



**Australian Government**  

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**Chief Scientist**

**DR ALAN FINKEL AO**

**Frontiers 2016: The Art, Science and Future of  
Otorhinolaryngology**

***Optimism, with pragmatism***

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**Sheraton Grand Mirage Resort  
GOLD COAST**

I have to start with an admission. When John Funder asked me to give this opening plenary lecture I was honoured, replied in the affirmative, then dived for the dictionary to make sure John was talking about what I thought he was talking about.

As an electrical engineer and neuroscientist, instead of the nine syllables of otorhinolaryngology, I was much more familiar with the three syllables of Ear Nose and Throat.

As it happens, I managed to find 22 words on the internet that have nine syllables. No surprise, the vast majority of them are medical or pharmaceutical terms. The only one I recognized in the list of 22 nine-syllable words was *establishmentarianism*, the doctrine of supporting the political establishment.

I recognized it because when I was a kid I learned how to spell the word *anti-disestablishmentarianism*, a resonant 12 syllable word with which to impress one's friends.

It also had the added bonus of being a double negative, and was reputed at the time to be the longest word in the English language.

Of course, I was wrong. A childhood error, easily made. It turns out that the longest word in the English language is the proud creation of the medical profession.

It is pneumonoultramicroscopicsilicovolcanoconiosis.

That's a 45 character, 19 syllable word that refers to a lung disease contracted from the inhalation of very fine silica particles, specifically from a volcano.

Still, in the day to day scheme of things, otorhinolaryngology is up with the best of them.

But I digress. I was asked to talk about innovation. A mere four syllables, but nevertheless an important if much abused word.

Many people confuse innovation with invention. Others think of it as a mystical process that takes place in a magic land called Silicon Valley. Of course, it is so much more than that.

One of the simplest explanations I know is still the best:

*Science turns money into knowledge; innovation turns knowledge back into money.*

And, of course, by money, I mean all the good things that we want society to provide.

Most commentary on innovation sets out with an eye to all the reasons that people might fail. And we have a talent in this country for coming up with truly exhaustive lists!

- We're too far away from Europe – and still not close enough to Asia.
- We don't have enough science graduates – except we also seem to have too many.
- Life is so good we get lazy – but life is so terrible we can't possibly find the time to make it any better.

Then, when we've persuaded ourselves that innovation will never work, we wonder why more Australians don't want to have a go. Rinse and repeat.

So my challenge as Chief Scientist is to reject the overt negativity and constructively thread my way between two equally important points:

ONE: We have a base. This country already innovates – in many cases, remarkably well.

And TWO: We can and should do better.

People tend to hear one or the other. But that's life: optimism, with pragmatism, is very difficult to convey.

The best method I have found is the story: stories that illustrate both how innovation ought to be approached, and the outcomes when we manage it well.

### **Lessons from a formidable lady**

And there is at least one shining example well known to everyone in the world of Australian ENT.

It's the Garnett Passe and Rodney Williams Research Foundation itself.

Let me explain.

Innovation does not begin and end with a brilliant idea. It comes about in four steps:

- first, identify a problem
- second, come up with a solution
- third, ensure that it can be scaled to the required level
- and fourth, make it available.

And we can trace all of those threads through the story of the formidable lady whose legacy brings us here today.

The Garnett Passe and Rodney Williams Research Foundation was established in 1991 through a bequest in the will of Mrs Barbara Williams to honour her two husbands. Her first husband, Garnett Passe, was an otolaryngologist. Her second husband, Rodney Williams, was a successful stockbroker.

Barbara was struck by the financial hardships that Garnett had faced while pursuing his specialisation at the University of Melbourne. She recognized this as a problem to be faced by future aspiring practitioners, who might not be able to pursue their specialization because of the cost.

That's Step 1 in innovation: identify the problem.

After Garnett died she decided that the solution for these aspiring practitioners would be to offer a bequest to Australians wishing to study to become otolaryngologists.

Although she was born in Kenya and had spent most of her life in Rhodesia, England, India and America, she chose to support aspiring Australians because that's where Garnett had been educated.

That's Step 2 in innovation: come up with a solution.

Fortunately, her second husband, Rodney Williams, was a very considerate man and respected the intentions of her bequest. What's more, he was generous, and although Barbara had signed a prenuptial forgoing any claim on his wealth he left a sizeable fraction of his wealth to her, substantially increasing the size of her bequest.

That's Step 3 in innovation: ensure adequate scale.

Finally, despite years of advice from her accountant, investment adviser and attorney arguing that it was unwise to leave so much money to otolaryngology in Australia, she remained resolute.

So here we have Step 4 in innovation: get it done and make it available.

Twenty-five years on, the Foundation has invested almost \$80 million in ear nose and throat research, and graduated approximately 20 specialists who took time out of their advanced training to do a PhD.

This has put Australian ENT on the map internationally, in a way that would have been undreamt of when the paperwork was signed.

There you have it, innovation in a nutshell courtesy of a lady who probably never described herself as an 'innovator' all her life.

And not a whiff of unicorns or magic about it – simply superb vision and real operational skill.

### **Looking up from the lab-bench**

As Chief Scientist, I ask myself what it means to carry forward that vision today, and help young Australians rise to their potential.

I ask myself, in particular, what it means to get a good education, in an era when so much about the economy is changing so rapidly.

In Mrs Williams' day, the professional degree was accessible to very few. When you signed up to the degree, you essentially committed to the profession, and your study was structured around that expectation.

