Australian Government

Chief Scientist

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INNOVATION WEEK 2017

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I've been asked to convey the best wishes of Minister Sinodinos, Minister Cash and Assistant Minister Craig Laundy, who are unable to join us today. They asked me to fill the slot, and I was delighted to accept.

But I don't want to launch this event in the traditional way.

I want to treat you to a story: a story about the power of ideas.

It starts more than 80 years ago, with a physicist at Columbia University named Isidor Rabi.

He wanted to study the nuclear spin of sodium. But he was too lazy to be bothered with the existing tools. So he worked incredibly hard to make them better.

He worked so hard that he won the Nobel Prize in 1944, for observing the quantum phenomenon of nuclear magnetic resonance, NMR.

Success: we have a new tool for high-end physics and chemistry.

Decades passed. We come to the 1960s.

A medical student working at Harvard named Raymond Damadian had a stomach-ache. It was excruciating. But nothing showed up on the X-rays.

He obsessed about it for years and years, until the revelation dawned: what if you could use nuclear magnetic resonance to *build a human scanner*?

So he ploughed away until the prototype was finally ready in 1977.

It was a one and half ton monster they called "The Indomitable".

And in the great tradition of medical pioneers, Raymond Damadian volunteered to be the guinea pig.

The only trouble: by now, he had a little too much body fat.

But luckily, every university has a good supply of lean and hungry people willing to put their bodies on the line for science. We call them "students".

And this time, it worked! A crude image was obtained, a 2D view of a student's heart and lungs, reconstructed with colour pencils from a mere hundred data points.

Success: we now have a one and half ton machine for experimenting on starving students.

Now leap forward to 2017.

The Indomitable has become… can you guess? The MRI: magnetic resonance imaging.

We abandoned the 'N' – the nuclear – because the word nuclear literally made patients scared of the machine.

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Today the MRI is a standard part of medicine: a household name, with considerably more than a million scans performed across the world every week.

The technology has come so far that we can now do therapeutic ultrasound, guided by real-time MRI, to focus on a brain tumour, and destroy it.

Thirty years ago it was a challenge to take one low-resolution image of the brain in a session. Now we can take high resolution images every second.

To start, we just imaged structure. Then, we imaged the functional areas of the brain. Now, we're imaging thinking.

And we in Australia are part of the charge.

Imaging, particularly brain imaging, is one of our great strengths.

Particularly here in Melbourne, from Parkville to Heidelberg to Clayton. I know from my time at the Florey how much our scientists such as Graeme Jackson and Alan Connolly have contributed to important developments like differential tractography.

And in Brisbane, Stuart Crozier invented new ways to correct the magnetic field gradients in MRI machines and now his technology is incorporated in 65% of all MRI scanners manufactured worldwide.

Our National Imaging Facility is a global gold-standard.

And as you know, we excel in clinical trials.

So we can take new ideas all the way from basic research in the lab, to patient care at the bedside.

That's today. Imagine tomorrow.

And it all began with a physicist named Isidor Rabi.

Shortly before his death, in 1988, he agreed to take part in an MRI scan.

As they wheeled him in, he saw his face reflected in the metal.

"I never thought my work would come to this," he said.

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We need to tell stories like the story of MRI.

We need to reflect on the lessons of success.

You can't script the future – but you can approach it strategically.

And so we have all been reflecting, you in your organisations, and the Ministers and their colleagues in Canberra, about Australia's way forward.

I've been working with Bill Ferris, Charlie Day and the Board of Innovation and Science Australia on the 2030 Strategy Plan.

If the Ministers were here, they would want to remind you of the major commitments in the National Innovation and Science Agenda, including the Biomedical Translation Fund, and something very dear to my heart: the Research Infrastructure Roadmap.

We will hear today about some of the activity in the research and business communities.

So what lessons can we all learn from the MRI?

ONE: Never let a problem go to waste.

Your stomach-ache could be someone else's salvation: you just never know.

TWO: Innovation needs intention.

Whatever you're doing, look for impact.

Opportunity will come from unexpected places: but you have to be ready to reach for it and welcome it in.

You have to be looking.

I'll repeat that – if you don't look you will not see.

And THREE: It takes vision, courage, patience, and time.

It helps to be brilliant – but you have to be bold.

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So the next time you're bored, or in pain, take heart!

Identify that there is a problem to be solved, then look for the solutions wherever they're hiding, and move boldly forward!

And in the meantime, let's make this an Innovation Week to remember.

I'm proud to declare it officially *launched*.