Australian universities and Oxford and Imperial College. So Doug Waterhouse who was chief of division had very strong links into Oxford and Imperial, he came over because there were a number of people on the shortlist and went to Imperial. One of his good friends at imperial was Michael Way who turned out to be my external examiner. I didn't know any of this, and Michael looked at the list of names and said, "You have to talk to this person" and sent Doug up to Norwich.

So in the letter that the division sent up to be approved the other candidates were Dr Ian Carter and SR Leather, all of whom were at the same department at Norwich.

Yeah, so they were all in Tony's group. Simon Leather, I think he worked for the Forest Commission then Imperial College for a long time and he's now a professor of agricultural entomology at Harper Adams University in the middle of England which is the big university there. Ian Carter went to Rothamsted and then went to work for the Royal Society of Protection of Birds and he was their field scientist for the RSPB and their policy person.

Your description of yourself in this talk so far is as an applied ecologist, but were you also an entomologist?

No, I never studied entomology, and not at university. So I ended up doing a PhD working on insects because the insects were a model system and I was interested in having a model system that generated the numbers to test against contemporary theory. So that was the great paradox because I ended up as chief of entomology. So all my entomology I had to learn as a PhD student from fundamentals, and then every time I encountered a new system I had to learn about the specifics of the insects. So I knew more about the ecological theory and the applications of the ecology than I did about the insects themselves.

And that proved to be a great advantage to you in the actual studies that you were doing?

Yeah. Well the PhD and the postdoc and then joining CSIRO allowed me to go to the ecological literature in Nature and other leading journals and say if that's a question how do you actually test that in a CSIRO setting on the scale that CSIRO was working at?

So Paul, you come across the country and in some ways I suppose your childhood and family experiences meant that travelling all around the world to do things wasn't a strange experience for you.

Not at all no, it seemed like a natural thing to do. So moving from Norwich to Warrawee as it was because I went to a small reserve station for CSIRO in the upper North Shores of Sydney seemed like a pretty normal thing to do.

And you were married by then?

So I was married to Anne - I was in Sydney until the end of '86 and then moved to Canberra, and I separated in '87. So was divorced in '87-'88.

So Terry and I have been in CSIRO for a long time, we've never heard of Warrawee. So it was quite a small laboratory?

Yeah, 55 Hastings Road. So if you know Knox Grammar School on the upper North Shore in Sydney and then on the other side of the railway track around Pibrac Avenue and Hastings Road there's a series of magnificent houses there on very large blocks. CSIRO had two outposts for entomology in Sydney, one at the University of Sydney which was the fruit fly research group, Alan Bateman and Brian Fletcher, and then there was another group at the Botanic Gardens that dealt with the importation of exotic materials, so that was Geoff Snowball's group. Those two groups merged and universities were shedding CSIRO sites in the late '70s, insects weren't coming in by boat anymore, they were being flown in, and so they moved the quarantine and the fruit fly group up to Warrawee.

There was this house that I think it was a high court judge had left to the commonwealth in his will, so somebody who didn't have children who left his property and there were various departments and CSIRO was allocated that. So that must've been in the late '70s, I arrived in '81 and it was a magnificent English – I think it was a Tunbridge Wells designed house, so English estate type house. So you walk into the entrance hall, it was all oak panels and there was a ballroom, there was an orchid house, there was all sorts of things, this original –

So it was marvellous.

Really beautiful property on five hectares, so an enormous space. We'd built greenhouses, put cool rooms into various parts of the building downstairs to allow environmental controlled experiments. I walked into a room twice the size of the one we're in here and there was a telephone on the floor and nothing else, and Alan Bateman who was the officer in charge said, "Here's roughly what the budget is Paul, we thought you might like to design your own lab from scratch." So it was still being built. That was interesting but also a shock that it was such a small team. I think there were three research scientists, Alan, me and Brian, there were two or three experimental officers and then some technical staff.

With hindsight most probably dramatically undersized for what you wanted to do, and for a young researcher actually intellectually a difficult place to be because while Brian and Alan were fantastic colleagues and really, really good academic colleagues in terms of what they knew, it wasn't a place where you could stretch your ideas very quickly. You do need a number of people around you to test ideas.

So you partially answered my next question Paul. You'd presumably come, with Tony Dixon's group at Norwich, from a large well equipped, well-resourced laboratory into this tiny empty house as you described it.

Yeah.

That must've been quite as you say a shock for you. Did you say to yourself have I done the wrong thing here?

No not at all. Canberra was harder to get to in those days because people didn't fly so you're driving and it was most probably a four and a half hour drive, because the old Hume

Highway wasn't the greatest road in the world. But there was quite a lot of movement of staff around, there were good links into Sydney University because you had to go to the library and the Batterham science library there was great, Charles Birch was professor of zoology and he was very welcoming and a number of other people were welcoming. So there was a different sort of community that you had to make for yourself.

The harder thing was getting the maths and stats advice because you had to go to the group at Linfield and of course they had other interests as well, so wandering in there it was quite difficult to make those networks. Putting the equipment together was tricky because while I knew for example the type of research I wanted to do, I was going to need particular types of microbalances that were plating particular weight scales; there was only one company in Australia that sold the sort of thing that I wanted and it was eye-watering in price. I think the ballast was \$4,000 or something.

So the way you describe your recruitment to CSIRO is that CSIRO decided that they wanted somebody in an area, which was presumably a newish area for the division of entomology, and they recruited you. Were you given any research directions apart from that or did Alan Bateman say, "Here's an empty room, tell me what you're going to do"?

At the time in 1977 and '78 there were three pest aphids which came into Australia back to back, all of which hit lucerne alfalfa crops. Dick Hughes, RD Hughes, was working on one of those species –

In Canberra?

In Canberra. There were these other pest species that were there as well and so I was asked would I work on aspects of the management of those animals? So Dick was working on something called the spotted alfalfa aphid *Therioaphis*, I was asked to look at the other species. That actually played to my interest because what happened not surprisingly was the industry moved away from a monoculture of one cultivar, so there was a cultivar called Hunter River that was just everywhere and it was a beautiful Australian broad based alfalfa that survived anything, and they brought in all of these proprietorial [sic] alliance with America, and so there was this natural experiment of you varied the plant landscape because there were genotypes of plants that were different, you had these new species of aphid that were erupting all over the country, and we were importing at the same time the biocontrol agents.

So for me that allowed me to move into three traffic level interactions and the jargon to be able to look at the plant and the insect the herbivore and the parasite and to look at how those things interacted together. That was a hot area intellectually at the time to look at something that wasn't just a pairwise thing, to look at the three levels. And of course it tailor made to the brief that CSIRO had asked me which was to begin exploring that.

So this was a real problem that CSIRO had been introduced to by the people who grew lucerne or the Departments of Agriculture or whatever.

Yeah.

So it wasn't something that you thought of yourself, it was that you started off solving a real problem of the end users.

Yeah, a major industry problem that by the time I arrived was catastrophic in South Australia, had been a major problem in Victoria and New South Wales up into Queensland and eventually Western Australia got it as well. So basically the temperate and Mediterranean zones all had these pests.

And it was eventually solved by the biological control?

Yeah, and also the cultivars that were brought in. So an integrated pest management solution essentially rather than a single technology. As a pest problem it's gone away as a lot of pest problems do over time because you've ended up with some different configuration of control mechanism in place.

Interactions with the Chief

In your PH file in January 1982 you presented a research proposal to the division, presumably you went down to Canberra to -

Yeah.

Just me reading it as a theoretical chemist 30 years later it looked like a very fine proposal for a young scientist to be giving to the boss. Was that the way things happened in that division or were you -

Very much like that. Max Whitten had come in because Doug had retired I think in '81, Max was there. So this is before the project program structure of CSIRO evolved there were assistant chiefs of division and so George Rothchild I think eventually was my assistant chief of chief of division and he expected people to package up ideas and actually produce small business plans around their research and have it be conducted, and then we've written of that collectively. So a lot of team activities that went on like that, but a lot of the science was actually driven through very small groups of people. I would've had an experimental officer and one technician, it was that sort of unit size of activity, it wasn't the project program structure that we went onto in the earlier Stocker period.

How long did it take you to get a laboratory at Warrawee that you were able to use?

Most probably 12 months. So I was able to write up some of my PhD papers, get the benches built because there were no benches or anything like that, begin to conceptualise some studies, produce some documents that you've seen and move on really starting to say, "This is how I'd go about it." So my approach wasn't to go in to do industrial scale research across several hundred square kilometres which of course the Departments of Ag were doing, I was trying to nut out individual questions and the links in the systems.

We've been going for an hour now so we might have a pause.

Yeah.

