ARTICLE FOR THE CONVERSATION

Australia's Chief Scientist on getting our research priorities right

By Australia's Chief Scientist, Professor Ian Chubb AC

In 2012 the <u>Australian Council of Learned Academies</u> commissioned a survey of some 1,200 researchers, at all stages from graduate to retired, about their thoughts on the career they had chosen.

For three out of four, the best thing about the job was the chance to work on interesting and important issues. The passion for changing the world brought people in, kept them going and made them reflect with satisfaction on their life's achievements.

It's a good thing that it did, because the frustrations they also reported were immense. For many, particularly in the early career phase, it was the uncertain job prospects that cut the deepest, along with the time devoted to grant applications and the difficulty in gauging where the opportunities might lie. To have a vision of something important, and to have no path by which to achieve it, was bitter.

Making the case

As far as I know, there has never been a golden age when every fundable project was funded and every talented person got a tenured position. Like all countries, in all history, we have finite resources to allocate to any number of important and worthy things.

Knowing, as we do, that science is both awesome and awesomely important, we have an obligation to make the case for investment to the Australian people. We have to give them the confidence the investments they make are aligned to the aspirations they hold, however difficult and winding the journey.

We also have to put everyone – ministers, vice-chancellors, business investors, individual students – in a position to make intelligent decisions with the resources we have.

Today we have a system that operates largely on the premise that dumb luck (sometimes presented as "market signals") will secure sufficient capacity, of sufficient calibre, in all the areas we need it. Too often, we look backwards at what used to happen and presume that the future will be similar.

The market is a helpful way of allocating private investment to promising ideas – but only when the legwork has been done to get the ideas to the point of realisation. And only if investors know where to look in the first place.

The instincts of researchers about what's important may be sound. But how often does a group of researchers all agree, and agree to work together?

Establishing priorities

So we have many people making difficult choices on the basis of limited information and often in the context of straitened funds. Other countries have faced the same challenges, and responded in an intelligent way: they have established national priorities for science and research.

So, starting in late 2014, I convened a series of roundtables with representatives across the disciplines, with a view to learning from success. The Prime Minister announced the outcomes of that process in May: nine science and research priorities, each with three to four corresponding practical research challenges.

It is a significant step forward, and it is important that the implications are properly understood.

First, and most importantly, this is not, and never has been, an applied research agenda. You could frame the priorities to exclude basic research, but we haven't done that, for all the reasons that the advocates for basic research put forward: it is important; it is integral; it must be supported to find the breakthrough solutions to many of the challenges we face.

So the priorities cover the spectrum from basic to applied science, as they do in other countries, and as they should.

Second, I have never suggested that all of our research spend should be allocated to the priorities – simply enough to give us confidence that we are prepared.

The priorities are not exhaustive nor exclusive. Government departments and agencies will still have their own priorities, with a proportion of their effort focused on the national priorities relevant to their mission.

The process is evidence-based. With the priorities identified, we have now begun to map the capabilities corresponding to each of the priorities and their specific challenges. We will draw on both the data and the authority of disciplinary experts.

Once the mapping is complete, we will be in a position to judge the scale of the investment required to both address any gaps and act on any latent potential. Government agencies will be required to invest in these areas, through their R&D budgets, as part of their overarching missions, to the extent we need.

A third point put to me is that the research path is by definition unknowable. And if you can't predict the outcomes, you shouldn't try to plan the inputs. But I don't accept that the uncertainty of the journey makes it impossible to point to a destination.

Take the United States. 19 new cancer drugs have been approved by the US Food and Drug Administration in the past two years. They exist today because of federally funded research begun in 1971 under the rubric of the "War on Cancer".

Last year the US became the world's largest oil producer. That is because of fracking – which was in turn made possible by research begun in the wake of the OPEC oil embargo forty years ago.

Two examples of mission-led research, both delivering on their goals, both based on a great deal of basic research and pursuing paths that proved even more fruitful than their proponents expected.

In for the long haul

There is nothing revolutionary in the nine priorities for Australia. If I tell you that food, soil and water, transport, cyber-security, resources, energy, advanced manufacturing, environmental change and health and are important, you probably wouldn't disagree.

But now we have articulated them. We have recognised specific challenges within them. We are expecting departments and agencies of the Federal Government to act on them.

And I hope we can give both the nation, and the research sector, the confidence that talented people are at work on critical projects, with the support for the long-haul they deserve.