



CSIRO Oral History Collection

Edited transcript of interview with Ron Sandland

Date of interview: 24th August 2017

Location: UTS Sydney

Interviewers: Professors Tom Spurling and Terry Healy



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Dr Ronald Lindsay Sandland AM, BSc (Hons) (Sydney), AIA (Institute of Actuaries, London), PhD (UNSW), Hon DSc (Melb) FTSE

Summary of interview

Ron Sandland was born in Marrickville on 13 April 1947. In the early part of the interview, he talks about his family background and his secondary education at the Kingsgrove High School. He describes the influence of his mathematics teacher, John Robson, including Ron's invention of Simpson's rule for numerical integration some years after Simpson! He recounts his time as an Actuarial trainee at AMP, his years at the University of Sydney studying Mathematics, his recruitment to the CSIRO Division of Mathematics and Statistics and his work the Division's laboratories in Canberra and Brisbane. Ron returned to the Division's Sydney laboratories in 1975 and commenced his PhD at the University of New South Wales.

Ron talks in detail about his experiences, from 1985, as the Division's Senior Regional Officer (for the Sydney region). This leads to a discussion about the merits of the 1988 McKinsey restructure of CSIRO and the role of a discipline in an Organisation like CSIRO. Ron was appointed the Chief of the Division of Mathematics and Statistics in 1988. He gives an extensive account of his time in that role, including some insights into the relationship between mathematics and information technology. He discusses the role of the new Institutes and their offices and his work in developing links with secondary industry. In the later parts of the interview, Ron talks about his role as Deputy Chief Executive to both Malcolm McIntosh and Geoff Garrett, his work on the CSIRO Flagships and their oversight and his post CSIRO activities.

NOTE TO READER

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Introduction and early life

This is an interview of Dr Ron Sandland being conducted at Floor 26 at UTS in Sydney and it's the 24th of August 2017. Present in the room are Ron, me Tom Spurling and Terry Healy. We're going to talk to Ron for a while about his life and career in CSIRO. So thank you very much Ron for agreeing to do this, and perhaps we'll go right back to the beginning. You were born in Sydney were you?

That's right.

And went to school in Sydney, so can you describe a bit about your family, your career in high school and why you went to mathematics?

I was born in Marrickville in Sydney. My family was living in Epping at that time, we moved later to Bexley North where I started going to school. I loved school. I did very well at school, loved my primary school. My parents were extremely supportive of me educationally. My father worked in the railways as a carriage builder, my mother came from a middleclass family in Epping, and both of them were extremely encouraging, as was my grandmother, of my doing well at school.

Just one small incident that I should tell you; at the end of my primary school days I was lining up to get the dux award next to the fellow who was winning the best and fairest footballer award and he said to me, "I bet you'd rather be winning the best and fairest footballer award" and of course I would've. It was just the way things worked in those days. Then I went to Kingsgrove North High School -

Where is Kingsgrove North?

It's north of Kingsgrove I suppose. Kingsgrove is in the southern suburbs of Sydney as is Bexley North in the St George area generally speaking. Kingsgrove North sort of butts onto Belmore. At the time that I went there they were making a big thing about sending kids to coeducational high schools and it was actually two schools combined and we had a so-called south school because we were supposed to go off to Kingsgrove High School but we never did, and a north school. Because they were moving away from the selective high school system at that stage, I went to this coeducational high school along with a number of other kids who'd been duxes of their primary schools, duxes of opportunity schools.

I started off doing extremely well at high school. There were a couple of girls who gave me a pretty hard run for my money, in fact I was running after them rather than them running after me. We had 700 students in our year -

In one year, 700?

In one year, because it was two schools combined -

So it's a huge school.

Good number of classes.

A huge number of classes, and so the standard in the A class and in the B class – there were two A classes, I was top of the south school A class and these two girls were top of the north school A class.

And was it a genuine co-ed school? Were there girls in your class?

The girls were in our class. At the end of first year they combined the two schools. So the A class if you can imagine there were classes down to S and all these kinds of things. The standard in the A class was very, very high and the standard in the B class was very high. They also gave us some very good teachers. My going into mathematics - we had an absolutely appalling science teacher, a science teacher who didn't really understand physics and could teach chemistry okay according to the book, but he didn't encourage us to really study physics outside of the limited teaching that he was giving. But I got a maths teacher who was like a dream. He started teaching me calculus in fourth year of high school.

What was his name?

John Robson of the blessed memory. He was a bit sexist, he obviously felt that boys were better at maths than girls were in that old-fashioned kind of way, but he gave me special problems and he made me feel great about my ability to do hard mathematical problems. My first example of this was a problem in geometry which is one of the starred problems. He used to say to me things that were very good for the ego like, "Don't bother doing the ordinary questions son, just do the starred ones at the end" and he said, "Don't spend too much time on this question" but I did and I basically got it out and he looked at my solution and said, "That's fantastic son, I've been trying to get that out for 10 years." So that was a huge -

This was your Euclidian geometry?

Not Euclidian geometry, analytic geometry.

Did you do Euclidian geometry?

Yes we did, mainly in the first three years of high school.

So what year of high school was this when you were doing well with Robson?

Fourth and fifth year. There were three classes doing mathematics honours. They were designed so that the C class teacher was a very, very good teacher well capable of teaching at honours level. The B class teacher I met at a winery many years later and he said his B class was the best maths class that he ever taught in high school, and so our A class was pretty amazing. So we tossed the ball around between topping that class.

He also got me doing research problems, he came up with a few hints and a few ideas and said, "Go away and see what you can make of this" and I came back after spending most of the night on it and I had a formula for approximate integration and I gave it to him and he

looked at it and he said, "It's very good son, it's called Simpson's Rule." So I'd actually invented Simpson's Rule, many years after Simpson of course, but the feeling that it gave me was tremendous.

My other favourite subject at high school was English. I absolutely loved English and when it came to sign up for honours, I decided I wanted to do honours in maths one which was algebra and calculus, and English. My maths teacher took me aside, actually he was a heavy smoker and his breath wasn't all that good, and he was speaking to me about that far from my face with his hands on my chest and he told me that in all his teaching career he'd only got one student who had got first class honours in maths one and maths two and I was going to be the second and I had to drop this silly idea of doing English honours.

So I did and I got first class honours in maths one and maths two. I got an A in chemistry and I was one of only two students in New South Wales who had first class honours in maths one and maths two and a B pass in physics because of the person who was actually –

Because of the poor physics teacher.

The poor physics teacher. I did quite well at physics at university but that was another story.

As I recall even though you weren't the fairest and best in the primary school football you were quite a good athlete weren't you?

I was a good runner, I was a fast runner and I played soccer for the school. My primary school I only played rugby league. I played basketball for the school until such time as about the same time as I started doing well in calculus other people started doing much better than I was doing in terms of height and so I was dropped from the school first basketball team. But yes, I was a sprinter, not the best in the school but one of the best in the school.

You have obviously very happy memories of your secondary education.

Apart from my science teacher.

Do you have siblings who also did well?

I've got a brother who's six years younger than me and he did roughly approximately as well as I did at school. He's a senior lawyer; he was head of criminal law in the State Legal Aid Commission. We've been very close despite the age gap and he's currently working on the Royal Commission into child sexual abuse.

In New South Wales, not the Northern Territory one?

The Federal Royal Commission. I think that's probably wrapping itself up but yes, he was not as strong as I was in maths but he was very similar in terms of English and he was 1-tenth in the state in economics I think. So he was a very good student.

So you got a Commonwealth Scholarship presumably to the University of Sydney?

Actuarial trainee at AMP

Yes I got a Commonwealth Scholarship but I had a bit of a diversion into thinking I might become an actuary by doing the actuarial exams. So I went to work at the AMP and after a year I realised that the maths that was being taught in the actuarial course wasn't as hard as some of the maths that was being done at university so I wanted to go to university.

So the actuarial course wasn't at University of Sydney?

Not in those days, it was done by correspondence through either the Institute of Actuaries in London or the Faculty of Actuaries in Scotland. I started off doing the Institute of Actuaries course and I decided I didn't really want to become an actuary but I was very well looked after at the AMP and each year in the holidays I went back as a vacation student. I won the employee of the month a number of times because they gave me some of the easier less challenging problems to work on which sort of embarrassed me and probably annoyed other people.

But at the end of my third year at university they stunned me by saying that they would be very happy for me to stay on full graduate salary, go and do my honours here at Sydney University and then come back to them afterwards on the basis of a gentleman's agreement and not a bond. But I was too much of a gentleman and realised I was more interested in doing research. So at the end of third year I said goodbye to the AMP.

Were they paying you during your first degree?

No, they just employed me during the holidays and they paid me.

So were you on a Commonwealth Scholarship?

When I went to university, yes I was on a Commonwealth Scholarship.

Mathematics at the University of Sydney

So you started that in 1965 in mathematics at the University of Sydney, then you did other physics and mathematics?

I did a little bit of physics but unfortunately I got sick in second year university and I spent a lot of time at home. I had pneumonia and bronchitis and all kinds of things and I missed basically half a year. While I was confident I could catch up in the theory part of physics they wanted me to do all the practical by myself. I was much stronger on the theoretical than the practical side anyway, and so I very reluctantly dropped physics and took up government as a subject which I didn't really enjoy that much but it was just a way of filling out my course.

So I had done pure and applied maths and statistics in my second year, and government was the only subject that I got a pass in at university. It was not something that I was all that keen on, especially seeing that they threatened a very big question on the Liberal Party and

my politics were a bit to the left of that. Despite my mother going along to university and taking notes for me and warning me there was going to be a big essay question on the Liberal party, I didn't read anything about it and hence I just had to make stuff up from the Sydney Morning Herald.

And this was despite the fact that the latter part of your career probably involved more to do with government than it did to do with maths?

Well that's true. I did never lose my interest in mathematics and I've retained the ability to look at the mathematics that's being done and have a strategic oversight of where mathematics is going. I'll come back to that a little bit later, but government as it was taught at university, in first year at least, was how government actually worked, how the political parties actually worked. It was a very heavy reading course and my interest in politics - I was very interested in politics actually and I was very left-wing at that stage of my career. Like a lot of people I've moved gradually closer to the right without actually crossing the boundary. I didn't think it was a great course, put it that way.

And you did honours in mathematical statistics, why did you do statistics and not applied maths or pure maths?

That's a good question. From an early age I was quite interested in data and analysing data. For my school fourth year maths prize I took a book which was a well-known statistics textbook and read all this kind of stuff. I used to do analyses of school exam results and various other things that I found intriguing, and as a result I'd had this interest in statistics – when we started doing mathematical statistics, the honours course in second year, a lot of it was about combinatorics, I really loved combinatorics. I was drawn to that; I was drawn to stochastic processes. We had a very attractive lecturer who made stochastic processes seem like fun. He'd been at Cambridge, probably one of the strongest schools in the world in that area.

So we were learning a lot of that kind of stuff. Interestingly I actually wanted to do in my third year course applied; I had actually done better in applied than pure, I wanted to do applied maths and statistics, and both of them said, "If you want to do honours, and I'm sure you're going to want to do honours, doing applied maths and statistics is not the way to go." The applied mathematicians only wanted people who'd done pure maths, the statisticians only wanted people who'd done pure maths. So I did pure maths and statistics. Pure maths by the time it had got to third year was getting really abstract and losing contact with reality, and I was particularly interested in stochastic processes, Markov chains and so forth, and it just seemed the way to go.

So you did an honours degree at the University of Sydney and what was that about stochastic processes?

It was about everything that they threw at us. A lot of it was about experimental design which I didn't enjoy as much -

There was a thesis involved?

No, no, there was a project involved in it.

So it was a coursework honours degree with a project?

Coursework honours degree with a computing project. I think the thesis is now much more common, but in those days we did have a lot of practical work, practical statistics labs but no actual project. We had a research reading project which I remember quite well. We had to study foreign languages, I studied Russian and French which I already knew - I didn't know Russian. Still mystified at the sentence that had the word function with three different cases – function, function, function, three words in a row with function in different case, I never cracked that.