So Paul, the Division of Entomology decided to close down in Warrawee and send it all off to Canberra, were you happy with that?

No, not particularly I don't think. I think at the time there was a rationalisation of sites. I'd spent six years in Sydney so I was enjoying Sydney and then the idea of being sent off to Canberra, which in the mid '80s wasn't a great attractor, was a contested space. But with hindsight it was the right decision both organisationally and for my career because CSIRO auctioned Warrawee and that sold for \$2.5m, in those days quite a lot of money, and they bought up the team from Hobart, so Robin Bedding's nematode group moved up from Hobart. The capital in those days was held by CSIRO and was held by the division. The legacy of Doug Waterhouse, so Doug had acquired properties all over the place and being able to then capitalise on those resources and to do things as a divisional strategy because capital moved –

You say the old judge left the building to the –

To the commonwealth, it became CSIRO title and then became CSIRO entomology title, so the capital for that then lodged with the division. So there was a wing on what's now the Australian National Insect Collection, the downstairs part was a lab that then funded the industrial scale site that Robin's group on nematode control was able to go into and it built new facilities at Black Mountain. So that was quite a clever device while divisions were able to move resources like that. Max presumably had spotted that that was a line of thought that was going to close off quite quickly, so he'd moved – I think Arthur Blewitt was still in the division at the time and so they'd rationalised resources. I moved with a small – Alan Bateman took early retirement because he had a property at Newport and didn't want to move, everybody else moved down to Canberra and I carried on my research then in Canberra.

Transfer to Black Mountain in Canberra

And presumably the division in Canberra had much better overall facilities than you had at Warrawee?

Yeah, a lot of very good facilities. So things like the electron microscopy was obviously orders of magnitude better. The lab system that I was able to put together there was equally effective. Of course you had the plant industry people next door, so people working on variation in plants were close by and a lot more interaction with colleagues in different research groups. At the time entomology was a big division, I think when I left to go on secondment it was 310 staff.

The files indicate that you had quite a bit of interaction with Max Whitten, did he interact with all of his research scientists or –

In writing.

Once I'd moved to Canberra?

Yes.

I think most of the interaction would've been –

He seemed to take a lot of interest in your career.

Yeah, as I think he would've done - there were a number of other younger scientists, so Gary Fitt for example, Joanne Daly, Bruce Holiday, there's a pile of us all the same age roughly plus or minus four years who landed around the same time. Positions were still as rare as hen's teeth to get, so once you were in you were in. I think Max's point of view was you had to let people build their careers and develop their careers, then advise them. Eventually I was in a project with Dick Hughes on something called the Russian Wheat Aphid and as a result had to do a certain amount of international travel, and I faithfully wrote in travel reports to say I'd visited these labs and seen these things, and very deliberately to say, "Here are other bits of science that are going on around the world that we should be interested in" and Max was always responsive to that. Of course the McKinsey's Review happened in '87 I guess, I'm trying to remember now, so the same year that I moved down to Canberra.

The McKinsey restructure

It was in '86-'87.

Yeah. So Keith becomes Chief Executive and as a chairman, so that split had happened. I think Ted Henzell had just been appointed Institute Director because I remember meeting Ted, he came to Warrawee.

So you moved down in '87?

Start of '87, yeah.

So during all of that –

Yeah. So there was a lot of churn organisationally going on. Then my team and others then became part of an aphid project team and there was a program structure that was put in place and so I sat in a pastures program or something like that. So it was that moment of experimentation in CSIRO saying, "How do we actually formalise the activities of each division in a structure?", and with hindsight I think that's then the position that say John Stocker inherited when John becomes Chief Executive because the resource mobility and the flexibility if you were the chief executive was close to zero because everything was locked away in a sort of formal structure within the division, which is why the divisional chiefs were so powerful of course.

And you applied for the Chair of Zoology at Otago in 1987?

Did I? I can't remember that.

Oh, well you didn't get it.

I didn't get it. If that's what the file says – I don't recall that.

Okay, well you did. So there's no memory on your account of being upset by CSIRO?

No. I think it's just the uncertainty of moving if the truth be told. I think picking up a team and moving them around the country is always difficult, and when you've got an institute that's closing – so it's easy to move individuals because you can say, "You'd be better off in Narrabri working on moths" or whatever, but quite hard to actually move a whole lab and close down a facility.

Leading a group of scientists

So in about 1988 you were firmly established in Canberra on Black Mountain and you started having leadership positions in the division. So you were a member of the Ecology and General Biology Discipline Panel according to the record, Deputy Section Head of Insect Pests and Plants in Timber Section, and so on. So when you started to do these leadership jobs were you given any sort of training or direction or were you expected to pick it up from example of others?

The first training I can remember was about 1991, I think there was a course called managing people at work. It was a one week course where everybody went and sat at Yarralumla in Forestry and, Maxine Fern and Michael Johnson I think if I've got the names right –

Very good.

Yes.

Yeah, were the driving force behind that. It was all around how do you feedback to people, how do you interact. So that was 1991, so all of this stuff in CSIRO predates I think the formality of actually how do we train people. So you're into the John Stocker period really before staff training becomes systemic. Certainly in my memory – I think it's one of John's legacies actually that he started to think about how do people work together in different ways.

I think I went to a leadership group at Tangalooma in the early '80s.

Bob Marshall.

Bob Marshall, yeah. So there was some leadership training going on, but I think that was when I became an assistant chief I was sent to Tangalooma.

I went to one before that at Thredbo. The one and only training course I ever had.

So you didn't have any training for that, you were given leadership positions but you kept on with your scientific work obviously but pretty soon after you became assistant chief and chief. So looking back on that period as a fulltime scientist in the organisation what do you think your main achievements were as a scientist in CSIRO?

Partly the lucerne aphid work and then a pile of work that Dick Hughes helped trigger which was actually trying to do something which at the time had never been done in the world

which was anticipatory biological control. So from about 1979 onwards something called Diuraphis, the Russian Wheat Aphid, moved from the Transcaucasus into South Africa then across to America and caused absolute chaos in the wheat industries in those locations. CSIRO knew about that through the international travel of people going to conferences and entomology had built a model called CLIMEX from Bob Sutherst's group in Brisbane that allowed climatic matching of cold blooded creatures to the temperature thermal controls about where they could live.

So you could do broad mapping of which zones are pre-adapted for which pests. With Maywald Doug Hughes did this piece of work, put the Russian Wheat Aphid biological properties into the model, ran it and of course the bottom half of Australia lights up. We then did some economic modelling with ABARE I think it was at the time, and it was over a \$1b a year impact of this creature if it got in. So the industry funded a whole range of projects on looking for resistant lines and what type of biocontrol agents might be brought in and which lines of wheat were going to be at risk in the Australian system.

So when you say the industry funded it, did that come through the state Department of Agriculture, the commonwealth department, the RDCs or –

Yeah, so you might remember John Kerin when he was Ag Minister helped set up the RDCs, and the GRDC as it had become was large and very strategic, and most probably still is, and they funded a considerable amount of money on this proactive research rather than the current pest problem. So with hindsight a big call by the industry to do something that was future looking. This work that went on then was in the early to mid '80s. The pest eventually gets to Australia, it didn't get here until about 2010, but all of that legacy work was done by CSIRO.

And useful in 2010.

And useful in 2010 because it then gave the starting additions about how you might go about solving the problem with a Le Mans start rather than a static start.

So the process of that project being funded was CSIRO scientists thinking that this could be useful, communicating that up through some system through to the GRDC and the GRDC deciding that it should be funded.

Yeah.

So a two way bottom up top down interaction.

Yeah. Entomology was eventually given a very small amount of money to run what was called the Russian Wheat Aphid Workshop where we flew in, I don't know, 30 people from around the country and had a closed workshop on different aspects of how you'd go about managing the problem if it got in. At the time we were trying not to spook the industry by saying, "This pest is coming", so it was a classic how do you actually do the science without disturbing the marketplace. Out of that workshop there was a set of conclusions and then we wrote up different project proposals and a pile of those got funded. That drove a whole pile of my research then for a period of time.

I had a project running at the CSIRO lab in Montpellier, so I had staff there and I was required to go to Montpellier once or twice a year to keep that on the straight and narrow, and interestingly take the pest from America back through quarantine into France and then put it into the CSIRO quarantine in France which is quite a high risk thing to do. So we actually had the licences to do now what would be very difficult things to do, moving pests across jurisdictions and things like that. Well, at the time it was difficult enough.

Can I just ask you another question about some of the science involved in this. This was a period when computing power was starting to increase and you say you did the model and the bottom half of Australia lit up, was your mathematical background and past useful there or did it somehow or other you had to get other people to do it?