Today, a university experience is the majority choice. And the upshot is clear: there are many more graduates from professional degree programs than there are entry-level professional roles in their disciplines.

It's true even in medicine. It's true in law. It's true in teaching. And it's certainly nothing new in medical research.

We accept many more students into PhD programs in biomedical fields than we can possibly employ at the postdoctoral level – let alone sustain in lifetime academic careers.

That is not just the reality in Australia, but across the world.

In the US, fewer than one in ten of the 86,000 current biology PhD students will become tenure-track faculty members. That's despite the fact that more than half of PhD students still rank a professorship as their most desired career.

In the UK, for every 100 PhD students, 47 will do a post doc, 4 will get tenure, and 0.4 will become professors.

## Following the process

Does the education system have a problem? Do we have a problem in Australia?

I believe we do – but before we proceed, let's start with step one and make sure we define the problem correctly!

Is it a problem that professional degrees no longer guarantee entry into the obvious professional job?

Only if we train graduates to believe there's nothing else for them to do.

Is it a problem that we can't match the graduate output to the available jobs one-to-one?

Only if we think that the purpose of education is to satisfy the needs of the economy exactly as we know them today – without heed to all the decades in which our graduates will be looking to work.

Is it a problem, in particular, for science PhDs to depart from the narrow field of academic research careers?

Only if we are utterly blind to the advantages of phenomenally bright people contributing to the economy in non-linear roles.

If you can obtain a PhD, then you can write a work plan, work in teams, write coherently and wring out results on a shoestring budget.

So why can't you build a startup? For that matter, why can't you run an ASX-200 firm?

I put these views in an opinion piece published in *The Australian* last week, and I have been overwhelmed by the positive response. People are tired of operating within an impossibly narrow definition of success that dooms all but the minority to disappointment.

No, graduates today cannot expect to be job-ready – if by that we mean ready to slot robotically into the pre-determined dream career.

Instead, we should harbour the conviction that every graduate can and should be work *capable*; and ready to seek opportunity in many ways.

So, to step two – coming up with a solution. How can we persuade Australians that success in the modern world is rarely found by unimaginative people in the most obvious place?

It's a big problem, so let me focus on a slice of it we all agree to be particularly tough: making the most of our science PhDs outside the lab.

I don't shy away from that conversation – I welcome it.

It is both immoral and unhelpful to lure people into PhD programs with false guarantees of plum academic roles. And it should also be entirely unnecessary, when we think of the abundance of things that a person with a PhD can do.

They can be like Angela Merkel, the physical chemistry PhD graduate currently in charge of Germany, and the flagbearer for the Free World.

Or they can be like Andy Groves, the chemical engineering PhD who through his innate business acumen made Intel the corporate behemoth it is today.

Angela Merkel is not a failure because she didn't achieve a tenured professorship.

Neither is Andy Groves a failure because he migrated from engineering to management!

We don't need to rip up the PhD program. We don't need to sacrifice the academic rigor. On the contrary, that would be the cruellest thing we could possibly do.

Students need a qualification that stands up anywhere in the world for rigor. They don't need three years of lectures on generic workplace skills.

But they also need to see how science skills are applied in the workplace in all sorts of roles; just as employers need to see the value that a science PhD can provide.

From experience comes the capacity for imagination.

So the solution is clear: we need programs that make the connections between PhD students and future PhD employers.

There are plenty of good examples overseas. In France, for example, 10 per cent of PhD students undertake their thesis research as an employee of a company. They sign a three year full-time work contract, with a good salary – which companies partly fund, because they value the skills the PhD student brings.

The companies have to demonstrate their commitment by investing in the student and their project. And they do invest, because of the excellent reputation the program enjoys.

If French CEOs can follow the logic, surely Australian corporate leaders can do the same.

And so to step three: achieving scale.

And here we hit the nub of the problem: PhD intake is growing far more quickly than the appetite or capacity in Australian companies to take students on. Nor are there clear incentives for universities to badger businesses into submission if it means that the universities have to shoulder the bulk of the expense.

But change the rules of the game – and just watch how fast the players adapt.

I know there is tremendous interest within Government in spurring that new generation of industrial PhDs. That was publicly demonstrated by the recent investment of \$28 million in the internship program already offered by the Australian Mathematical Sciences Institute.

So finally step four: get it done – through leadership!

Mrs Williams had that combination of a big vision and superb operational skill. Through her commitment, the Australian ENT community is extremely well-positioned to lead today.

You have the experience of encouraging clinicians to undertake doctoral training. And through that work, you have enriched research with a deep awareness of end-user needs.

I only wish we had a Mrs Williams for every field of research – but until we do, I look to you to be advocates as well as examples for the cause.

## **Conclusion**

I want to conclude with a very specific challenge applying equally to every one of you.



Over the next two days, you will hear many fine examples of emerging technologies and best-practice clinical standards.

From that deluge of ideas, please identify just one: one idea that you can and will implement in your organisation.

Go back to your organisation and commit to it in iron-clad terms. Yes, I mean an office announcement... and a document trail.

Then try out the Mrs Williams formula for success: define the problem, identify the solution, build it to scale and *get it done*.

If everyone here takes up that challenge, then this conference will have been a resounding success.

And think of the discussions we might be having at the 30<sup>th</sup> anniversary conference in five years' time.

It's over to you.

Let's do Mrs Williams proud.

**THANK YOU**