In Russian?

In Russian yeah. With my years at Sydney University, because I'd missed so much in second year I was actually off my game in third year and so missed first class honours, got an upper second, still got a commonwealth postgraduate scholarship offered.

To do a PhD?

To do a PhD.

But you didn't take that up?

CSIRO Division of Mathematics and Statistics, Canberra

I didn't take it up. I had three offers at the end of third year; one was to join CSIRO where my professor had told the chief of the division that although I had an upper second it was equivalent to first class honours anywhere else which was pretty arrogant of him.

Who was the chief of the division, maths and stats?

E A Cornish, very famous, one of the founders of the division after whom the building in Adelaide is known. I was also asked to take on a tutorship at Sydney University. I was also offered a job in the treasury, I did the public service exam, and they were interested in my actuarial background. I'd said that I wanted to do defence because I thought there were some interesting problems in operations research. They started asking me quite a few penetrating questions about my political views and obviously I fell down on the political side. So they offered me a job in treasury, the AMP wanted me back and then I saw a job ad for CSIRO, and as I've said many times it was like winning the lottery. I went off to Adelaide for my interview; my interview was extraordinary.

So this was an experimental officer position?

Experimental officer position which was conducted by Cornish himself and -

And other people?

No just by the chief, and the divisional administrative officer was hovering over these interviews. After being in place for about an hour, he said, "We'll break now and come back after lunch." So the divisional administrative officer asked me how the interview was going and I said, "Pretty badly I think" and he said, "Why do you say that?" and I said, "Well all the chief's done is to talk to me about the commonwealth superannuation scheme" and he said, "That's not an interview going badly, that means he's decided before the interview that he wanted you and he's just trying to convince you to take the job."

So that was quite amusing because I really thought it was going terribly. So I took the job, and he even took up Oliver Lancaster's phone call and paid me first class honours salary even though I'd got an upper second. So it was a happy start to -

And you went to Canberra?

I went to Canberra. I worked with George McIntyre who was a legendary statistician in Canberra. I spent a year in Canberra working for George McIntyre. I found him an extraordinary talent, I found him quite intimidating really because he had such an incredible understanding of how variation was actually broken up. The technical term is components of variation and I hadn't really been taught that very well at university. So I'd learnt all that stuff from George McIntyre. Also in my first year at CSIRO George McIntyre introduced me to a method that he'd developed called Rank Sets Sampling.

The idea of Rank Set Sampling is that if you can actually rank the amount of biomass for example or the dominance of a particular species out of three quadrats and you can repeat that, then you get a very good estimate of the total biomass by averaging the one with the highest biomass, the one with the middle and one with the lowest biomass. I thought he had intuited this method which was getting a certain amount of attention in the agricultural literature. So I went off and privately worked up all what was called the theory of order statistics that backed up this methodology and I came up with these formulae, and I proudly showed it to him and asked him if he thought we should publish this and he said, "No, all this theory is known" and I thought yes but it isn't known in the context of this.

But then he showed me his notebooks and it was very clear that he understood all of the theory of order statistics and had worked this out perfectly well himself. So I binned this stuff and a year or so later the exact paper that I'd written was published by someone else and it became a citation classic. So it's just the way the world works. I did rib him about that at a conference later, and then he offered me joint authorship of another paper that he'd written but I refused it because I'd had nothing to do with it.

So you were in Canberra for a year and then went to Brisbane and you got married sometime in that -

Then Brisbane

I got married in the year in Canberra. People seemed to get married at very young ages in those days. I was 22. We went to Brisbane and that was an interesting period in my career in CSIRO.

And why was that Ron?

My wife hated Brisbane -

Yes, we've read some of the letters that you wrote; she didn't like it at all did she?

She hated it.

That was before air-conditioning wasn't it?

We certainly didn't live anywhere that was air-conditioned. She was away from all her support group, she fell pregnant pretty soon after we arrived in Brisbane and it was really, really difficult for her.

But you were there for five years?

Yeah. I didn't say that I hated Brisbane; I said that it was a very difficult time because she hated Brisbane and I was, as a lot of ambitious young men in particular are, very committed to progressing in my career and working with the scientists at the Cunningham Lab. She was cut off from a lot of the friends that she had in Sydney; the social life in the Cunningham Laboratory wasn't really to her liking. We eventually did make some very good friends in Brisbane but it took longer than I would've liked. By the time I wanted to leave Brisbane I was really enjoying my working life at the Cunningham Laboratory, but if it's not too soon to go onto this topic my then chief Joe Gani had talked to me about doing -

So did he succeed Cornish?

Yes. He did a review of the division after Cornish died in office.

Joe Gani taught me mathematics at the University of Western Australia; marvellous character.

Yeah, a marvellous character. He came in to do a review and he did a review. I believe the executive told him that they'd accept his recommendations on one condition, which is that he took on the position of chief. He took on the position of chief, and I was keen to do a PhD, but the people in statistics at the University of Queensland at that time, very different now, were not very theoretically inclined, the senior professor there was reading measure theory about a week or two ahead of his class. So it wasn't very good from a theoretical point of view. I was quite friendly with some of the young people there at the University of Queensland but I didn't want to work in the areas that they were working in. So Joe recommended that -

You did tutor there?

I did tutor there for some years, I really enjoyed doing that. That's where I met my friends from the University of Queensland, still friendly with some of them. In fact I had a great time tutoring at the University of Queensland. Joe Gani decided that obviously I was capable of doing a PhD, obviously the statistics people weren't going to be very good for me

to work with, so he introduced me to an applied mathematician, Fenton Pillow, and suggested that we work together. The problem he wanted me to work on was flow past a wedge. I really wasn't very interested in flow past a wedge, it just seemed to be a really boring problem, but I learnt a bit more about solving partial differential equations.

I decided that there was someone that I wanted to work with, Charles McGilchrist at the University of New South Wales and so eventually, and slightly reluctantly, Joe said, "You can go to Cronulla and do a PhD part time at the University of New South Wales." They were very generous with the amount of time that I could take to do the PhD, but I did carry a full consulting load over that period. Once again it was very difficult for my wife because I was doing a PhD all the time that I was not actually working. I couldn't quite come at spending a lot of my work time on my PhD. I was collocated in three different places.

We had a famous old building called Alpha House in Newtown and there was a very good statistics group there from CSIRO, I worked there one day a week, I worked at Cronulla two days a week and I was doing my PhD two days a week at New South Wales. That was a very productive period both in terms of the joint research I was doing with people at Cronulla mainly, but also with colleagues in the maths and stats division, and I was particularly keen on working with Charles McGilchrist who was a wonderful statistician and a very fine person. Still is to the best of my knowledge. The last time I saw him he looked very, very fit, just turned 80 and he'd just come off the tennis court after a pretty hard game of tennis.

Back to Sydney - completes PhD at UNSW

So you located in Sydney in 1975, did your PhD which you got in 1980. In your CV it says you got the actuarial qualification in 1974, did you have to do more work for that?

Basically my frustration with not finding anyone that I could do a PhD with in Queensland led me to go back and start doing the actuarial qualifications, which was pretty unusual to be doing actuarial qualifications without any colleagues and helpers around. But I did that course and I was determined not to drop out of the course, so I did the exams for the associateship level. The fellowship level you really needed to work as an actuary in order to get the required level of experience. Because of the fact that I didn't have a PhD at that stage I was uncertain about which way my career would go, and I considered that was an alternative. The chief government actuary in Queensland was quite an attractive role model because he did a bit of research as well as working for the Queensland government, so it wasn't entirely out of the question. But my longer term interest was really in doing research.

The documents around that time indicate that your division wanted you to go from being an experimental officer, EO3, to senior research scientist and put up a case and there was some argy bargy. Were you aware of all that?

Only later but it was a very funny story, probably one of the funniest promotion stories I've ever heard in CSIRO. I was doing my PhD and I was put up for senior research scientist despite the fact that I hadn't finished my PhD but I had quite a few research publications. So I was put up for PhD and a long discussion ensued. As far as I'm aware what happened

was my case was unsuccessful and they wanted to wait until my PhD had been conferred after which it would go through automatically. But somehow there was an error when the promotion round results were announced and I was announced as being promoted whereupon my manager wrote back and said as I've heard it from him, "Look, this is actually an error because the result is not along those lines, however it's a perfect opportunity to reconsider the case." So they reconsidered the case and I was promoted. So I was kind of promoted to senior research scientist in error.

The staff estimates classification has that error recorded for posterity, you were an SRS and then you were an ES and then you're an SRS.

That was all 1980.

Yes. The institutes had been formed in 1978/'79 and there was some discussion that the other chiefs in the institute were against your promotion and your chief went around to the chief executive and said, "This is silly -

Yeah, well I'm not aware of the full story but –

And this was stochastic growth processes?

Yeah that was my PhD.

Was that connected to the application in fisheries?

No not really. I did some growth related stuff in fisheries but that wasn't really where it came from, it was mainly theoretical and I got data from wherever I could. The difference was that fisheries growth data is almost always based on captured fish and ageing the fish by means of the otoliths, like tree rings basically. But what I was interested in doing is what happens when you follow a single individual over time because those results are going to be correlated whereas a lot of cohort studies just take people at a particular age and people at the next age and people at the age after that and assume that the results are independent. So you have a very different analysis methodology that you use in that particular situation.

A reference from your McGilchrist said you were going to write a book about this, did that book ever eventuate?

No, it didn't eventuate for good reasons. I wanted to write the book, and Charles would've been a co-author, but at that time Joe Gani left and Terry Speed joined and Terry wanted me to go and work in different areas and that was a pretty trying period of time. So I kind of left a lot of my growth research on the table because Terry really wanted me to get into different areas.

I think Terry Speed had also been a professor at the University of Western Australia.

He was a very young professor at the University of Western Australia, yeah.

First management position-Senior Regional Officer

I'd gone before he was teaching mathematics there. So you became an SRS and then the record says that you became the senior regional officer in 1985 and that was presumably the first management position that you had in the organisation was it?

Yeah, absolutely.

You'd been probably promoted to PRS by that stage?

Yeah.

And what did a senior regional officer involve, and we're interested in knowing were you trained in any way for that, were you given any instructions? What was the job description that you understood that you had to do?

Terry Speed told it to me, he said that he thought I was the best person for the job but I wouldn't get any credit for doing the job, it was just something that he wanted me to spend as little time on as I possibly could. But it did involve making sure things like seminar programs were working okay, that visits were planned appropriately, that all the stores and quarters functions were being appropriately looked after like computing and so forth. So it was really a people management type of role but not a science management type of role.

I see. So you weren't in charge of any of the scientific programs of the region?

That's not entirely true; I basically was in charge of a project in industrial statistics more or less in parallel with that. But in answer to your other question I received absolutely no training in it and Terry Speed's success criteria was doing the job in the minimum amount of time and then spending the rest of your time doing research or consulting or whatever.

And were you drumming up consulting business in that role?

At that time the drumming up wasn't really a major part of it. People were located physically elsewhere, so I had this location in Cronulla for some time. One of the things that happened and I haven't got the date for this is that fisheries research was moved out of Cronulla and down to Hobart and so there was no home for me there anyway, I'm not quite sure exactly what that date was. As a result –

It was connected to the election of the Fraser government I think, it was a promise of the Fraser government I think. I may be wrong there.

Okay, well Fraser government was elected for the first time in 1975 so it didn't happen at that kind of period of time. I was there for a fair while and then they handed fisheries research over to the state government and then the state government did something stupid with it as well. I had multiple responsibilities at that time and the work on industrial statistics was becoming more important, there was a big push on total quality management and I was basically leading the division's research in that area. So I did have people reporting to me scientifically but they were particular project allocated staff, they weren't

all the staff that existed in the region. So the drumming up business was usually by people being located at minerals, spending some of their time working at minerals, people spending some of their time working at – I've lost the name of the division but it was essentially the genetics division that was located at North Ryde.