I didn't do that type of computing, I was more analytical maths, equation type stuff rather than computer based models. So other people in the division like Maywald and Sutherst, Peter Rule and a whole pile of people, Mike Dallwitz, there were a huge number of people in the division with great computing skills looking at different problems and building unique bits of software for different purposes.

And did those people interact with the division of maths and stats and the computing research as well?

So we were very fortunate that one of the consequences of the McKinsey Review was it said blow up maths and stats. That didn't happen, so they lost a number of senior people over that suggestion. I think Peter Diggle was divisional chief, he left, actually became one of my professors at Lancaster by the time I got to Lancaster, that's a different story however - three CSIRO divisional chiefs of staff at Lancaster when I was there at one stage. So it just tells you about the mobility of people actually. But maths and stats survived but they put implants into divisions.

Including one in ours in Fishermens Bend.

Yeah. So we had a guy called Richard Morton who would come in, and I have to say Richard was a really great person and now sadly passed away, but a really great person to work with because he persuaded all of us rather than bringing in crappy data after the experiment had been run for a statistician to try and repair, that having the statistician as part of the coproduction of the design of the experiment might be a really good –

And this is the Tony Dixon legacy.

Yeah. So Richard was very influential over a whole range of important studies in entomology including a number of mine, and was very well able to look at design issues. There's a fabulous example of Richard's work, not in my area but looking at insects on eucalypts and the damage they were causing there which was an industry question at the time. Roger Farrow's research group –

These were exotic insects?

Or even Australian insects. Because of things like windbreaks on farms and things like that, people trying to get established eucalypt trees and which ones to plant and what configuration. Richard did this amazing experimental design that allowed you to take out and harvest trees while keeping the configuration in place. So a very sophisticated bit of stats. I think that was the legacy of the interaction between CSIRO divisions that you could do that type of multidisciplinary work as we'd now say, and if you had the right people connected it was relatively seamless. CSIRO was I think always open to here's somebody else with a different problem, how do I help solve that?

Leadership development program

We're now into 1993 and you became nominated for the CSIRO leadership development program and the file indicates that you took that and that was a very serious step for you. What did you learn from that? Were you nominated for that or did you apply for it?

I think so, I'm trying to remember. I thought I was on the third cohort of that. so this was Bob Marshal and Jane Lowther I think then running this program. It was several weeks over an 18 month period. My memory of that is that we were all told that we had to influencing skills sessions and I think there were foundational type things like financial literacy and all that sort of stuff, and it was 30 people drawn from across the organisation roughly.

And our colleague Garret Upstill was part of that cohort.

Yeah. And so that was an eye-opener because you suddenly realised that what was custom in practice in entomology was not necessarily custom in practice in animal health or animal production or whatever. So the cultures of the divisions I realised were very strong differentiators about how people went about allocating resources or time or whatever. So that was revelation. I think the other thing that I remember a lot is that there were two people on the program who made the decision having completed the program that they didn't want to go up the greasy pile into being divisional chiefs or whatever, one left to become Professor of Water Science at Adelaide Charles Sturt, and the other was John Church who became a very famous oceanographer and is now at New South Wales University, but knew that their science was more important to them than the administration of the science. I think that was actually a terrific moment for that cohort to realise there was plurality in the way that –

Plurality of careers?

Of careers, yeah and –

And no one career is going to be better than the other-

And that CSIRO was able to let people go through that process knowing that not everybody would say, "This is for me". It wasn't a compulsion to move from level X to X plus one.

[END PART 1]

Assistant Chief of Division of Entomology

Thank you very much Paul for that lunch. We're back now discussing Paul Welling's career and his thoughts about CSIRO and the national innovation system. We were talking before lunch about the leadership development program and the fact that you learnt quite a bit in there. You were appointed Assistant Chief of the Division of Entomology in January 1995. How did that come about?

I think that was really just an internal discussion. Bill Vogt was standing down as assistant chief, so he was retiring. There had been a number of very well-known assistant chiefs like David Evans, George Rothschild. So they were all internal provinces rotated through. I'd been on the leadership development program and I suddenly found myself running my research lab, running the program and being assistant chief. So it was one of those magic moments where you had three offices and three job descriptions and three workloads and one salary. But it was the classic sort of Band-Aid approach to filling the role for a while. So I took that on and eventually was able to shed the program leadership to somebody else.

Did you make a decision to shift from science to leadership at that point? I ask you about it because I've looked up the Web of Science and your publications and you appear to get out of active research at that point.

Yeah, and I think '97 is the last paper that I wrote in anger. Slightly before that I'd said to Max Whitten some years prior that I wanted to go on sabbatical and I'd started to liaise with colleagues at Wageningen and Imperial to do a particular project for six months on sabbatical in Europe looking at particular aspects of houseplant resistance. Max thought that was a good idea, and then he came down the corridor about three weeks later to say actually we're restructuring the division and would I take on the program leadership. So that was a moment where fairly well crafted academic activity in Europe just got put on ice, and then all these things from program leadership to assistant chief to chief happened relatively quickly.

As an ecologist the sort of work that you were doing is presumably more difficult than it was for me for example to continue being a theoretical chemist and a chief of a division because I just could do theoretical chemistry in my spare time as it were.

Yeah, so I'm the guy who could run my lab and do all the admin stuff that was needed at that level of detail, and the only person I know who's successfully done that is Jim Peacock. Jim when he was divisional chief used to have Friday afternoon with his postdocs and other team people and design experiments and keep his hand in in that way, and most of us fail in that where you need lots of data coming in in that type of endeavour.

Including going into the field yourself?

Yeah, it's almost impossible to do.

And soon to be Chief

So this was in early 1995 you become the assistant chief of the division and in July 1995 you were appointed chief of the division, so you didn't have very much experience as an assistant chief before you became the chief. And Max retired early, he left at 55 or something?

Yeah, so he'd done two seven year terms at that point, because I think he was 40 something when he was first appointed, and I think there had been some thought that Max might've gone to be an institute director. So there'd been a big discussion beyond my pay point around whether Max would do that. John Ratcliffe actually took that job. There was a fairly big hiatus at the time because there was a government enquiry about CSIRO and agricultural science that had been set up. I think John Stocker as chief executive wasn't happy with that review and of course Max was on the other side of that debate.

What was the issue?

I think it was about the funding of science and the reallocation of resources within the CSIRO envelope. You'll remember better than I do that as John came in as chief executive there were two big things that I certainly recall. One is that a lot of the activity of the organisation was mapped on attractiveness and feasibility matrixes, and that was a resource allocation modelling tool, and the other big thing that John I think did was to make the argument for multidivisional programs where activities sat in between divisional spaces. So for those divisions which had been used to just getting a static budget increasing a bit each year and then playing in their own space being told that there was a bigger playground to play into was starting to see a flux in the resource that I don't think CSIRO had been used to, certainly at certain divisional levels, and agricultural research I think started to see the resource flow away from it.

So you remember as Barry Jones had been Science Minister we'd had then a letter of direction create an institute for IT and that was funded from within the resource envelope. I don't remember additional resource coming to the organisation to do that. So there was a lot of flux in resource. Anyway, so Max got to the end of his term, wasn't going to be reappointed, made it clear that he didn't want to be reappointed in that environment, and so there was an international search for a chief at the time.

So you went into the division as the chief having been a scientist there for 15 or so years, what was your impression about what was your task as the chief? The division had strengths and weaknesses presumably, what did you think you had to do?

There were two things; one is that Stocker was leaving around the same time, so Roy Green I think was acting and then got appointed substantially. Notwithstanding I was appointed when John was chief executive, by the time I actually got in through the door Roy was there. The internal political reputation in entomology was in tatters if I can put it like that –

Because of this argument?

Because of the argument that had gone on. So there had been a view that said as Max left should there be some different structure be put in place. So I wandered into the chief's office with a relatively hostile Limestone Avenue there, a lot of unhappiness I think with the institute directors around the role that they'd perceived the division to play a role as

individuals, all of those sort of cultural things that go on in an organisation, and trying to put that to bed. The other big issue that I had was financial, that a cruel accounting system had come into play in CSIRO about three years prior to that, the division's budget was not in a good place and it was buffered in the out year budgets by assumptions of commercial income, and some of those numbers were heroic. So I think I was appointed in the, I can't remember, July or something like that.

17th of July 1995.

Yeah. By September I had a redundancy program running in the division and there were a number of colleagues who then lost their jobs. That was a very difficult thing to do because I obviously knew these people man and boy, so it's always difficult in those situations. But it was a 10% cut in the division in order to reshape it and to try and actually get the budget back into good order, and to do that at high speed to make sure that by the time we got to the next financial years that the numbers were such that I wasn't going to have finance in Limestone Avenue saying, "This is just a non-sustainable position that you're carrying." So all of that happened very quickly and that was a bruising experience for me and for a lot of other people as well.