Biomolecular engineering?

Well there's a division of animal genetics and there was also the molecular biology, Geoff Grigg's unit, but I don't remember much mathematics. I think it would've been animal genetics rather than Geoff Grigg –

Yeah I think it probably was animal genetics. We had a person there working in the very early stages of bioinformatics, and so he made a very, very considerable investment in learning the background biology. Similarly people who worked in the geology division and this is an area where Terry Speed was keen for me to be involved. But Terry had a style which was more telling you what to do as opposed to discussing what might be best suited to your particular talents. But he did say to me that he felt that what I was doing in industrial statistics was really important, but he wanted me to take on this senior regional officer role as well.

I was keen to get that question asked because I wanted to know whether there was any marketing involved or did business just walk in the door because you were collocated with the customers.

Business largely walked in the door. There was also animal production out at Prospect at that time; we had people located out there. Generally speaking our people went out there for one or two days a week and generally speaking it wasn't a matter of sitting on your hands or begging for work to come in, work was coming through the door. That model –

But it was work that came to you from other divisions of the organisation?

Yeah.

Were there any external clients of your division?

Very few at that time. That was a big transition.

So this was in 1985 that you became the senior regional officer and how long was Terry Speed the chief? So he took over from Joe Gani and stayed there for a while?

He took over from Joe Gani and stayed there for four years I believe

Someone had mentioned that Terry had done a PPE of a particular scientist who I won't mention by name and they were worried because this person had come out of this interview ashen and someone had said, "Don't worry, everyone comes out of interviews with Terry ashen."

So Terry left the division, who became the chief after that?

Peter Diggle.

So Peter Diggle was the chief for a short time?

Very short time. That was at the time when we had the McKinsey Review and the McKinsey Review basically recommended that the division be wound up and the staff be transferred elsewhere.

McKinsey Review of CSIRO structure

Are you happy to comment on that?

Yeah.

In particular the model of having a specialist activity like maths and stats that is available to all divisions and the maths and stats people actually go round and have their own professional centre but their actual day to day work is with the users seemed to me as a very good model, and yet McKinsey said no.

So the McKinsey recommendation came out, Peter Diggle was the chief and what happened?

We'll get to that in one moment, I just want to respond to Terry. It was a very good model and there was some really good research that was being done. In terms of industrial research laboratories CSIRO maths and stats was ranked I think number two in the world behind Bell Labs as an industrial mathematical and statistical laboratory. I might say earlier Joe Gani had created an influx of new people in applied mathematics and some really outstanding statistical researchers who were in non-traditional areas. So it was a very, very strong division over that period of time. Peter felt that he didn't want to be there during this discussion and the institutes must've been in the process of formation –

So the McKinsey work started in about 1986 with the research priorities study, the rare earth study, and then the board hired McKinsey to do the review of the structure of the organisation and that took place in 1986/87 –

Yeah correct.

And the recommendations came out in 1987, and the new institutes started on the 1st of January 1988 and Bob Frater became the director of that institute.

Yeah, but I don't know whether Bob was involved at that time but certainly Ian Elsum was.

Ian Elsum was the staffer of Neville Fletcher who was the director of the old institute of physical sciences, and I think the division of maths and stats was in that institute.

Yeah, and Ian argued exactly as you had argued Terry that this was a very good model and that McKinseys coming in and just rolling out some kind of –

Line management.

Line management type of model was highly inappropriate. So Ian Elsum was a real hero of the division, and unsung hero, but I knew how much effort that he'd put into it. So Peter Diggie essentially asked myself and Noel Barton, an applied mathematician, to become involved in what became almost like trench warfare. We had many arguments about this but I do remember a story, so I didn't observe it firsthand, that Neville Fletcher had bought the Ian Elsum argument but he didn't feel that he had the power to resist the McKinsey Review. According to the story as I heard it he actually issued the edict that maths and stats would be closed down and he had tears in his eyes when he was doing it. This is the story that I've heard. I can't absolutely guarantee the truth of that but it sounded not uncharacteristic and it was told to me by reliable sources. Now quite how that was obviated - I worked extremely hard in that period of time, I wasn't a very present husband, I was spending a lot of time just working on this, as was Noel Barton. Peter found it really difficult to engage with the task. He wasn't as invested in the division and in CSIRO as we were and -

And he didn't find it fun?

He didn't find it fun. He was a great statistician but essentially he decided he was going to leave.

So Ron, accordingly to what we can work out from your PH file you were still a principal research scientist at that point in your career, you did all this work and Bob Frater became the institute director. Was it Bob who appointed you the chief of the division?

Chief of Division of Mathematics and Statistics

Yes.

And that happened in 1988. Did you start there at the beginning of 1988 as the chief?

No. It took a while for the Peter Diggie imbroglio to sort itself out and then there were interviews and there were two natural internal candidates, myself and Noel Barton. I think they got some external applicants as well. I put forward a pretty comprehensive strategy for the division which I would work to and -

Do you still have a copy of that?

My filing system is terrible. It doesn't exist on my PH file?

It doesn't exist on your PH file.

So it was I think about an 11 page document which I submitted.

You were appointed the chief on the 11th of November 1988. Bob wrote you a formal letter November 1988, so it would've been in that period -

It was in the interview period that I developed this strategy which was all around new forms of data expanding our applied mathematical range including operations research. I can say

that Noel Barton was extremely disappointed at not being appointed and felt that this was part of the old statistical push determining the future of the division. So I had some pretty rough times with some of the applied mathematicians early on, but I think they pretty soon saw that I regarded the applied mathematical work as being critically important, particularly as one of the things that we had set out to do was to work much more closely and directly with industry and some of the modelling - the computational fluid dynamics was really coming to the fore and we had a crackerjack team working in that space.

With the wisdom of hindsight that strategy, the 11 page document, did it actually turn out to be the strategy followed?

Yeah.

For many years?

Yeah, and furthermore it prophesied what's really happened at least in statistics since then. One of the things that I didn't quite get to – I certainly was very clear on the fact that statisticians needed to get used to working with data that came in the form that was generated by sensors. As far as I know this was the first time this had really been actively talked about in the division at least. Also foreshadowing greater expansion into working with images was important. Operations research, optimisation of industrial processes was all in there in that strategy.

One of the ways we can find a document like this would be who it's addressed to. Do you remember who it might've been –

It was addressed to Bob?

It was addressed to Bob. If Bob's filing post retirement is anything like mine it'll be extremely difficult. I can't promise to look for it until – I'm going overseas in a couple of weeks, I can't look before then.

We'll look first but it should have your name and Bob Frater's name on it as a piece of paper?

I would've thought so yeah, and it was certainly read I think by all of the panel members. I remember Chris Heyde was on the panel.

We'll try and find that, so I think we'll have a break now if that's alright with everyone.

[music]

Okay, so we're back after a short break and Ron has just been appointed the new chief of the Division of Mathematics and Statistics and it's in the new institute structure with Bob Frater as the institute director. In his proposal to promote Ron, Bob or somebody has written that the division was required to transform itself for an almost entirely non-commercial internally focussed consulting and researched division to one with a totally new set of externally focused objectives. This has been achieved in an impressive fashion and it said earlier that

the division which is basically concerned with internal consulting and research with little external industry activity and disastrously low morale. So how did you transform it Ron?

Well, basically the disastrously low morale resulted from the McKinsey Review and a number of people leaving. We had some 11, 12, 13 people who actually left and to become full professors in universities, so it's a pretty impressive -

Alumni.

Alumni, including one who was an experimental officer who became a full professor which was pretty much unheard of. But anyway, the first thing that I needed to do was really understand where some of the things that we could actually build on might be in terms of companies. So I introduced a new approach which was to go and spend time talking to companies Comalco was one I spent a lot of time talking with, Solar Optical in Adelaide was one I spent a lot of time talking with. I found that I needed to win the trust of the applied mathematicians because I saw that the work that they were potentially doing with industry was going to be extremely important.

We also had some work going on in image analysis which had quite a bit of commercial potential with spinoff companies, sorry with start-up companies rather than spinoff companies. So we also inherited some of the work of Siromath which had been disbanded. There was also at that time this quality revolution was taking place so there were a lot of companies who were very interested in talking to us about the use of mathematics on statistical methods in that area. There were also crossover applications, for example using imaging in quality control which I think Nick Fisher and I were the first people to actually talk about but there was no company in Australia that was actually game to take that technology on, now it's quite routine because of much better data capture methodology.

So basically it was going and talking to companies, talking to them about their needs rather than telling them what it was that we could do in the first instance and trying to sort of setup some dating agency type of things. We had a particularly good relationship with Comalco, we spent two days with our research teams talking to Comalco and it was finding people who have the right kind of imagination. So there was a guy called Mark Taylor in Comalco who had a particular interest in what it was that we were doing, mainly on the applied mathematical side but we got him interested in statistics as well because he could see how statistical modelling might work in that domain as well.

So what really happened is that the transformation was really made easier by the fact it was starting from a really low base. And we were able to grow areas like operations research, imaging, we had the applied mathematicians doing some really outstanding work with industry Frank De Hoog won the McLennan Prize. Frank was probably the best applied mathematical modeller in Australia, Terry Speed and I agree on that, he won the Hannan Medal just recently of the Australian Academy of Science. So really it was in some sense building on the skills that we had developed in working with other CSIRO divisions, but we didn't have that problem of needing to continue to service some of those clients because a number of them had been spun-off into so called biometrics units which were -

Within the divisions themselves.

They were located in the Divisions.

So they left your division and went into -

So yes, there are a number of people who left the division and went to the Biometrics Units.

Did you maintain any professional responsibility for their ongoing training and development?

No but we talked to them a fair bit. We continued to meet them at conferences and so forth and some of them had very strong relationships with individuals back in the division. So the thing that I really did was first of all win the trust of the applied mathematicians and they saw that I wasn't going to give them a bum deal. If I was disappointed in any one of the groups it would have been the statisticians who really weren't as prepared to go out and work with industry as the applied mathematicians were. The operations researchers were heavily engaged with industry.

But the very first thing that I did was I intuited that the reason we were working with – that some of the work that we were doing in industry wasn't being taken up as much as it should have been. So what I did was set up a market research study with a professional market research company and got them to go out and talk to industry about the work that we'd done with them, like BHP Billiton for example, Comalco, Rio, all of these kind of companies we worked with and what came back as an answer which is what I knew would be an answer but I knew that if I said it, would be me just insulting people, was that your guys are really terrific but what happens is they come in and they write this incredibly impressive looking report that's full of partial differential equations, we don't really understand it and we can't see what the implication is for our business.

So I just hammered the point, this is something we've got to overcome, here's how we overcome it. I also worked quite closely with a number of other chiefs because they had contacts in industry whose needs they couldn't meet, they didn't have the internal capability. Although we did come unstuck a couple of times when people tried to voice on industry, people who'd done say second year statistics at university who might be geologists or something like that. That didn't go over at all well. So I suppose the word of mouth got out that we were really interested in doing things with the industry and so it's quite easy to grow off a low base and so we grew quite dramatically and I think -

Would we find that strategy in your strategy document? The strategy to do...

When you applied for the job of chief?

I know what you're talking about; I'm just not absolutely sure whether that would have come out in that document. Certainly I hadn't realised the kind of backlash that existed at first about another statistician being appointed to the role. So that winning trust, so I became very, very friendly with a number of the applied mathematicians like Frank De Hoog

and Bob Anderson, and we always greet each other like very old friends when we get together which is not as often as I'd like.

But yeah, it was mainly really being prepared to actually listen and not tell. I know there was a – when I did listen to other chiefs, a lot of it was going to industry and saying we've got this product that we want you to sell. It was more of a commercialisation pitch than really getting down and understanding what it was that industry needed. And of course we were all under the magic sort of 30 percent external revenue target and frankly as came out in the Batterham Review, the unintended consequences were that that was really in many instances the major KPI for chiefs, well it was sort of like a hygiene factor but if you didn't make the 30 percent and I'm very well aware that not just in other divisions but in my division I was aware that people were putting in a lot more than 30 percent of effort to service -

To get to 30 percent.