Would you be happy to talk at all about the impact of that on the quality and quantity of work that the division could produce?

Yeah. So interestingly I think by the time we went strategic planning having made all of those adjustments, Norm White had become my senior administrator at the time, I think Kevin Smith had moved to Melbourne because he'd been in the division after Arthur Blewitt, and so I had Norm's team do a piece of work saying, "Tell me how big the division actually is in financial terms and headcount compared to previous years." So we went back and took out the deflator for 20 years and actually produced this graph, and the thing that changed in the division was that the proportion of external earnings hit 50%, but the division had never been bigger either in financial terms or in headcount. So we recovered that quite quickly, but actually using a business model that was about market facing research that people wanted doing rather than assuming that there was going to be a balance form the commercialisation of technology. So that happened very quickly and you could see that -

When you say market based research that's the sort of research you started off doing that an industry group, GRDC, gave you money to do and you didn't rely on royalties or stuff?

Yeah. So the external earnings of entomology and a small number of other divisions was much higher than the 30% that had been set during the Hawke period, and I think when I left was running at about 50% external, and that was of GRDC or other research councils or ACR or industry funds for the Stored Grain Lab and things like that. So culturally we recovered that hiatus quite quickly and it's the classic thing of people who had not been made redundant in the division seeing their activities regrow in some way, possibly in a slightly different shape and thinking we've come through that marrying of resource into open round again, let's get on and do things.

So a common story in a redundancy situation is that you lose a lot of good people, in fact some people say the ones you lose are the ones who are capable of getting jobs elsewhere. Was that your experience or –

It wasn't a voluntary redundancy, it was a directed redundancy. So the HR people both in Limestone Avenue and in the division did a terrific job around that. I'm not sure how easy it would be able to do now given the enterprise bargains that exist, but at the time it was possible to go in and tap individuals.

So you could pick your new team in effect?

Yeah. So I had the invidious task of having to talk to every individual, as you'd expect as divisional chief, but not an easy thing to do. As Tom said, fairly new in the job and trying to recraft it to essentially stop the external political debate within the organisation tearing the division apart.

You mentioned a couple of times the idea there was a resource shift from some of the rural divisions to information technology say and the more industry faced divisions. From the point of view of the industry faced divisions we never saw that –

Exactly yeah, but I think that was the narrative that was running. I think we were all experiencing flux, because I can remember as a program leader and assistant chief seeing charts of which divisions got what appropriations and what external earnings they had. So a division like ento which I can't remember the figures but say had \$15m of appropriation, \$15m external would be saying, "Why has this other division only got \$4m of external earnings? How does that work?" So we were all trying to consume each other's resource in that sense. It was a very odd period, and it may still be like that at times.

So did you think that the rural industry oriented divisions were somehow different from the more secondary industry oriented or –

No. The lucky break I had was Roy Green. You might remember I think there was a meeting in Melbourne where the whole organisation was under question. So this must've been the late Keating period, just before John Howard came in, so there must've been some other review that was going on that was casting doubt about the value of the organisation. So that might've been the Mortimer Report or something like that, or maybe just before that. Because I can remember John Stocker's period and Beth Heidi saying there were just continual reviews on everything. So we all went off to Melbourne and Roy and Bob Frater ran a workshop that generated the sector based model. A lot of divisions were totally aligned to one sector and I came back and said, "We're not going to be one of those divisions" because we had four or five big lumps in grains and meats and biodiversity and whatever else.

So we sat around instantly with our comms team producing a set of documents that said, "Here's entomology in the middle of a spider's web and we service 11 of the 16 sectors" or whatever it was that were there. That went all the way from grains which was our biggest to pharmaceuticals which was our smallest, but we had some clear evidence in each of those areas. That model of here's a disciplined based division but actually looking outwards

was a narrative that I think Doug had created actually as divisional chief, Max had continued and it was a different manifestation of presenting entomology. And the sector tool by chance that Roy approved then as chief executive played beautifully back to ento for a period of time.

And division of chemicals and polymers then start interacting with you and that was the John Oakeshott, Greg Simpson interaction -

The John Oakeshott period, yeah.

That went on for two decades -

Yeah. So I think there was a lot of intellectual capacity that was released partly by reframing the division and then this happenstance that Roy wanted to deal with the politics of Canberra by having sectors rather than divisions as the point for advice. I think that was actually quite a big step for entomology.

You've partially answered my next set of questions. It's to do with the impact of the external earnings and the commercialisation drive that was connected to that and its impact on the division of entomology. I think you're telling us that your view was that in the end it had a positive effect on the division's work -

The external earnings target

Yeah.

Can you expand a bit on that?

I know when I was divisional chief, which wasn't for very long in the end, the Stored Grain Research Lab which was heavily funded by the bulk handling authorities got very worried about the deregistration of fumigants because at the time phosphine and methyl bromide were the big fumigants. One of them got knocked out by the Montreal protocol and the other was in doubt about its long term viability as a chemical for the industry, and fumigants for everything is still grey. So we actually sent a team that wasn't very big looking for simple molecules with fumigant properties, and that was driven by the market saying, "We can see a big change is about to come." One postdoc in the space of 12 months identified six possible molecules that were going to be useful, and I think carbonyl sulphide, COS, came out of that.

So that was an old molecule that had been set aside in the 1940s, recovered as a new thought process in the 1990s, and then commercialised eventually. So it's that type of interaction with the market, separate funding that's commercial driven and very specific. So this is type two science in the modern jargon about how you go about things, and CSIRO in those days was really adept at doing that type of work. And entomology wasn't alone, I think lots of different divisions had teams of that sort doing it. The problem is they were in isolation from each other, so it wasn't really until the commercialisation committee came in with Jack Steele and people like that, that we started to see what was the whole panoply of

opportunity across the whole organisation. That wasn't really until '97 or '99, I can't remember when that really started as a central activity.

So you point out that you weren't the chief for very long, but what do you think were your main achievements as a chief of the division of entomology? The fifth you say?

The fifth, the shortest lived, I think, after Tillyard. It was a shock when I left because people assumed, because I was quite young, that I was going to be there for 14 or 21 years because they were seven year appointments at the time, and that duration didn't change. I think Geoff Garrett eventually started to want people on shorter terms like three or five years. But it allowed cultures to build up and teams of great researchers come together. I think my legacy was normalising the positioning of the division and sorting out the budget. I was only there for a couple of years as chief. Some of the scientific things obviously got started, but in reality other people carried those to fruition. So my role was really administrative in entomology.

But setting up the finances and setting up the processes within the division –

Well recovering those into a more tenable space because I think they'd been pushed in a particular way in the early 1990s.

Secondment as First Assistant Secretary at DIST

DIST, the Department of Industry Science and Tourism, and you went across as a first assistant secretary in 1997. Why?

I was 14 years into my career at CSIRO, become division chief, so I was still young, I was 42 or something, and I'm sitting there thinking I'm going to do this for 20 years, all my predecessors had done it for a long time. And it was a global job, so having got it I could go to any international congress and people knew who I was before I'd even get to the door even if I didn't know them. Sounds a bit arrogant but there was a hat that went with the job that, like all divisional chiefs, people wanted to talk to you because they wanted to interact with your division. Malcolm McIntosh had become chief executive, John Howard had taken over as Prime Minister and John Bell stood down as deputy secretary and John had done all the science policy stuff in the Hawke and Keating period and things like that.

By chance John Radcliffe was on leave, I was acting institute director because there was still institutes in those days, and I got a phone call and then a note from Malcolm saying that John Howard and Peter McGoran and, I'm trying to think who the minister was, John Moore had been in discussion, and they'd formed the view that the gap between the research bureaucracy and the research community was too big and they wanted a CSIRO officer to go on secondment to close that gap. They wanted a senior person so Malcolm wrote to me and said could I give him the names of some senior people. So I sat down, went through my thought process about CSIRO and sent Malcolm a letter with about eight names on and signed it yours sincerely Paul Wellings. So mine was not one of the names.

I then went off to Sydney, I still remember because I was at some meeting, got a phone call from Malcolm. So I'm standing in the Cerulean at the InterContinental Hotel, the coffee bar

in the middle of the InterContinental in Sydney, and he said, “Paul, thank you for your note you sent me yesterday. There’s a name on the list that the government’s interested in going forward with” and I said, “That’s great, who’s that?” and he said, “Paul, you made the mistake of signing the letter son. We want you to go.” So it was a stitch up. So I wasted a day and a half thinking through people’s CVs and all that, and Malcolm in a very nice way instead of just saying, “Would you go?” So from memory that was the Thursday, on the Monday I was on secondment.