To get to 30 percent. I'll just tell one story about that, I was working late one night in the office and I went down, needed to go to the loo and I was standing at the urinal next to one of our good young scientists and I said to him "You're working late"- sorry about that, I'll just turn this off, I'll pick that up later. And I asked him how his work was going and he was saying that he was working – that's what I asked him, why he was there so late and he said "Basically it's all this consulting work that I'm doing with the industry, it's just taking all my time, it's stopping me sort of doing my research" and so I listened to him and I went back and had a look and I discovered that this fellow was probably bringing in a very modest amount of revenue from consulting but he was grotesquely over servicing his clients.

That was a big tendency in the division that people, you know, for example people didn't mind if they did more work than was necessary, but if they've quoted for say five days' work and it was only three days' work, then they'd make sure that they did the other two days and then some to make up for that. But I think the main thing was going out and talking to industry. I remember with a group of people we had to introduce ourselves at some CSIRO function and I described myself as a travelling salesman which is kind of how it felt. I didn't mind that at all, I really enjoyed talking to people with industry, but it was essentially that sort of direct engagement encouraging others to directly engage. Some people were really good at it; some weren't so good at it.

In retrospect the idea of subsidising work for industry. What's your attitude towards that?

Look, subsidising work for industry is fine providing you're developing some intellectual capital that can be used outside of that. If you're not doing that, if it's pure consulting work I don't approve of it at all, it should be all covered by cost.

So if we just take the SOLA optical work here, I don't know whether you wrote this or Bob wrote it, but let's assume that it was an accurate description. SOLA optical support for significant tactical research into algorithms for progressive spectacle lens design has grown into support for more strategic research into mathematical aspects of optics and for new corporate directions in quality improvements. So that sounds to me like a project that

started with a sort of somebody was saying that we're going to consult you about this problem we've got and then the people involved in are realising and solar realising that it required actually more than that and it became a genuine strategic project.

Well it certainly did and once again, the person who was involved in that research, I didn't write that by the way, I mean I don't know who did but I didn't. I would have said it in those words. But one of the things that happened with SOLA optical is that I was aware that we were doing good work with them and they were working on progressive spectacle lenses and they were doing the kind of mathematical research that led to software packages where they could actually optimise the optical performance of progressive spectacle lenses. And SOLA actually got a lead in that area.

But I said that I wanted to go and visit them, so Tony took me out there and we got talking about various things. They were obviously very satisfied with the work that was going on there and so it came up that we wanted to renew a contract with them and so I went to them and talked to them about renewing a contract and about the sorts of things that we could do. They thought what we wanted we to charge was a bit steep but I actually offered them an alternative which was to have a genuine assessment made of the value of the work that we did to the company's business and we would take a percentage of that, and within less than a day they came back and said well maybe the charges aren't so unreasonable after all. So they couldn't sign it quickly enough once I started talking about actually capturing some of the value of it.

It also mentions that you spent a – you've explained that you spent a lot of time outside the division talking to people, but it says in this that you drove the cultural change strongly from the top with you visiting, coaching, discussing new expectations with all staff and you achieved this change with a minimum of dissatisfaction and disruption. So did you spend – was a lot of your time spent internally on the road talking to people?

Yeah on the road. Yeah and I usually try and – well yes it was, I mean as I said I had to bring my applied mathematicians on board. The operations researchers I appointed in the first instances, so they were strongly supportive. The statisticians had a culture of working with other divisions so they kind of understood that up to point. But yes, I did, I went around and spent time talking to various people.

I had some interesting things along the way, I remember one young woman suddenly bursting into tears and hugging me saying that she didn't think she was up to the job and she felt that she was in too deep. I sort of gradually extricated myself from that situation and then just talked to her and encouraged her and she'll tell the story today, she's now a research dean at QUT, so she's done extremely well and I think that she was on the point of sort of throwing in the towel at that stage.

So the applied mathematicians was really a matter of getting them on board, I tried a few things like doing Myers-Briggs for the whole executive, well the whole management group of the division. That was interesting. There were two extraverts in our group and I was one of them. The predominance of the kind of introverted scientist type was very strong and that's something you have to work with and realise.

Were Bob and Jane involved in that? Bob Marshall and Jane Lowther?

Yeah, they would certainly have been encouragers of that, strong encouragers of that and at that time I kind of think we used Maxine Fern rather than -

Yeah, our division used her a bit too.

Yeah. So yes I did do a lot of that and I enjoyed doing that. I mean, because I am extraverted I get my energy from talking to people rather than sort of getting my energy from going away and being in a room by myself.

So Ron, when you look at this, I'm tempted to say to you McKinsey was right, you transformed the division from being an internal consulting division to being a division as part of a number of business systems. Is that a fair comment? So the old Division of Mathematics and Statistics that had people imbedded in divisions was transformed by you into a new division that serviced business systems independently of other parts of the organisation.

That's absolutely correct but that doesn't mean that McKinsey was correct. The McKinsey flaw was one that Terry picked up earlier which was that this group of mathematicians gained strength from being able to spend time talking with another, discussing problems together, getting some cross fertilisation going on, where-as the Mackenzie model would have just had people sort of scattered to the four winds when they were internal consultants. So maybe it was absolutely true that the division needed to change and I was only too happy to drive that change.

But I also should say, you're talking to Bob tomorrow, Bob Frater and Ian Elsum and the institute was incredibly supportive of what I was doing, they would always have time to talk. I went overseas with Bob a couple of times on sort of study tours and they were really intellectually satisfying and productive for me. Interestingly, we went into the Battelle Pacific Northwest Lab.

Yes, that was marvellous wasn't it?

Well, I mean we thoroughly enjoyed it but at that time they were struggling with a matrix management system which we predicted would not last the course and it didn't last the course. I actually had people who were telling us that they aspired to be in positions that no longer existed in the organisation, so.

The Institute of Information Science and Technology

So that brings me on to my next question really, is that you became a chief simultaneously with the new institute structure, so you presumably were only peripherally aware of the old institutes, the Neville Fletcher Institute structure and so can you just reflect a bit, I mean you've already done it, about how the Bob Frater office and the office of the institute and your interaction with the other chiefs in that institute helped you along?

We had regular meetings and I found most of the chiefs very -

So who was in that inter – was John O'Callaghan -

John O'Callaghan was in there. He was running a business model that I didn't particularly like because they were running a lot of demonstrator projects and the demonstrator projects. I was more interested in having an impact and demonstrator projects, some of them were great and some of them were way ahead of their time, but because we didn't have the industry in Australia they generally sort of finished and the money was taken and banked and they went on to something else. But I found – Ron Ekers was there and I sort of enjoyed a very warm relationship with him. Dennis Cooper was there and Dennis was, you know -

So what was Dennis Cooper was the chief of the division of?

With -

So Ron Ekers, so you had both Ron Ekers and...

The division of radio physics was Bob Frater's old division, but Dennis Cooper was in charge.

And Ron was in charge of the telescopes?

The telescope yeah.

Yeah, so there was two separate positions?

Two separate positions and so there was a lot of work being done at the institute level on culture and I remember our promotion discussions were particularly interesting where we sort of compared standards across the division. I should say one aspect of culture change that I was personally involved with was related to a promotion case and I had my management team and I think this is something that is sayable on the record. Tony Miller, the guy who was involved in SOLA optical who'd done some transformative work in lenses was up for promotion to PRS and there were about six or seven others. The management team came back and there were people -

Your divisional management team?

My divisional management team came back with their recommendations which was Tony Miller didn't get promoted and almost everyone else did. I said "Well I don't usually have this kind of management edict but I'm just going to say this to you, if you're not prepared to promote Tony Miller after the impact that he's had with SOLA optical, then I'm not prepared to let any of the other PRS cases go up. It's your choice; we can look at the other PRS cases but Tony Miller's first cab off the rank". And so they wanted the others to go up so that was bullying I suppose up to a point, but he absolutely deserved the promotion and he won the McLennan Prize, you know, I mean to say a McLennan Prize winner shouldn't get a promotion compared to -

So he didn't have the publications and stuff?

No, he basically was like a number of people in CSIRO at the time, he was very inclined to meet and overmeet the needs of his client, but less inclined to actually write stuff up. I'll sort of jump ahead just for a moment when I was myself deputy chief executive, I inherited the role of working with Boeing and I used the same kind of tools that I'd use previously in terms of engagement with Boeing. One of the issues that I had to get people to understand is that the only way Boeing would be interested in working with you is if your science was actually world class and if your science wasn't world class, then no matter how customer focused you're going to be, Boeing wasn't interested. They needed people to be absolutely on the cutting edge.

So there was a young woman at a division, not mine, and I've lost the name¹. But she was an absolute hard driver and she worked really hard with Boeing on materials science.

I know the lady you mean.

Chinese.

She's now in China, she now works for Boeing.

Yeah I know, she now works for Boeing. But I basically told her that the publication record of her and her team didn't reflect the quality of the science that they were doing. So she made an impassioned speech to me and she said "If I have to choose between my work for Boeing and publishing my research then I'll always go for Boeing" so then I said "Okay, if you continue with that approach then Boeing will gradually lose interest in you, so let's just have a target of writing up some of this work, so how many papers do you think you'd be able to bring out from the team on this sort of cutting edge composite material technology?" She said "Well, I'd be prepared to say we could certainly put in an effort and we get six papers out".

The end of the year they'd got 16 papers out in first class journals and of course the rest is history. Boeing poached her and she finished up working in China, heading up their research lab in China. But that's jumping ahead.²

So let's stick with the discipline of mathematics and jump ahead, it seemed to me looking back that mathematics and information technology – I think John O'Callaghan's division was called information technology.

Relation between Mathematics and Information Technology

It was called information technology.

They seemed to merge.

Well they did.

Yes, well the divisions merged but the – did the disciplines merge or I mean, why did that happen Ron and so we now have Data61 which is the sort of mathematics information technology group within CSIRO. So was that an evolution that you predicted?

Probably not to the extent that it's actually happened. I think the role of classical applied mathematics in modelling industrial systems had kind of been somewhat dangerously supplanted by the availability of software like MATLAB and so forth that can actually do a lot of this kind of stuff and it's taken some of the think work out of that space. So it is obvious that for example, now when you look at statistics you can't really think of statistics except in terms of very large and complex datasets, so called big data.

Yeah I predicted that, I called it the Woolworths problem. I said basically Woolworths have got all of these cash points at the end of their supermarkets, each of those is generating a huge amount of data on what people are buying, their response to price changes, all of that kind of thing and that can be integrated in terms of areas and all of these enormous data sets and the only way you can make sense out of that, you can impose statistical models but unless you can actually do the computational grunt behind that, you won't actually get to the end of it.

There are some dangers with this new approach, so for example a lot of universities these days including UTS downstairs here has a so called cave where you're able to visualise data on a 360 degree screen. But that's to my way of thinking is not scientifically satisfying, you might generate hypotheses there, but unless you actually design experiments and gather data, you're not actually proving anything by looking at that, you're just generating hypotheses. And I think that there has been a tendency to gloss over some of those things about really testing scientific theories in favour of massively observational studies. So I think there are some real risks in it.

Yes and curiously this, what you're saying applies in environmental data, economic data as well as scientific data. So I think there is a risk. So what is the role of mathematics then in the future of science and technology?

I think it really is about being able to – first of all I don't think it can be seen as being independent of the advances in computation. So from my perspective, Data61 is in some ways a natural evolution but it's heavily overbalanced in terms of the computational side of things from a personal perspective. Because Adrian Turner really wants to develop business platforms like Uber and working towards that kind of thing, which is a very admirable goal. Although there are still some very good mathematicians involved in data 61 and I think that will continue to be the case because I know one of them has just come back to lead a group in data 61, having decided to leave CSIRO.

So my – I think it is a very important trend and I think that in terms of mathematics per se, there is well as I mentioned I'm chair of a centre of excellence in mathematical and statistical frontiers. That's all about challenging new forms of data, interpreting those new forms of data, developing the algorithms that can underpin that, that that's the kind of thing that people are sort of – and then drawing conclusions from the data. So if it's going to be a

real, sort of continue to be a hand maiden of science, then I think that marriage between computation and mathematics is inevitable.

Of course in pure mathematics, of the purest form, there is very little of this work going on in an organisation like CSIRO where it's about engagement with an impact on science priorities and national priorities, I think that is absolutely inevitable. But I wouldn't sort of in any sense deprecate what's going on in the high pure mathematical end, like our Australian Terry Tao working in California.

So CSIRO has never really been in the pure - let me ask you again, was CSIRO ever have a capacity in pure mathematics?

It had some very good mathematicians, but they wouldn't regard themselves as pure mathematicians. I suppose that one interesting example there is Frank De Hoog who did some really quite stellar work in terms of proving how you could develop algorithms to converge really quickly in fitting splines to data and he was clearly a person who was high on the list of people who are going to be put forward for the Academy of Science. When the division changed its focus, Frank is an incredibly loyal person; he changed his focus and started doing much more applied work.

So he did the work that led to the modelling of the Kelsey Jig which has sort of gone all around the world and he won the McLennan Prize for that as well.

You talked about Data61 and computational science, in that context you didn't mention climate science or oceanography, are they on your radar as things which are still importantly relying on mathematics and statistics?

Well absolutely, but they also have a number of people who are quite strongly mathematically trained as physicists who work in that space. But well I mean I'll just give you an example of something that I've been working on, on a panel that includes Terry Speed and a number of other statisticians to look at the way, I don't know if you've heard of homogenisation of -

Only in milk!

Okay, well this is homogenisation of data. So this is the kind of *bête noire* of people like Alan Jones and Malcolm Roberts and basically homogenisation is where you note or you may in fact have metadata that suggests that the nature of particular station has changed. So for example, near Port Macquarie they changed a station from one side of the highway to the other side of the highway. If you ask locals in Port Macquarie they'll tell you that if you're on the western side of the highway it's five degrees colder in winter and five degree hotter in summer.

So in order to have a continuous record of the data, you need to make adjustments to that data once some changes like this have occurred. Buildings might grow up that shadow, these things. And so there is a technique called homogenisation which is, excuse me, highly mathematical but where they're still relying on a higher level of mathematical and statistical

input, is that they don't know how to put uncertainty bounds on the estimates they've got and until they do, they're never going to be able to satisfy people fully that this is a legitimate technique. So we've made very strong recommendations that they go ahead and work this kind of thing through.

I was just reflecting my impression that climate science and also oceanography are going to be big users in the future and Australia, if you're thinking about the future of Australia and then the future of science in Australia, that's huge still and will be for many, many years.

Yeah and of course, you know, the Bureau of Meteorology's needs for high level modelling and re-running models and so forth drove high performance computing in this country for many years.

Interaction with secondary industry

So the Division of Mathematics and Statistics in its pre-Ron Sandland days had very strong interactions with the biological divisions, but probably not much with the physical science divisions.

Well not entirely true but the bulk of the work came from that agricultural space. But there were people who worked for what was originally building research. There were people who worked with the food research, people who worked in yeah, the minerals divisions. That had gone on really for quite some time, but the initial genesis of the division was out of agricultural research.

But the new division that you were the chief of worked with everybody and you had links with companies that had Comalco, BHP, SOLA that were essentially manufacturing using physics and chemistry in manufacturing.

Yes.

Very good. Alright, well I think that that's the sort of – after lunch we'll go back and we'll come and talk about your more senior management roles in the organisation.

Good.

[music]

The Frater review of CSIRO structure

Okay, we're resuming this conversation after lunch, and once again thank you Ron for spending such a long time with us. So I thought we'd now go from your role as a chief of a division to your other roles in the organisation as a senior manager and in policy development. And so I'd like to start with a time when I first really had a lot to do with you and that was when the Board wanted to look at the institute structure, and Bob Frater headed a committee that consisted of you and Adrian Williams, Jim Peacock, and me, and we came up with the plan to have a slightly different system of managing the organisation.

Can you tell us about your impression of that process and the outcomes, and why that needed to be revised with the Flagships? What was wrong with that system?

I think what was wrong with that system was that it was potentially too difficult to recruit resources onto projects of national importance, and of course it was clearly a step in the right direction, but I guess the Flagships really came about when Geoff Garrett was appointed to be chief executive of the organisation, and he took the senior managers away to Cammeray Waters to discuss what it was that CSIRO could uniquely do. And I think interestingly he was very exercised by the results of the Backing Australia's Ability Initiative where CSIRO hadn't been mentioned by name. And he went around talking to a lot of senior people in the bureaucracy, and he got a strong sense that CSIRO was in bad odour.

And I have a kind of sneaking feeling that when Malcolm McIntosh was the chief executive of CSIRO he was so successful in winning arguments with public servants that these people were building up negative views about CSIRO that they weren't able to exercise because Malcolm was just their superior in every sense.

And so Backing Australia's Ability came. It was three billion dollars, nothing for CSIRO apparently, and I guess there was clearly an interaction between the acting chief executive of CSIRO and the chief scientist that didn't win the day in terms of additional resources for CSIRO, and it was quite clear that the exercise was heading in that direction.

Who was the Minister at the time? Was that Nick Minchin?

I believe it was, but I'm not absolutely certain. It was certainly in and around that era. And so I think that in terms of really being able to sell to politicians something new and something different, and indeed to the chief scientist, that the Flagships came about because that seemed to be a solution to the equation of how do you actually – well, all of the chiefs tended to the view that the thing that CSIRO could do far better than universities was to assemble teams that could address very significant national challenges.

So you could bring a chemist and a mathematician and a biologist, or in multiple orders, and get them doing something really significant. And it was clearly difficult to do that sort of thing in universities, and up to a point it still is. So for example, at Sydney University the Charles Perkins Centre, which has got a very important national problem, had a lot of problems getting people to actually want to work together. CSIRO was clearly better at that than the universities.

And the Flagships I think came about as a manifestation of that perceived competitive advantage. And I'm not sure that there was anything particularly wrong with this new model. I actually forget the name of it.

It was Sector -

Sector.

Management Systems.

Sector Management. And so -

And so the Deputy Chief Executives were in charge of different sectors of the – and that’s when you and I were both reporting to Bob Frater.

Yep. And so I suppose also that there was the view that some of the big challenges were actually cross-sectoral as well.

Yes.

So I think the sectors were really quite important in shaping our thinking, but I think they probably didn’t reach quite the end point that was necessary.

Deputy Chief Executive

So can you – at the time of – we have John Stocker leaving, Roy Green being the acting chief executive, this process going on, the recruitment of the new chief which was Malcolm McIntosh, Malcolm getting ill, Colin Adam becoming the acting chief executive, and then the recruitment of the new chief executive. I was there for some of that time, but I was overseas for a lot of that time. What was the atmosphere? What was the sort of atmosphere in the organisation at that time? Was it, as somebody described in here, disastrously low morale, or was the organisation – that was describing your old division before you took over. Was there some sort of sense of malaise in the organisation?

Yeah, I believe so and I think that it was borne of a number of factors. One was the external revenue target was driving everyone spare and it was driving a lot of stuff in CSIRO. There was a strong perception the quality of the science had suffered accordingly -

And was that true?

Not really. There was great science going on in the organisation, and I think it was demonstrated that it wasn’t really true, but it was a perception on the part of people who were working on consulting projects that they weren’t necessarily doing the stuff that they wanted to be doing. But I don’t think it was nearly as true.

I think there was certainly a lot of evidence gathered to show that CSIRO was still performing very highly in most of those research areas. So put it this way, it was at least greatly exaggerated. It may have been true up to a point, but it was greatly exaggerated.

There was – I mean, it was a different kind of period. Malcolm McIntosh’s arrival was generally positively greeted. He was a person of huge personal warmth and charm. He could win an argument anywhere. Seeing him in Senate Estimates was very different to seeing anyone that we’d seen in Senate Estimates before. John Stocker wasn’t used to the process and found it quite offensive that people were asking him questions.

But Malcolm loved it.

Malcolm had been a very good cricketer and he reminded me very much of an outstanding cricketer who could pick his deliveries and smash them to the boundary, often insulting people who needed to be insulted along the way –

And he left some to go through to the keeper.

And he left some to go through to the keeper, and he blocked others. Roy Green tended to block everything. John Stocker tended to take a swipe at a lot of things. And I think that – I don't remember Colin that well in Senate Estimates but -

He was a bit combative at times.

So can you just for the record tell us what the OASITO thing was?

The idea was that all government agencies would essentially have the same sort of common computing infrastructure, and essentially a standard Microsoft Office environment. And we had to try and explain to them that really this was completely unsatisfactory in a scientific environment.

But there was also another controversy at the time that Colin mentions and that was the selling and leasing – selling CSIRO properties and the organisation leasing it back. And John Fahey was also part of that, wasn't he? Do you remember anything about that?

No I don't remember a lot about that, but I know it was going on.

Right.

But we had really got OASITO to agree to a system that was much more bespoke for CSIRO and they had basically signed off on that, but I think with Nick Minchin's - I think with Nick Minchin's strong support - there were other cases where OASITO was trying to foist -

OASITO is a company of some sort?

No, OASITO was a government agency -

The Office of -

Oh, the office of something or other.

The Office of Administrative Services and Information Technology.

Okay.

Something like that. But it was a government agency. Anyway, we had got to a position which we could live with. Then whether it was the Minister or the Prime Minister, whatever, they just basically shut OASITO down because there were other cases where they were trying to force inappropriate models.

And I must say one of the things that most angered me in the CSIRO post – in the post Geoff Garrett, or in the Geoff Garrett era, was when Rose Frost was appointed to the chief information officer at CSIRO. She said that the worst decision we'd ever made was to resist the OASITO -

She'd come from a department hadn't she?

She'd come from a department and basically she had very little appreciation of the fact that computing wasn't just an administrative tool. It was an essential part of the scientist's kit bag.

And becoming more essential

And becoming more essential, and now I guess that's much more recognised, but she didn't recognise that.

So we're back in the end of the Malcolm McIntosh era, the Colin Adam acting chief executive era, and the organisation was not getting the traction with the government that -

Correct.

we needed -

Absolutely.

is essentially what you're saying I think.

Absolutely.

And for various reasons the - probably Malcolm McIntosh's personality to start with, the fact that he probably couldn't do as much towards the end, and as you say in Icon in Crisis that Colin wasn't as experienced at dealing with the bureaucracy as Malcolm was.

Colin had done amazing things for the organisation in terms of bringing it closer to industry, and that was his forte.

And so Geoff Garrett comes in as the chief executive. Were you interested in being the chief executive?

No. The reason I wasn't interested in being the chief executive was pretty simple. I was feeling really quite unwell in that year. I know Paul Wellings put his hat in the ring for that position. I didn't even consider it because I knew there was something wrong with me. I didn't know what it was, but towards the end of that OASITO era I was shunted off to hospital for a heart bypass, and so that was really -

What was the date of that? 2000?

Sorry, my heart bypass?

Yes.

2000. Late 2000. I was home just before Christmas and I was actually – I've got a lot to be grateful for CSIRO for at that time, because they were bringing in a process of health checks for senior executives and I said to the CSIRO HR 'look, I would really like to be first cab off the rank with this because I just want myself checked out. I don't think that GPs are quite up to it'. And I did one of these calcium scans, found that my arteries were full of calcium, did an angiogram, and had a heart bypass and was home by Christmas and it was – it all worked very, very well for me. I haven't had a problem since, touch wood. But that's the reason I didn't even consider it, Tom.

And was Paul Wellings the main internal candidate, do we think? Probably.

As far as I know. I don't know whether Colin put his hat in the ring?

I don't think so.

For what it's worth, my impression from Colin was he wouldn't have minded being invited but he was not going to ask.