So Malcolm fixed it.

Malcolm fixed it but it was very quick. So we had about two days in which to draft a letter that would go both to the research community externally and internally from me to my colleagues. So Jim Cullen was appointed chief. I froze my contracts, I actually had a reversion point as divisional chief at the end of the secondment and then never used it because I then became a company executive.

How do you look back on that period, was it a good idea in retrospect?

Yeah. So my memory of being a divisional chief is that roughly your world outlook is three weeks to three years as a strategic role. The equivalent role in the public service your world outlook is three minutes to three weeks. That was a shock to me because you could be here like now and the phone could ring, it could be the minister and you’d have to excuse yourself and go and do whatever the minister wanted. So the issue about how you write strategy and do positioning in an environment which is so responsive was a learning curve for me as an individual, and actually a really powerful moment for me to learn how to do that. I had a lot of support; John Spasojevic was my Dep Sec and so John was a very tough guy but hugely supportive of wanting me to succeed because I was one of his direct reports.

So you weren’t perceived as an implant from the outside?

I’m sure I was but I had protection from John Spasojevic and –

And from the minister presumably.

And from the minister, so unusually I had a direct route first to John Moore and then to Nick Minchin who were my two ministers, and Peter McGauran when he was around as Science Minister, and Brian Loughnane and Kieran Schneeman were the two Chief of Staff. So I had a very unusual route into their offices at any time. We did a lot of things very quickly, so the Gene Technology Act which had been struggling to get through, I brought in Michael Hirsch who had been one of John Radcliffe’s offsideers. Michael by chance had been a pesticide regulator for the South Australian department so he knew how to do what was essentially complementary adoptive legislation rather than substantive legislation, because we had to get every state onboard to do that and keep the commonwealth happy at the same time. So we did that. Writing a cabinet paper from scratch for me was a novelty because I’d never seen that done, because you don’t normally see how the sausage is made.

You don’t want to.

We set up Biotech Australia. John Stocker's office at the time was directly next door to me as chief scientist, so John was there as part time chief scientist, but food and rations for his role actually came from my office. It's structured in a different way now. PM Sec was created and so my role there was to be one of the people sitting behind the Prime Minister in PM Sec. So there was a lot of learning for me, but a lot of things happening very quickly on the science front.

I've got two questions about that period Paul, they're related I think and you've partially answered them. Can you reflect on the way the government and the public service viewed CSIRO at the time when you were in there, and you're saying that you had some input into various policies but during that period the government had a number of white papers investing for growth just after you got there and the Knowledge and Innovation paper in 1999, it was before the Backing Australia's Ability paper, but were you involved in any of those white paper developments –

No, no –

- and what was the view of the public service of CSIRO?

There was a group writing the response to the Mortimer Report, there's a section there on R&D, and at the time the CRCs were seen as an alternative to CSIRO and there was a lot of tension both in the bureaucracy and with various external individuals who would come in and basically bag CSIRO at the first opportunity. So trying to deal with that in some professional way rather than just being partisan for CSIRO, because I was meant to be partisan for CSIRO, was a very interesting moment. The CRC secretariat reported to me because that was one of my sections in the division, and actually trying to get the narrative right for those people so that CSIRO wasn't seen as the enemy – because that was a problem at bureaucratic level within that area. The other big thing that we did was that Russell Higgins who was on the board of CSIRO, you might remember Russell was secretary, he argued for a program policy split within the Department of Industry.

So AusIndustry had both been a delivery arm and also had created the innovation policy, and I said to Russell, "Give me all of the innovation policy to put beside the science policy." So that group came over into my division, my division grew, Aus Industry then dealt with delivery. There was a research commercialisation workshop we ran that Don Mercer chaired for us down in Melbourne looking at policies around the research commercialisation, and that was a precursor to eventually what became the innovation statement and Backing Australia's Ability in 2000 or 2001, whenever that was. The interesting thing there was that CSIRO though didn't really get any resource out of that. I think that went into ARC and a couple of big centre stem cells and IT.

Out of Backing Australia's Ability?

Yeah. And maybe not a surprise but John Stocker stood down and there was a subsequent chief scientist Robin Batterham, and Robin's views about CSIRO were very different to John's views about CSIRO.

I've got questions about all that, you probably realise that Backing Australia's Ability and the fact that CSIRO didn't get any money has been painted as a crisis for CSIRO?

I was getting to that -

You're going to go there but you don't want to go there yet?

CSIRO and the Public Service

Well because you were just reflecting on the way the government and public service viewed CSIRO at the time, were you able to in some way alleviate that, were you able to educate the bureaucracy about the role of CSIRO?

Yeah, in lots of different ways. If you look at the government's response to Mortimer, somewhere in the back of that or around the science bit there's a page that Beth Heidi wrote, she may not know she wrote it but she wrote it, on examples of research commercialisation that every single one of them is a CSIRO example. At the time that was done because Don Mercer was running a review of the CRCs, so we couldn't put CRC stuff in there because we weren't sure where the policy was going. So we wrote the page that said, "Here's one organisation an example from lots of different business sectors about how you get industry impact." So that caused a lot of debate in the bureaucracy, not so much with the ministers because it was seen as reinforcing CSIRO rather than highlighting the role of universities or the CRCs or CSIRO.

So it was those sorts of examples. But the debate within the department at the time was pretty weird. CSIRO did, and presumably still does, get the equivalent of the telexes from diplomatic missions that are not classified in particular ways. So if you were sitting possibly at divisional chief but certainly at institute director or deputy chief executive and chief executive you'd see briefings from different parts of the world continually and scientific issues that were being thought about. There was a game on at one point from within the bureaucracy to try and stop CSIRO seeing those cables. So try and put your hand in the machine to say why would we do that, what's the purpose of that? There was another debate that happened I remember around key performance indicators. Somebody came in to see me with a massive framework of KPIs that would've been imposed on CSIRO, and I only asked one question which was, "What are we going to do with them when we get them?" and there was no answer. So I said, "Well we're not going to even ask this. It's a resource allocation question that the minister is actually going to wear the heat of this because it's just misappropriation of moneys."

But it was about who controlled the organisation, and I think the worst bit actually was after I'd come back into CSIRO, I think Chris Schacht asked a question of CSIRO's view of the CRCs and I drafted that in consultation with various people. Again because the department was a post box to go to the minister, it wasn't a decision making body to vet CSIRO's documents, they tried to vet the document to change the CSIRO response before it went to Nick Minchin and I kicked off over that saying they didn't have the right to do that. So there was a period there where the bureaucratic machinery was actually saying, "We should actually control some of the strategy of the organisation" and that might've gone on for a long period of time, but certainly the window that I saw it in, it seemed to be very acute at times.

Just trying to moderate some of that behaviour to say, “Actually that’s not our job guys, there’s responsible adults at Limestone Avenue who are doing that, suspend disbelief.”

But they were competitors in the policy game, is that right? So in other words the departmental people saw themselves as being the principal advisors to the minister and the government, and that these guys from CSIRO were actually setting themselves up in competition?

Yeah, and so as soon as you ended up – Beth Heyde’s group as was clearly would take advice from the relevant divisions with right responses to government enquiries, and was quite careful to put in a scientific view rather than a social or economic view around, “This is how the science would work.” But on major issues like climate or water or future of technology or aspects of defence or human health issues, the scientific view very often was an important voice to put in. It may not be the only voice to consider if you’re the minister, but putting that in without being nuanced in some way by a group of separate officials was a role under the Act that I think that CSIRO was asked to play from 1926 onwards. That was the thing that was under challenge, it was about who was putting the wrapper around how the scientific evidence might be presented.

Back to CSIRO as a Deputy Chief Executive

So you went to DIST in 1997 and came back to CSIRO in 1999 as the deputy chief executive succeeding John Radcliffe.

Yeah, I think –

And Malcolm was still the chief executive but wasn't very well, was being treated for –

Kidney cancer, yeah.

Well he'd had secondaries by then. So you'd had this view of CSIRO from within the public service, you came back to the organisation, what was your impression then of the organisation?

The organisation changed of course because we blew up the institutes and created the deputy chief executive.

That had happened when Malcolm came?

Yeah, just as Malcolm came. I think John Radcliffe had been the first of the deputy chief executives, and we were in clusters, so I had environment and natural resources. My view of the organisation was partly covered by here are the opportunities because Biotech Australia had been created and clearly all those divisions that dealt with biotech issues had an opportunity to work with that machinery. The innovation statement was being cooked up, and so Robin Batterham came several times to meetings of the CSIRO executive. There was a lot of tension in that, and Malcolm was a pretty deft operator in that being able to

talk directly to the minister. Unusually Colin, Chris Mallett were there as deputies, Ron Sandland and I were appointed on the same day.