Yeah, whereas Paul definitely put his hat in the ring, and I don't know about Bruce Hobbs.

The Geoff Garrett era

Anyway, so the selection process takes place and Geoff Garrett comes, and none of us knew much about Geoff Garrett.

Well, my knowledge of Geoff Garrett was reading the CSIR South Africa website and I was able, through the CSIRO website, to predict pretty much the approach that Geoff took when

-

Yes, this interview's not about me but just let me say that I was in Jakarta and my – person who's become a sort of a friend of mine over the years, Ramesh Mashelkar, told me that CSIRO was lucky, they've got a star.

Yeah.

So anyway, that was the feedback we got. So there was a sense, in our little group in Jakarta, there was a sense of excitement about a new broom coming in or a new person coming in, because we did have the impression from our remote location that the organisation was treading water.

I think that it was a time when CSIRO needed a very significant change because, I mean, being not really considered part of the equation when the -

The Backing Australia's Ability one, it features a lot in Icon in Crisis and in what you're saying and what people thought, so the organisation was in need of a change -

A change.

So Geoff Garrett comes along. And when was the Cammeray Waters retreat in relation to his term? Was it pretty early on?

Very early, within the first year of his term. Probably within the first six months of his term. And one of the things that was characteristic of Geoff is that he came in loaded up with a lot of management speak that some people regarded as being inappropriate for an organisation like CSIRO, but I could see that we needed this kind of change and -

So I wasn't at Cammeray Waters, but Terry Healy and Ron Sandland both were.

I was not at Cammeray Waters, I was at something here at -

Oh okay, sorry.

Brighton?

No, the show business part of the harbour down here.

Darling Harbour.

Darling Harbour.

Darling Harbour. I'm sure that's where it was. Geoff Garrett was jumping on tables.

Anyway, let's not worry about that. Let's get back to Cammeray Waters. What was the atmosphere and what happened at Cammeray Waters?

The atmosphere really was a sense of where we were was – we really needed to go to the next step and we needed to get it right. And the next step that – we did the usual thing of pinning things on whiteboards, and the thing that came out was the fact that we could assemble teams to tackle problems of national importance, better than universities could.

And so that would potentially be the kind of niche that we would fit into. So it was still going to take a few years before that actually came to fruition, but basically by the end of that the chiefs had voted to put their money where their mouth was and essentially agreed to a call in of revenue, which was going to be grossly insufficient to do what was needed for the Flagships.

Was that decided at Cammeray Waters?

Flagships

That was decided at Cammeray Waters, yep. There was still a long way to go and there was still a view among a number of the chiefs was that they could translate their existing projects into exactly what was going to be needed by the Flagships, which started out relatively small in the organisation but one of the great things about – one of the big

positives about the Flagships was that they attracted Robert Batterham's positive attention and they also attracted Brendon Nelson's positive attention.

And so it finished up really gaining quite a bit of funding in the short term over about an eight year period for the Flagships, and there was quite a strong – it's all stated better than I could state it here in the book – but a strong process for saying whether a Flagship should come into being or not. We had a Flagship Oversight Committee that was really quite a rigorous questioning of the proponents of the various Flagships.

I remember John Wright was a proponent for the Energy Futures Flagship and he kept coming back with a portfolio that was essentially what his chiefs told him they wanted in there, and didn't really bear on any great issue of national importance that we could see. And we wanted to do something in the energy space but it took a long while before John could convince his chiefs that they needed to come up with something rather different. In fact, I remember we called our committee, the Flagship Oversight Committee, or FOC, and I remember John Wright going out of the room at one stage and overhead him talking to his chief saying 'I've been FOCced'.

So this is a question I'd like to ask you based on my observations, by then outside the organisation. So I came back from Jakarta in 2001. I stayed in the division for a short time, and then went to Swinburne. So I was essentially an outside observer of this, and you've probably read what Garrett Upstill and I have written about it. It seemed to the outsider that this was a process that was entirely internal. So that the process of – this is a criticism that we made in our paper – the process was an internal process.

The slogan of the organisation was to look out but it seemed from the outside looking in that CSIRO was spending its whole time looking in. So can you enlighten me on why – I mean the Light Metals, Preventative Health, Healthy Country were the first three Flagships. Why were they – why did you think that they were the things that the country - the Flagships that the country needed, at that point?

So basically we just went through a process of people putting forward a prospectus for which way they wanted to see this go.

These are people inside the organisation putting forward a prospectus?

Inside the organisation, but with some external consultation. And you might realise that we also agreed to and we got additional funding to have a Flagship Collaboration Fund which was with external university partners.

Yes.

That was very important, but I think to be honest this was such a large scale undertaking that there was a limit to how much of this kind of thing you could actually contain. But let me say I also think that there were distortions of the Flagship process that came about as the process evolved. Not, I have to say, on my watch but for example a Biosecurity Flagship was set up and essentially the BHAG that it was associated with was we will basically take

responsibility for all biosecurity research in Australia. Well, that was sort of internalising stuff that - much of it was going on very effectively outside the organisation.

So that was an example of what you were talking about, but that wasn't the kind of thing that we were – there was quite a lot of industrial interaction that went on as the Flagships were originally formulated as well. So for example in Energy Futures there was a lot of work with all kinds of energy providers. One of the first things that was set up there was a forum, which was totally outside of the organisation, to think about the sorts of things that Australia needed to do in terms of its energy futures, like metals -

Was that Energy Transformed?

Energy Transformed, yeah.

Could I just ask where we might find this? Was all this documented and subject to papers to the FOC and there was a secretary and it all got properly managed?

A lot of it's described in the book.

Yeah, but in terms of CSIRO files. So Graham was the secretary, or general manager, or acted as secretary to that committee, and was it well documented, all the decision making processes?

Anything that Graham had anything to do with was very well documented. Where those files are now I honestly couldn't say.

But they exist, and they'll probably be FOC files?

The FOC files, if they – look, I have absolutely no knowledge of what's happened to those files -

Well, we've got some of them. We've got 2007 and 2008 FOC files.

I wanted Ron's impression of it.

My impression was certainly that they were well documented at the time, but I have no idea where those files are now. We did have access to some of those files when we were writing the book, but my impression was that the storage of those files hadn't been as good as it should have been at that time, because we were writing this book.

Right, and the actual meetings where these decisions were being made, or progressively, were they formal, with papers?

Yeah, very formal with papers.

And was the Board involved in that?

The Board was absolutely involved in considering whether we should -

So there would be papers to the Board?

There were papers to the Board about how the initiative was travelling and indeed there was one celebrated incident where the Board Audit Committee decided that – I mean, we basically were quite open about the degree of risk associated with the initiative, and the Board Audit Committee decided that we should pull the plug on it because the risk was too high.

On one particular Flagship?

No, on the whole initiative.

The whole lot? Oh, is that the one where Catherine stood up to the Board?

Yep.

Do you remember what year that would have been? 2003?

It was very likely - it would have either been 2002 or 2003, but I suspect it could have been 2003, but it could have been 2002. It would be late 2002 if it was 2002, or somewhere in 2003. And I know that there were a lot of off the record discussions happening between Catherine and various others, but I know that she stood up very rigorously against those -

So she was very much – her Chairman’s forward in the 2002/3 annual report was very supportive of the process. So you say in the book that Geoff was – some people thought that Geoff Garrett blew hot and cold a bit on Flagships. Can you expand a bit on that?

Absolutely. I can exemplify it. There were a number of chiefs who were less supportive of the Flagships than others. And there was a executive management committee meeting where the chiefs were involved, where having gone through this process there was a chief who’d been appointed after the event who spoke passionately about that he could do all this kind of stuff within his division, and he didn’t need the Flagship initiative.

And Geoff said at that meeting ‘well then, let’s go back and have the debate’. Now the debate had already been had, but by saying ‘well let’s go back and have that debate’ that was very problematic for members of the executive team who were committed to this Flagship initiative.

The other thing that I remember particularly was a dinner meeting that we had with Geoff and the Flagship directors, where the Flagship directors said that – they were just explaining some of the issues that they were having. And one of the problems that they had was lack of commitment from the chiefs to the process, so that if a Flagship project was going to be funded and they needed people from division x, then sometimes division x would not bring forward their best people for that particular project. And that caused the Flagship directors some grief.

But what astonished the Flagship directors at this meeting was that Geoff turned on them and passed on a number of carping, nit-picking criticisms that he’d got from the chiefs,

some of which were realistic. One of the things that was realistic was it's very difficult if you're a chief of the division to have a resource allocated to a particular project that becomes surplus to the requirements of the Flagship. So the idea of having fast fail projects is not necessarily going to be – well, it wasn't helpful in terms of the Flagships, sorry the divisions, being able to run it and there was a real need I think that – there was a real need for the Flagship directors to recognise more that the only way that the Flagships were going to run was with the scientific resources that actually lived in the divisions. And in order for the scientific resources to flourish in the divisions, there needed to be a certain amount of certainty as to where resources were going to be allocated.

Now I think it's fair to say that initially the Flagship directors were pretty bloody-minded about this kind of thing, and the chiefs were fairly annoyed and angry, and I had lots of conversations in both directions. But in this particular meeting Geoff really turned on the Flagship directors and they went out with their tails well and truly between their legs. So I think that there were certainly major challenges in having that happen.

I'd have to say that I think the job, under the Flagship model the job for chiefs became not necessarily more difficult but certainly a bit less attractive. When I was a chief of a division and we've described all these things that I was able to do, I mean that was probably the best job I ever had.

It's certainly the case, in my recollection, being the chief of the division of chemicals and polymers was the greatest fun I ever had in my life.

Yeah, well me too. Basically the division of maths and stats grew very significantly because of additional external funding, and because I was being successful at bringing in external funding Bob Frater was saying 'well, I've got some more money here, more appropriation funding for you'. And so I could really fund any strategic initiative that I wanted to within reason, and yes, it was the greatest professional fun that I ever had.

And getting – let me just say getting the 30 percent external earnings was also great fun.

Yeah. I absolutely enjoyed it. I didn't enjoy it when people made a meal of it and over serviced clients and that sort of stuff, but the fact that you were out there working with industry and talking to people in industry, that was just tremendous. I met some fabulous people in industry.

Just continuing that theme, within the Flagship model was there any reason in principle why you couldn't have a Flagship that was in effect a division headed by a chief? A new division?

I'm just trying to think of an example of where that would work, and of course this is the argument that was put forward about fisheries and oceanography, but I didn't ever see an example where the two things were really equivalent, because the Flagships had these so-called BHAGs, or Big Hairy Audacious Goals, and in order to – and those Big Hairy Audacious Goals were what it was agreed to and for example you get very close to a BHAG business system, if you know what I mean, but you still had in a kind of matrix sense a home to feed chemists and physicists and mathematicians.

On a disciplinary basis?

On a disciplinary basis.

But there was also, say something like plant industry, which has a wide variety of disciplines within the division and you could say that plant industry was tackling BHAGs like cotton and wheat and those sorts of things, and so is there any reason, I'm just saying in principle, why you couldn't have a division that was in fact the same as a BHAG / Flagship?

Well, I think if you take the plant industry example, certainly without questions one of the most successful divisions in CSIRO, there were certain areas where the Flagship construct in terms of food futures really forced some issues and some really good science to address problems that plant industry hadn't actually thought of.

So it was a process of intellectualisation, and some divisions were closer to tackling a BHAG than others. So for example, maths and stats could never have been described as a BHAG. It was basically a set of capabilities that could be deployed very usefully in other Flagships. Other divisions were much closer to that.

But Wealth From Oceans could have been a division.

Not necessarily. There were a lot of other resources, modelling resources, and so forth that they didn't have at the start.

But that could have been gathered up into the division and run that way.

And they would have thereby entrained the same problem that we talked about earlier in terms of lack of effective disciplinary homes for people.