So Malcolm by chance had four individuals, all of whom had been divisional chiefs. So he knew that he'd come into the organisation, notwithstanding he was a scientist, to a sort of lateral arabesque as a public servant, and he ended up with four individuals all of whom were pretty good scientists in their day and understood the breadth of the organisation. I think there was method in his madness in terms of how do we actually then link the policy framework that's changing very quickly into the scientific activities that relate to each of the clusters that Chris and Colin and Ron and I had control over. So that bit of the design –

Was Bob there then still?

Bob was gone. So Bob Frater became Ron Sandland, and Colin had been there a while, and I'm trying to think whether it was Alan Donald that Chris would've succeeded in that hierarchy of who went where. But the four deputies for a moment were all ex divisional chairs.

So Malcolm then passed away I think and a new chief executive was being appointed, would you have liked to have been the chief executive at that time?

Yeah, I was a candidate –

And what would you have done?

What a Wellings-led CSIRO would look like

Differently? I had a personal view that said we should've just had two major clusters of divisions that were disciplinary based, so there would've been the physical resource mining group and there would've been chemistry life sciences, and in between I would've created a third tier that dealt with interdisciplinary research to try and draw – sort of what became flagships in a different way, but actually have it three structured and then put the central administration as the fourth pillar and had four individuals with my proposition. But drive the interdisciplinary stuff by actually having a deputy chief executive whose task it was specifically to do that. And you might've simplified the divisional structure a little bit, I have a particular view about the size and shape of divisions. So that was a position that I had but CSIRO's tended to always go outside for the chief executive in my memory really since Paul Wilde. I think Keith might've been the last internal person.

History tells us that until John Stocker was appointed every chief executive or chairman had come from within, and after that everyone's come from without.

Yeah. Charles Allen was the chair. Charles chaired the committee. They must've looked at several candidates, they looked at me and went in a different direction, so Geoff was appointed.

Working with Geoff Garrett

So Geoff became the chief executive, and this was at the time Backing Australia's Ability was released. The government received the policy statement in January 2001 and I think Geoff became the chief executive in January 2001, and the story from within the organisation, and I was still in Jakarta at that time so I only saw this from afar, was the fact that CSIRO didn't have any resources allocated in that statement meant that the organisation was in crisis. Was that your impression?

That was certainly the story that had been created. I think Malcolm passed away, Colin acted for a year. There was a lot of white anting that went on bureaucratically in that year before Geoff came, and I think just at the time that Geoff's appointment was announced there was a consultancy report, Allen's I think had a consultancy report that came out that was incredibly critical of CSIRO. That of course became common knowledge amongst those people who –

Was that a public report?

It was sufficiently public that people knew the direction of that. It was a very critical report. I remember Geoff came to a meeting that Colin chaired, so this might've been in the November before he joined in the January, so there was a meeting somewhere in Canberra, he knew about the report and that for him was - I think Ron Sandland's line was, "We're on the last roll of the dice, that we've got to do something differently", and that gave Geoff a mandate to say if we don't respond to that type of criticism of being too insular, not engaging with universities and industry and blah, blah, all that sort of stuff, we're doomed. Geoff then came in with the Brian Clarke model from CSIR about doing more short term research and consultancies and things like that and a view around the flagships. So you can see that in the literature, there's a paper from the late '90s, however Clarke's name because he was Geoff's predecessor at CSIRO. We inherited a fair proportion of that structural dynamic that had gone on in South Africa for different reasons in South Africa about how to liberate CSIR and make it more market facing and responsive.

But were you part of that discussion as the deputy chief executive? You were a deputy chief executive under Geoff?

Yeah.

Were you part of all of that –

For sure. So there was a moment where under Malcolm the deputies had functional roles like environment or agriculture or mining or manufacturing, all of that got swept to one side quite quickly. Colin retired, Chris Mallett resigned to go to Fonterra, and Ron and I were left as the two deputies. Relatively quickly within the first six months or so Geoff asked me to take on a different role rather than managing the research outputs of a cluster of divisions. So I was asked to look after business development, which at the time was a brand new centralised function of business, and clearly it existed in divisions. So I was asked to try and put that together.

So there was a framework where we were given large and small tasks, like I had CRCs in my job jar, Ron Sandland would've had reforming the RT framework of the institution, all those

sorts of things. So that was against the framework that Geoff created about One CSIRO and Look Outwards. There was a series of slogans, about five or six slogans that formed part of the strategy, and behind that people like Ron and I, there was a commercialisation committee that I think Jack eventually had control of. John Reid came in to do that –

You didn't appoint John though?

I didn't appoint John, that was done by Geoff. So there was a pile of people like that who came in. So John came in to drive commercialisation and the business development stuff. So simplistically we had business is money in and commercialisation is ideas out, and those two executives were different people. So I had how do I corral all the divisions and get them to think about the financial target that Geoff had set. I can't remember the exact numbers but we were roughly a \$900m organisation and he said we wanted to get to, I can't remember, \$1.2 or –

1.3 yeah.

1.3 in a five year period, and all of that step change was going to have to be externally funded because there wasn't going to be government funding for that. So there was a five year plan to say how do we go from 900 to 1.3?

What resources did you have to help you with the business development side of your job?

Very little. I think I had three senior people, Geoff McAlpine who was doing communications work, Michael Hirsh and Graham Thompson who then went on to work with –

And he wrote the book with Ron.

Yeah, wrote the book with Ron. So those three officers worked directly with me, and then I think Bronnie was there, I had Prue Rutledge and –

That's when you were over at Black Mountain?

Yeah. So there was a team of six of us and the business development staff, essentially Graham and Michael, put together a lot of the guts on that and we had an interdivisional committee that helped drive that. So it was difficult because it was a series of workshops, because Geoff loved calling people together and so they were all happening at six week intervals, and trying to create a gated process to be able to go to every other one of those to say, "Three months has passed and we've actually moved forward in some way" was something that we had to do at relatively high speed.

Early on in Geoff's time there was a report that we found from the board papers of a strategic priorities review that covered various topics, what you're saying is probably part of this process, and it had 17 topics that it was doing, you were in charge of one of them but in particular one of them was how do we clarify the different roles of CSIROs and universities and it came up with certain recommendations in 2001 about their respective roles. Looking back on your experience since then what do you think now about the different roles of CSIRO in universities in the national innovation system?

Can I go back slightly? When Colin was acting Colin and I had a long conversation about the CSIRO university interface and I said to Colin, "Can I try and do something?" So I managed to persuade Chris and Bruce Hobbs, because Bruce was acting for Colin and Ron, that the four of us should look at which universities CSIRO interacts with. So we had the top 12, so it wasn't just the group of eight, it included Tasmania and all sort of places, James Cook, and I wrote to the Deputy Vice Chancellors Research of each of those universities and said, "Come to a meeting." We had a dinner with the minister.

We had a very difficult meeting at Limestone Avenue because we were all fighting with each other. Eventually the guy who became deputy vice chancellor at Queensland University, David – it's gone out of my brain now, stopped the meeting and said, "Look, Paul's invited us, we can either bicker all day or we can get an agenda because we've got the minister coming this afternoon." So he got it. So we rapidly put together something. That met two or three times. I think Geoff then didn't want me to run that interface when he became chief executive and he appointed Vijoleta Braach-Maksvytis.

Ah yes, I remember her.

- to do that, and that eventually ran into the sand somewhere. So that was a moment I think when Colin had seen the writing on the wall and had asked me to say how would we finesse this in a different way. He knew that he couldn't just come in as chief executive because he was too senior for the interface to be wanted, so getting the deputies to interface with the DVCs R was the trick there. So I think that's a problem because if I look back, when I joined CSIRO the bit of CSIRO that I was interested in did large scale public benefit research. It's impossible for universities even now to do things of that sort, and we're all converging in the same spot. So if you go across to our innovation campus here you can see one of the most successful accelerators and incubators in the country, much more successful than anything that CSIRO has got, and yet Larry is rushing into let's all do incubation type stuff.

So the world has moved on in innovation policy and in a sense CSIRO jumped the CRCs and said, "We'll make critical investments in CRCs when we need to but they're not going to be the way we run our business." Universities have now responded 10 years on to say, "That's exactly the same thing." So the CRC model the way it's working is working well, but it's actually a tailored process, it's not just a random resource allocation process that we're all just competing for. We're much more strategic about how we go about setting up new projects as universities, certainly in the Australian setting, and so Judy Raper and people like that here at the Wollongong context is thinking quite carefully around where we bid and what we invest in. I think that's the big problem now for CSIRO because the innovation framework is around new industries and new jobs, the universities have moved into the entrepreneurship space, we own all the students, where a lot of the ideas are generated in the PhD students.

So the human capital is actually on the university side of the table, and I actually think that may well be a structural problem for CSIRO for the future. I don't have a sense now that if I was 26 or 27 again whether CSIRO would be a destination, but I remember vividly the night I

was appointed, got the letter from Doug Waterhouse. I was with a group of people from Cambridge and a very senior person came and said to me, "Paul –

You won the jackpot.

"You've won the jackpot, you have to go and take this job in Australia because every other young scientist in the country is hanging out for a role like this." I'm not sure that if you're 26 or 27 again that CSIRO is the lottery ticket that everybody wants to win. But that might just be me 40 years on almost now.

Numbers of people are saying that, but it does raise the other question though about CSIRO and for example work like climate science, whether that is actually the long term big scale future role for CSIRO as opposed to lots and lots of small innovations.

Yeah. That's what I say, when I joined CSIRO the large scale long term public benefit space was the thing that really stood out for CSIRO. You may not remember or know but the year that I joined in '81 there was a very famous report published by one of the Bureaus of Economics down in Canberra where people had been whinging – so this is in the late Fraser period – about the cost benefit of investing in research. Doug Waterhouse took on the bureaucrats who were doing that and said, "Come and do it but do it for the whole division" –

This was a Productivity Commission report?

Productivity Commission report, and I think a lot of people in CSIRO thought that Doug was mad. The figure on entomology was for every dollar that went in \$9.00 came out I think was the number, but the range was here's a whole pile of projects that lost money, and then there was a small number of projects that made a gazillion dollars, and you couldn't pick - you needed the disciplinary or scientific view that said let's play all these cards and some of them are going to pay dividends to the country. So I think that was the big surprise, that was '81 I think when the first of those came out.

So this strategic review had a range of things, so we'll quickly look at some of them before we get onto your time in Lancaster. It said more discipline about costing and pricing, CSIRO had a culture of not listening to stakeholders, it said that it didn't do enough to encourage collaboration across internal/external boundaries, it needed to improve its procedures for liaison with the government. These were findings. Looking back has it improved?

They're all the findings out of the Allen's report, so what you're seeing in that board paper is material that's just been taken straight out of the report that was done at the end of Colin's time as acting chief executive. For the life of me I can't remember who commissioned that report now, whether that was the government or whether it was –

The Allen's one?

Yeah.

We don't know that.

Yeah. But I think what you're seeing there is Geoff using that language back at the board to say, "We've got to move." Some of those things have worked out – where I sit now as a vice chancellor CSIRO's almost invisible, which is a terrible thing to say. So I know more about the doings of ANSTO, possibly because it's just up the road. But there isn't a very clear liaison framework for me as a head of institution. I know Larry very well and I can go and have a cup of tea with Larry, but there isn't any formality beyond saying, "Should we collaborate?" into what's the design, and it's not clear who would help drive that design. Historically somebody in CSIRO might well have done that, advising the chief executive –

This depends a bit on where you are I suppose. I think on the Clayton campus there would be closer links.

Yeah, and Megan when she was around as chief executive wanted I think to set up communities of 7,000 individuals. So presumably she saw her interface with the Parkville strip or with the campus at St Lucia, those sorts of places –

And the campus around Curtin University.

Yeah, those sorts of linkages rather than saying, "Material sciences is strong at Wollongong and so we should have a very clear relationship with material sciences at Wollongong."

Yes, which indeed we did have when I was the chief of division of chemicals and polymers.

Yeah, so those are the things we've lost, both the universities and CSIRO and the country if the truth be told. That's a bit of unfinished work.

There was a lot of discussion at that time about the external earnings target and Robin Batterham was the chief scientist and had a review which got it dropped. My own impression was the external earnings target produced some of the greatest fun of my life, so I didn't care whether it was dropped or not. What did you think of all of that, linking with the external produced good outcomes?

And still does. If you looked at the budget of Wollongong Uni for last year or when we published our account what you'll see is contract research has never been at a higher level. It's our most successful year last year, so category four income. So engaging with SMEs or Blue Scope or whoever it is that we're engaging with is part and parcel of academia now. Robin might be right to say, "Let's take it away as an arbitrary target of X%" but you can't take it out of the culture. If Geoff Garrett wanted to go from 900 to 1.3 the only way that he could do that was to drive more external income rather than just fix it at 30%. Had we fixed it at 30% we would've stalled the organisation, and then the political debate in the late Howard period would've been how do we disaggregate CSIRO in some way.

Vice-Chancellor at the University of Lancaster

So in 2002 you went off to Lancaster to be the vice chancellor of the University of Lancaster. Had you got sick of the organisation or a new opportunity?

If the truth be told I was the youngest deputy chief executive that CSIRO had appointed, so I was still very young when I took that role in '99.

This was 18 months into Geoff's term.

18 months into Geoff's term, so I hadn't been successful in getting the chief executive's job. The mood within CSIRO was pretty difficult between the troops and what was happening at Limestone Avenue, so there was a lot of churn of ideas, a lot of people getting burnt out in the process of change that was going on. My personal view was actually that I most probably looked as somebody who'd come through the ranks and as divisional chief and knew a lot about government that ultimately I would get burnt out or burnt during Geoff's first term. So I thought we had a productive working relationship but it wasn't the way that I would've run the organisation, I wasn't the chief executive so it wasn't me to run it, but I needed to move on and think about different things. I had a pile of people advising me to go and run the spinoff company and do all that sort of stuff, so that was a view that certain people said I had the skill to do that, and then the head hunters circled around university type roles.

So I was shortlisted at Adelaide, which is why I'd written the documents, and then by chance Lancaster advertised and their advert was in the Australian as well as in the British. So I had completed documents, and the process of appointment at Lancaster moved faster than Adelaide so I withdrew from Adelaide and made the decision that I would go with the first institution at that level, because vice chancellor jobs are relatively hard to get. So thought that was a good thing to do. What I didn't know of course was that at the Lancaster end there was a CSIRO division chief ex Peter Diggie who wanted me to come, and a very senior Lancaster person who worked –

But you weren't head hunted, you applied?

I applied for that job, and then there was another senior person who did water research from Lancaster but all his fieldwork was in Adelaide, so they knew about CSIRO and I think they'd rung around and said, "Could Wellings run a university?" So I suddenly found myself back where I started in the same city that I'd left. There's the irony in all of that.

So can you reflect a bit on the differences between the UK and Australian national innovation systems, what can we learn from one another?

I was very lucky that I went to the UK in 2002, so that was five years into the Blair government. So new Labour was doing things, there was a lot of restructuring of resource. It was one of those jobs where science had moved centre stage, Blair appointed Lord Sainsbury as science minister, and the story goes is that David Sainsbury said to Blair, "I'll take the job, I won't get paid" because he was apparently wealthy, "I don't want income, but I'll tell you when I'm resigning, you won't tell me when I'm resigning." Those were the conditions. So Sainsbury was science minister for the best part of a decade, and he very cleverly manipulated both the supply side and the demand side of policy, and had somewhere advising him of framework and so the research councils got more money.

There was more incentive around postgraduate support on the supply side, on the demand side the route to commercialisation and looking at the Fran Hoffers and those sorts of things. So this is where CSIRO could've gone, "Actually we could be more Fran Hoffer like if we'd wanted to be in previous generations." So that was the really big difference, to actually have a minister who'd got it and understood that the policy shape – what we failed at doing in the innovation statement that the Howard government with hindsight didn't actually have a framework around both the supply and demand side, we just invested in big licks of money into IT and stem cells as though new institutions were going to be the go rather than saying, "We've got the universities, we've got CSIRO, we've got ANSTO names, we can actually do something very different here, mainly on the supply side but driving industrial change in some way."

I think that's the thing that I learnt, and Sainsbury held on, I think he even joined the Gordon Brown government and eventually new Labour lost government to Cameron and things have moved on, but there was that moment where almost every Monday as vice chancellor a new set of opportunities hit your desk.

So the British system invested a lot more in the use of government itself in driving innovation, so government purchasing to drive innovation and various demand side policies which Australian governments have always been reluctant to do.

Yeah. You might remember Alan Gilbert who was vice chancellor at Melbourne became vice chancellor at Manchester while I was at Lancaster, and Alan Gilbert pushed the line all the time that the greatest driver to endogenous growth is procurement and persuaded government a lot that that was something that they should be thinking about, so did Schumpeter. And here, it's very difficult, if you look at most of the accelerators and incubators around the Australian landscape, a lot of the young people have got ideas that will influence transport or education or health, so that's where their points are going, they will run into the procurement problems and die from cash flow unless they can get their ideas into a slightly riskier space.