Yes. Can you just – once again my perspective in this is looking from the outside at that time. The three initial Flagships seemed from looking at them not to involve the assembling of huge interdisciplinary teams so Light Metals, Preventative Health, Healthy Country were pretty well confined to a couple of capabilities. So the rationale for having these, assembling large multidisciplinary teams didn't seem to be the case in those first three Flagships. It was the case - I mean I disagree a bit with Terry on this. Wealth From Oceans seem to me to be one that did require a range of people because it required minerals, fisheries, oceanography, analytical chemistry, a range of stuff. But those three seemed to not be what – the first three didn't seem to require this great ability to assemble multidisciplinary teams.

So if you take Preventative Health, one of the chiefs -

Preventative Health presumably had a lot of modelling and mathematics in it as well.

Yeah. And they were gathered largely from the maths and stats division but also I think I'd have to say I felt that Alex Zelinsky who was chief of then the information technology centre, I thought Alex had a better idea of how to ensure that the IT capabilities that were needed for particular Flagships were actually delivered to those Flagships. I thought he was an exemplary chief in the way that he actually delivered capability. So Preventative Health

was certainly one. There was certainly some manufacturing stuff associated with the Light Metals Flagship, and what was the other one that you mentioned there?

Healthy Country.

Healthy Country. Well, there was a lot of modelling associated with that around water flows and so forth.

So the Flagships developed, and you had three in 2003. Another group came in 2004, and eventually the percentage of the organisation that was involved in Flagships grew to about 40 or 50 percent by the time you left. Had manufacturing come in before you left, Niche Manufacturing? Minerals Down Under. 2007, there was Niche Manufacturing and Minerals Down Under.

Future Manufacturing.

Yeah, I think it was Future Manufacturing. I think it started off being called Niche Manufacturing but eventually Future Manufacturing, yes. So were you surprised that so much of the organisation -

Yes.

- was involved in the Flagships?

Yes.

When you read your book, it was – I got the impression that initially you had the idea that these BHAGs would be a goal. I mean, you describe the formation of penicillin and the Boeing 707 as a -

They were definitely BHAGs.

- BHAGs, and they came and went in a sense. I got the impression that your initial thought was these Flagships wouldn't be perpetual structures.

Exactly right.

But they turned out to be so.

And -

How did that happen?

Well, first of all I thought that the percentage – my original thought was the percentage of the organisation that was doing Flagships, that was the percentage of the organisation that could be attributed to Flagships, would be around 30 percent.

I think that one of the things that happened was that people, as they do, decide that in order for them to be successful they had to be involved in a Flagship. So there was more and

more divisional stuff that came into the Flagships, that chiefs were contributing divisional work into Flagships, and that some of that work - I think that involved a certain dilution of the concept of Flagships.

I have absolutely no doubt that when I looked at – well, certainly the supposed Biosecurity Flagship that I saw entirely from the outside was actually making people in say the Department of Agriculture, with whom I was doing some work outside of CSIRO, very angry about well, why is CSIRO saying that we do all this kind of stuff?

And the kind of people that they were putting up – I was working at the University of Melbourne with Mark Burgman in the Centre for Excellence for Biosecurity Risk Analysis, and he would be a person who would be absolutely in the front rank of people working in biosecurity risk analysis world-wide, and it was interesting to me that CSIRO didn't particularly want to work with someone like that. They would have preferred to have carved off something that they did themselves.

And I actually became so alarmed about this one that I did inject some comments back into CSIRO that weren't actually effective. I mean, I had no clout left in CSIRO, but I did think that the particular one was a significant mistake.

Similarly, not so much similarly but we had a number of projects in terms of – I've just lost the term. It was one of the agricultural projects that became a Flagship late in the piece.

Sustainable Agriculture.

Sustainable Agriculture. And what -

That was the last one to be formed, I think. Or 2009 that came in.

2009, yeah.

2009 after I'd left CSIRO, and people ask me about that but I basically – the genesis of that thing was that Sustainable Agriculture resulted from the science investment process where there were people doing highly aligned work in different divisions and the science investment process said you'd better get these themes -

Together.

Together and we're going to take off a million dollars as an incentive to do that. And so people actually did come together and start working together, and it got basically morphed into a Flagship without really a proper Flagship Oversight Committee process.

One thing I would really defend is the Flagship Oversight Committee process. It was a strongly intellectual process where there were a lot of questions asked about portfolios and so forth, and a perennial problem of people being over-confident about what kind of external revenue that they would bring in, their engagement with industry.

I also felt that one of the - certainly when we first saw the Food Futures Flagship we saw some terrific stuff from essentially plant industry that was, you know, here's some great science, here's the BHAG, but no - and I described the middle stage after a Larsen cartoon was then a miracle occurs, because there wasn't a clear linkage between the science that was going to be done and the impacts that needed to be achieved. So we had some really good debates about that and actually formed that into a significant Flagship.

So Ron, you mentioned earlier in this discussion that you went to Battelle who were introducing a matrix management system and you predicated that it was going to fail. What

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Matrix management systems

What was the basis of my prediction?

No, and it did fail. The Flagship morphed into a matrix management system. Did you not want that, and why did that happen?

The Flagships morphed into a -

Did they start off as a matrix management system?

They started off as - they didn't start off with that kind of very explicit matrix philosophy behind them, but they did - they obviously involved assembling teams from different capability areas to tackle particular challenges, which sounds very much like a matrix. I think as the chiefs started folding more and more of their Flagships into -

More of their projects into Flagships.

Sorry, more of their projects into Flagships people started getting keener and keener on formalising this matrix system. Now I think that - I always felt that it was becoming overdone and cumbersome and bureaucratic, but -

So if it had remained a system that Flagships were defined and solved the problem and went, and you got another Flagship, then it wouldn't have been a matrix management system.

No, and that was the original idea of them, that they would have a finite lifetime. And some of them did have a finite lifetime but of course most of the people involved in them wanted to have an infinite lifetime. They wanted to have this as part of the establishment.

I think probably the matrix management overkill - matrix management tends to fail if there aren't appropriate communication devices between the rows and the columns. I think that if - I tend to hypothesise, but I haven't got any kind of business school type proof of this, the more ubiquitous Flagships actually become, the more I suppose cumbersome the matrix management communication becomes.

So my view is always that it should have been around about 30 percent, but it became up to a point a victim of its own success I think. One of the great things about Flagships is that it

did attract half a billion dollars of additional government investment in CSIRO which is pretty unique in the last period. So it was seen as a good thing to happen, and I think at the time that Geoff Garratt left the organisation and I left the organisation it was really ripe for a significant rethink, as opposed to letting it continue to evolve without really proper oversight from a Flagship Oversight Committee. Even though something like a Flagship Oversight Committee continued, my perception is there wasn't the same level of rigour associated with the examination of the portfolios. That's just a -

So if we come down to 2008, you'd gone from the organisation -

Yep.

I'd come back into the organisation as a member of the Board, and I got the impression that the way that the organisation was being managed, the way the time allocation of people was going on, was becoming so complicated that it was counterproductive.

So you had a person - one of my former colleagues was involved in something like ten projects across four Flagships, and that was – it was clearly not a sensible way of using that person's time. And that was multiplied – that was worse, or not worse but it was more pronounced in divisions like mathematics divisions and chemistry divisions where that capability was needed -

Was needed across -

- across the organisation. It wasn't such a problem in the division of plant industry where -

There was a limit to where they -

- their capability wasn't really useful terribly in the chemical industry, but chemists and mathematicians, and to some extent physicists, were required across and so their time was too fragmented. And my impression was that the organisation didn't really have a mechanism to cope with that.

I think you're right. Can we just turn that off for a second?

And on again.

Yeah, I can't disagree with you that I think it had become too complex, and it certainly needed to be reviewed. I still think the Flagships was intrinsically a very useful concept, and the fact that it's useful I think is borne out by the fact that now we have universities putting together things that look very much like Flagships without necessarily the same complexity of management structure.

Let me give you my perspective on this, see if you agree with what I'm saying. My view when I got onto the Board was that there were aspects of the organisation that were dysfunctional because of this matrix system. It had become a matrix management system and some people's time was being too much divided, and the quality of science that was going on was

– it was still pretty good but there was a danger that it was going to be affected by this, people not knowing who their boss was, and some people having two or three bosses.

So in a sense I agree with your original concept that the job of CSIRO, its unique capability, is to solve national problems. So why wasn't the whole organisation in Flagships? And that's in a sense what has happened now, is that the organisation has gone back to an arrangement that looks like the early 1970s but it's retained the notion that the organisation should be solving big national problems.

So what I guess I'm asking you is that you're saying that you thought the organisation should be 30 percent Flagships. What was the other 70 percent going to be doing? And had you ever thought of this being the start of a complete restructure of CSIRO around a different way of looking at national objectives?

So the first part of it, what would the other parts of CSIRO be doing? They would be working on significant issues that could essentially be retained within a single division where the client base was well understood, and they would be working with clients and also working on research to develop that –

The future.

The future. And that goes to the kind of concept that Mehrdad Baghai talked about of the Three Horizons. The first horizon being the really close to market kind of stuff, the second horizon being the five to ten year period, which is kind of where BHAGs fitted, and the blue sky stuff goes at the other end. And there's a really good paper, that I refer to I think in the book, which says that for most people either being in the hurly burly of the first horizon, or the playpen of the third horizon, is much more attractive than this complexity.

Now my sense is, Tom, that the momentum was going so rapidly towards folding everything into Flagships without really understanding what the complexities were. The complexities became if you like emergents from a complex system, rather than being stuff that had been effectively predicted in advance. Given that those things had emerged I think that firm action was really probably needed as that started to happen, certainly as people started to formulate new Flagships that were going to come up and solve problems that were often really a recapitulation of divisional research themes.

That's where I think the things started to get complicated beyond where it might have got to. I mean, I'm a long time out of it now but I could see in the few conversations that I had with Megan Clark after she became the CEO that she had a strong desire to make her life simpler, just put it that way, and that the Flagships were making it harder for her.

And this motion of projects increasingly to go towards the Flagships, was that just driven by scientists and chiefs just going where the money is?

Yep, largely. Largely. I mean there were arguments that were being raised about – to be honest, the Flagship directors found it attractive as well. The Flagship directors found it attractive because if you brought in say Horizon One science from a division you can say

well this is actually – this Flagship is now having an impact at the grassroots level and the external revenue's going up. There was a big problem with external revenue associated with the Flagships. So it was, if you like, a kind of symbiotic thing, but it was driven by perceived interests of both divisions and Flagships, not necessarily driven as strategically as it might have been.

So you say in this Robin Williams interview that 'a potential risk for CSIRO that I perceive in the recent clamour for new Flagships in their hard-won popularity is that the original reason for their establishment could be forgotten as they become more business as usual. This is not unexpected in an initiative that has been running now for ten years, but unless Flagships continue to set their sights on major national goals, the organisation's financial imperatives will begin to take precedence'.

Okay, I said that better in Robin Williams than I've said it today. So I absolutely maintain that that's true.

The future role of CSIRO

Okay. Anyway, I think that your legacy, one of your legacies in the organisation is the Flagships. So you have got some, I mean apart from this, what would you say to people who are looking at the history of the organisation? Flagships have come and gone in a sense so what's -

I still think that the driving mechanism behind Flagships, i.e. the ability for an organisation like CSIRO to assemble teams to tackle problems of national importance was absolutely the right thing to pursue at that time. It clearly won the hearts and minds of government and the chief scientist.

Initially it's complex to set up organisations like this. I think that we had a really good crack at it in terms of the governance structures that we put in associated with it, but I think that if you like this challenge of too much science going into Flagships, too much business as usual, meant that this Horizon Two challenge was never really fully met.

I also think that in hindsight after a significant period of time we needed to get back to this concept that if you're talking about a five to ten year horizon, then things should be changing within that five to ten year horizon. So after five years, and before ten years, you'd expect Flagships to be moving onwards, outwards, upwards. There needs to be a new BHAG being developed.

And I absolutely agree with you that if you think about the team that developed penicillin, Florey's team, notwithstanding that there were others who were significantly involved in it, that really operated as a true Flagship. So no one's really working on penicillin anymore, but essentially it probably changed the whole course of the Second World War, it had an enormous impact. But the whole Flagships as business as usual, in hindsight is something that maybe we should have been taking a closer look at after about five years of the Flagships.

So you left CSIRO in 2007 -

Yep.

Why did you do that? You weren't terribly – 60 wasn't – many people stay in the organisation longer than that.

Yeah. I think I left because I was tired and I wanted to do -

Do something else.

Something else. I had a passion for writing something. In the end I wrote *Icon in Crisis* with Graham Thompson rather than writing a novel, which is something that I was thinking of doing at the time.

I think that I was sort of looking forward to not having to go to as many meetings as I went to, and I think I was looking forward to just doing something a little bit different. I also feel that there's a kind of time scale which kicks in, and I think I was – as you mentioned I became chief at a pretty young age. I was 41. I became a deputy chief executive at 52. I think about this kind of period of about 10 years as being a bit canonical, that they're really important jobs and you do them to the best of your ability, and if you can possibly pass the ball to someone else to take them over it's definitely a good thing.

There were a lot of other things that I was enjoying. I really enjoyed my role with Boeing. That was a really good thing. I enjoyed working with Attila Brungs on the science investment process, but there were complexities in working with that including the fact that we found it incredibly difficult to get the right figures out of corporate finance, which drove us spare. You got to a point of convergence and then someone told you that the figures were wrong and you needed to go back to the drawing board, and once you went back to the drawing board you shift one thing and then another thing needs to shift and it becomes quite complex.

Which figures were they getting wrong, just for the record?

Just the budgets associated with the themes, the total. There was often something that they'd left out of the total envelope. So the – if you've got a total envelope of x and you allocate that x according to some sensible prioritisation criteria, and then you find that it was $x - y$, that creates all kinds of difficulties and that happened repeatedly.

But they knew how much money was going to divisions? That is, if you knew how much, in each year, how much money went to which division, they would have been able to answer that accurately?

Not if they hadn't taken into account the amount of money that was – I mean, the money was really going into – there was a significant amount of money going into Flagship themes. The money was going into themes, it wasn't going into divisions per se and if you didn't know what the total was because they'd forgotten some initiative that needed to be – it almost appeared to be wilful. And I'm not saying that it was wilful -

But the organisation was trading in the black, except when it was borrowing against future earnings, but corporate finance knew how much money was coming in.

Yeah, but they couldn't – I think what Ron is saying was that attributing that money to a theme wasn't -

It was much harder because -

It was much harder and there was some -

it's not a receptacle for money.

: - double count, yeah. There's some double counting involved.

But there were significant bits that were actually left out, and I can't remember one in particular at the moment, but it might be some IT upgrade or something like that, that was organisation wide. Oh, we've forgotten the IT upgrade. And so that needed to be – and they knew what the top line was. They knew how much money was coming into the organisation. They knew how much was projected in external revenue, but if suddenly that gets lowered like this and you've allocated your resources up to here it's a complicated problem. It's not necessarily a linear problem. You can't just pro rate this stuff. It was – we had Peter Smyth, Attila Brungs, Kate Taylor, all really good people and they were just pulling their hair out year after year.

Post CSIRO activities

So what have you done since you've left CSIRO?

So one of the things that I did do was write the book which was fun, and I must say that I wrote that book with Graham Thompson, and I couldn't have written it without Graham Thompson. He was a very great help in that process.

I joined the Council of University of Technology, pretty much soon after I left CSIRO. I chaired the board of first of all the Australian Centre of Excellence in Risk Analysis, now Centre of Excellent in Biosecurity Risk Analysis.

For some period of time I took on the chair of the Australian Mathematical Sciences Institute based at Melbourne University. I took on the chair of the Centre of Excellence in Mathematical and Statistical Frontiers, and I've done significant chunks of consulting work for government departments.

Probably one of the most important things I've been involved in has been chair of the Australian National Data Service which is one of the NCRIS capabilities and we're currently going through a process of renewal, or bringing together of the number of data related capabilities under one kind of capability. And that's a significant exercise.

So I've actually been very busy since I retired. I didn't retire to play golf, although I would have liked to have played golf more than I have. I've had one game of golf since I retired.

And I haven't had nearly as much time for reading as I would have liked, but it's been enjoyable working on a portfolio of different activities.

I've also recently sort of branched out. I did the business plan for the Australian Urban Research Infrastructure Network, which was kind of interesting because there were a lot of players who kind of had an entitlement mentality there and we sorted that out and made it much more strategic.

Similarly the Population Health Research Network, I did a funding plan for them, which I'm really proud of because that meant that I managed to take some money off a non-performing region which had built up a surplus, much to their annoyance I might say, and translated that into building a really excellent data analysis system for confidential data, where people actually analyse data that they're never actually presented with. They're presented with confidentialised data, de-personalised data, and at the end they get the results of their analysis but they never get to hold the data. That was developed by a woman called Louisa Jorm who's now at the University of New South Wales. Just a fantastic piece of work.

And so that was - being able to fund that instead of just having a lazy continuity of funding elsewhere in the system, and recently I've been working with the Australian Plant Phonemics Facility and they're very keen for me to chair their board and I'm still contemplating whether I'm going to do that or not. So it's been really interesting, but I haven't had an office other than my office at home to call my own.

So looking back now, like Terry and me, we're looking at CSIRO from the outside, what is your impression now?

My impression is that CSIRO is now a much smaller part of the Australian research ecosystem. I think it's still doing some excellent work. I think that it is seen externally as being very much a creature of the government. So for example, there could have been few initiatives as badly handled as the cutting of the climate science group. That was probably one of the worst examples of poor management that I've seen.

I actually saw this from my work with the Department of the Environment, and with the Bureau of Meteorology people who were incandescent with rage about being consulted. They absolutely depended on those people and I think that was a rather sorry episode, notwithstanding the fact that CSIRO needs to have the right to shift resources from one area to another.

But I also see the emergence of the ability of universities to behave in very different ways to the ways they used to behave. So for example a university department used to have a professor, and maybe a couple of associate professors, and some senior lecturers, and lecturers and tutors. And they basically did some teaching, and they did their own research if they got the chance, but it was very much a hierarchical structure.

Now you can look at a university department and there are many professors associated with that university department, and in many cases they'll be working on something like an ARC

Centre of Excellence or they'll be working on another alternative type of Flagship type activity associated with – this university has a number of those in environment and in other areas of science.

And one of the most interesting observations that I'll make is that a CSIRO scientist called Jay Guo, and I think it's okay to mention his name, was really – his career was flagging in CSIRO and he left to go -

What was his discipline?

Communications engineering.

Communications, telecommunications engineering. He's come here to UTS and he's just absolutely flourished. He's developed a very large group that are getting world first results, and I'm quite saddened by that, to think that a scientist had to leave CSIRO to become successful. I think it's good to have scientists leaving CSIRO, going to universities, and going back in the other direction. But I knew Jay quite well in CSIRO, I had a very high regard for him, and it's sad that he had to leave CSIRO to become successful.

I think that on the commercial side CSIRO is still regarded as being overly protective of its own IP, cautious, not necessarily a good partner in CRCs despite often creating most of the good science in the CRCs. When it comes to commercialisation stuff they start to put their oar in and stop things happening rather than really let them fly.

So I think that the unique role of CSIRO is in some sense disappearing, and so I find it difficult to say exactly, as I could - when we went to Cammeray Waters I think I could absolutely endorse the statement this was a unique capability of CSIRO. I don't think that's true anymore, although I think it's still difficult in universities.

So if you are given the task of restructuring the Australian National Innovation System, would CSIRO still be there?

You know, Tom, so much of my heart's in CSIRO that I don't think I can answer that question fully objectively. But I could understand a system sometime in the future where the unique role of CSIRO wouldn't be as important. But I think that there's still an advantage that CSIRO has in terms of the linkages that it's developed over time with industry, and I notice – one thing I absolutely notice about CSIRO is how incredibly successful CSIRO people who go into universities actually are. They're really making a big difference, a big positive difference, and that's both a plus and a minus and I think it's possible to imagine something like that.

Interestingly I do talk in the book about the DARPA model of having an agency that puts together projects from university groups and other groups. I think CSIRO would still be better placed to do that than most other places.

And I can say that I also had the task of being part of a review of the Crown Research Institutes in DSIR in New Zealand, and I have to say that I think that the DSIR model, which was the corporatisation of research groups, was not entirely successful. In fact, it has some

– I’d probably use stronger language than that if I wasn’t talking on tape, but I think there were some major significant difficulties with that kind of -

And CSIRO’s international reputation amongst the scientific community used to be very strong. How do you rate it now?

Look, I think it’s still pretty strong, but I think that the damage that the CSIRO closure of its climate science, albeit now reversed, generating an editorial in the New York Times is kind of not what I particularly wanted to see. I think that the jury’s out on some of its new initiatives.

I think if Adrian Turner’s vision of Data61 can be realised that’ll be a really positive thing for the Australian nation, but I think that’s really challenging. And the reason I say it’s really challenging is that the kind of IT developments that have occurred in the United States have been really on the back of incredibly large, incredibly demanding and hungry, greedy markets so you can set up the platforms like Uber and AirBnB. I find it difficult to imagine such a platform being developed completely out of Australia, or even out of the UK or France. I think that you can imagine it coming out of, or you could imagine it coming out of, the US. You can certainly imagine it now coming out of China, but they’re almost unique in that regard.

I’m not certain that the reputation of CSIRO is as strong as it used to be, but I guess one of the things that used to be the case is that when we were growing up you learnt about CSIRO in school. It was actually an important topic in social studies and something to be really proud of, and so my view when I left university, or was leaving university and deciding what I wanted to do, and partly the reason I didn’t go on to do a PhD straight away, was the fact that I got married when I was 22 and I felt that I probably needed to -

Earn some money -

Earn some money.

Send your wife out to work.

Yeah, but I think that – the thrill of actually getting a job offer from CSIRO is something that I’ll never forget. It’s sort of like a -

But CSIRO was about 45 percent of Australia’s R&D effort in 1969 when you joined it, and it’s now four or five percent.

That’s incredible, isn’t it? I just find those figures hard to believe, but it was absolutely enormous and it was an organisation that you could just be -

Well, it wasn’t. It was actually smaller than it is now.

Yeah I know but -

But it was the place that young scientists like you and I aspired to work for.

Yes, salaries were higher and prestige was higher, whereas it's the reverse now.

I certainly feel that there's more prestige in getting an academic job than there is getting the equivalent job in CSIRO, and I think that my perception is that the best and brightest want to go and work in universities rather than in CSIRO, and I don't think that that was the case when I was going through.

I know that like Google, the division of what was then mathematical statistics when I first joined, was putting a vacuum cleaner through the best statistics departments in Australia. And so Murray Cameron went to Sydney University the year after me. Nick Fisher went there the year before me. And in Adelaide was the other one that they did a lot of recruiting from. A lot of top students from Adelaide came to CSIRO. So it was definitely the place to go, and things have changed. I don't know, if you want to take it off the record, do you want to –

So Ron, in summary what do you think is the future role, or what is CSIRO's future in the Australian National Innovation system?

Well, as we've discussed CSIRO has become a lot smaller in the Australian National Innovation System than it once was. I think that what happened in 2001 in trying to redefine the role of CSIRO and coming up with the idea of the Flagships was certainly a good move for 2001.

I think for all the reasons we've discussed earlier CSIRO needs to really think hard about redefining a unique role in the Australian innovation system because the universities are in fact doing many of the things that CSIRO at one stage saw itself uniquely capable of doing, and unless it does it won't have a clear unique role in the Australian innovation system.

Well, thank you very much Ron for giving us all of this time in a most interesting day of talking about the CSIRO. Thank you very much.

Thank you.

[End of transcript]

¹ Dong Yang Wu

² She's now back in Australia working with DSTG under Alex Zelinsky.