All of those things are state governments, they're not federal government, so the interface is actually state government procurement is actually going to drive potentially new ideas into the ground or create space for new industries and new jobs, Australian ideas to get forward again.

Yes, that's an interesting point which I think we need to develop further in our narrative about CSIRO. Just quickly what were your main achievements at Lancaster?

At Lancaster? Doubled the income, managed to get my hands on about \$600 million worth of resource to rebuild the half the campus, created the largest Centre of Environmental Research in Europe. A lot of things went on. Lancaster sits now in the top 10 universities in the UK if you believe the lead tables, 125th in the world. So it's not bad for a 1960s – it's the equivalent of Macquarie or Wollongong. So sitting most probably –

Just done better than Wollongong.

Yeah, done better than Wollongong. So when the league tables first came out Wollongong and Lancaster were both listed 196th and a lot of the Australian universities went back because of the methodology change, some of the English universities went forward. So Lancaster has ridden very high and it has some things that we haven't got going here. Lancaster University Management School would be in the top 25 in the world, possibly Melbourne or New South Wales on a good day might get close, but the real Achilles heel in Australia is the absence of a truly outstanding management school. I can remember actually when Malcolm was on the executive and in a conversation with Batterham one of the things that Malcolm put to him is that CSIRO should partner with Harvard in the management school space to drive the route to market for ideas, and how disruptive technologies would actually get taken up by the marketplace, and Robin hated that idea that you would go overseas for a partnership. But I think with hindsight I think Malcolm was –

Malcolm was probably right.

- right that had we done that, it might not have been Harvard but some other major business school around the world, that we could've actually done something really very special. There's still the chance to do something like that, but you look at the typology of our business or management schools across the whole of Australia, we're on the weight for weight basis way off the pace compared to –

VC at the University of Wollongong

Do you have one here?

Yeah, and it's good but it's just that you can go to Warwick, you can go to Lancaster, you can go to Imperial, you can go to Oxford, you can go to Cambridge, you can go to bits of Cranfield, they're all brilliant by global standards. Very hard to say which bits of the Australian system in the business school frame is brilliant. Our engineering is truly outstanding, and I think it's that tension between if you look at North America engineering and business and health, all those pistons fire in the major universities simultaneously. Here at Wollongong I've got one piston that fires which is engineering. My challenge is how do I get a second piston to fire quickly enough because that will cause us to move – and we've bet on chemistry and health and medicine to do that because we think that interface is a singularity for Wollongong.

I know that you were probably head hunted for the job of the chief executive of CSIRO when Geoff left –

Yeah.

What would you have done to CSIRO, how would you have changed CSIRO if you'd got the job?

Then? My sense is that I would've tried to back away from some of the contract research thing, I would've gone more back to where Terry was which was the large spatial scale stuff. Because of the Lancaster Management School I was still remembering what Malcolm had said thinking how do I drive that type of process more rapidly to think about the sort of

social science interface of the science to try and build industry capacity. So I think Megan guarded the shop to some extent, if I can be blunt about it. So I don't have a great sense that a lot of different things happened. I think it was the trajectory where the perturbations happened I think as Larry's come in. But Geoff Garrett's legacy I think was continued a little bit by Megan, and I think there was a different route that you could've gone there.

But you soon came back to Australia to Wollongong. So were you at that point in your career wanting to come back to Australia?

Yeah, I remarried when I was in Canberra, my wife's from North Queensland, we had elderly relatives in Innisfail and I just had done nine and a bit years as vice chancellor at Lancaster. I could've stayed, I had a contract that would've taken me to 67 at Lancaster, I was being offered other jobs in the UK in other universities, but didn't want to do that. Then when Jared was leaving here the opportunity to come back to a young university that is very action orientated was really attractive, and very different actually to Lancaster. Lancaster was strong sociology and management, a lot weaker on the science side which had got reinforced in my time while I was at Lancaster. Here engineering and education were the two foundation pillars.

So the narrative is very different here. At Lancaster you'd have an idea and the academic community would say, "Why do you have to have that idea?" , so it was sort of the first amongst equals. Here if you have an idea the risk is that people try to implement it before you've fully formulated what might need to be done because it is very action orientated. I think that's the engineering community here and the way the culture's set up. So similar sized universities but very different in terms of internal cultures, and as a chief executive that's a really interesting place to be because that's a challenge then to say how do you hold the reigns of the horses?

The place of CSIRO in modern Australia

So Paul if we're now starting from scratch in Australia setting up a national innovation system would you have CSIRO?

Possibly not.

How would we do this long term research?

In my mind you'd keep the name CSIRO because it's a global brand, but I actually think that the interface between CSIRO and the ARCs, I actually think there's a chance that CSIRO could be both a commissioning organisation as well as a doing organisation. So you might end up with the equivalent of an environmental institute, a manufacturing institute, that were real places that did specific long term strategic and spatial stuff, and then worked in partnership with universities or industry to do other things. So if you look at the Environmental Research Council in the UK or the –

To some extent the National Research Council in Canada.

In Canada it's both a doing place as well as a commissioning place, and we've never had that experimental thought to say – if you go back –

But we had it in 1916.

Yeah, in 1916 and then somewhere between '26 and '44 we lost that model. So I think there's a space to do that and then you're left with the difficult question of if you did that would you merge CSIRO and the ARC –

Well you'd have to.

And how you'd organise those resources, but you might end up with one overarching body and four or five or six pillars, depending on whether you wanted economics and social science in that framework as well, and then you'd work out where you needed specific institutes like agriculture environment or manufacturing. There may be some like economics and social science you might just see those as a resource allocation function. So there's a completely different typology to do that, and I think the difficulty is – I think one of the big mistakes that John Howard made was the Uhrig Review where they looked at statutory authorities and they moved decision making control to the minister's desk rather than having a body of experts to come to a decision having had a letter of instruction from the minister say on an annual basis.

Uhrig moved a hell of a lot of responsibility back to ministers, which is sexy if you're the minister because you can put your signature on a piece of paper, but actually stifles a huge amount of creativity and decision making by experts. It's what in the UK would be called the Haldane principle about how you actually get experts to make decisions within a safe policy framework.

So in your new national innovation system would you retain ANSTO, AMES as separate institutions, or would they to some extent be bound up in this new typology of institutes or groups that –

I don't think there's a simple answer to that. I wouldn't retain AMES in my mind. I think you've got to retain ANSTO because ANSTO gives you a seat at the table in Vienna with the IGEA, IEA – whatever it's called. So that international energy linkage and the global framework that the existence of a reactor gives you. So I think it's a non-trivial question to say how do you actually unpack and reorganise a system because there are some things where the global consequences of changing things need to be understood.

But you could remove non-nuclear work from ANSTO and put it into the combined –

If you wanted to, or you could make ANSTO have a dual function and have some resource allocation and some national security.

And we did that a bit in the 1990s when part of that came to CSIRO.

Yeah.

What about things like AAHL and the telescopes and so on, big national facilities?

I think that's where they would go into national laboratories. So you might have an agricultural –

So the name CSIRO would be part of that?

Yeah, I think – Julian Cribb's work back 20 years ago suggested I think the third most important brand name in Australia after Ford and Coca-Cola was CSIRO if I've got my memory right. So you'd trash the name at your risk, but you might repurpose how all the bits hung underneath it. So that's a major review to do that.

I don't think we do it now but for many, many years we did - Swinburne did an annual survey of trusted names, CSIRO was always the top. What we also did was discover that nobody knew what CSIRO did.

Not these days. Kids all –

Even those days. But anyway.

Just as a matter of interest, legislation, Science and Industry Research Act always permitted the kind of model that you were talking about right from day one.

So I think the legislation allows you to do it, as to whether there's a political will to do it. Then something like ARL has to exist because it's one of six places in the world where you can do that research, has to be a government lab, and then in my mind – so if you had natural resources or agriculture institute or whatever you want to label it, it would just sit in there as a function –

Under Science and Industry Research Act.

Yeah.

Broadly interpreted.

Yeah, and then if there was other research that was commissioned in the universities or elsewhere you'd do it out of that certain body.

In the early days of the University of Wollongong you had a very good group here with Ron Johnston thinking about innovation policy which I don't think you have now.

No.

So maybe what you're telling us now is the start of the University of Wollongong rethinking its role in –

Innovation policies –

Driving the agenda.

Paul, it's now past 2:30.

I've got another meeting I need to go to.

I'd just like to say once again thank you very much for this talk and we've certainly enjoyed talking to you, I hope you've had an interesting couple of hours.

Interesting to see what the outputs of this look like. Thank you for coming as well, it's been good to catch up and interesting to reflect actually. You forget what a long journey careers are.

That's right.

We done?

Yeah.

[END OF TRANSCRIPT]