



Australian Government  
Department of Industry,  
Innovation and Science

Office of the  
Chief Economist

# Competition or collaboration: from which well does innovation spring?

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\* This paper was the basis of David Turvey's address to the Cooperative Research Centres (CRC) Association, Sydney 15<sup>th</sup> May, Aerial Conference Centre, University of Technology Sydney.

## Salutations

Good morning, it's a pleasure to be with you and thank you to the Chairman and CEO and the CRC Association for the invitation to be with you this morning.

I would like to begin by acknowledging the traditional custodians of the land on which we meet today and pay my respects to elders past and present.

I extend that respect to all Aboriginal and Torres Strait Islander peoples here today.

### Slide 1

The slide features a dark blue background with white text. In the top left corner, there is a logo for the Australian Government, Department of Industry, Innovation and Science, and the Office of the Chief Economist. The main title is 'Competition or collaboration – from which well does innovation spring?'. Below the title, the speaker's name 'David Turvey' is listed, followed by his title 'Office of the Chief Economist' and the date 'May 2018'. A small number '1' is in the bottom left, and a URL 'industry.gov.au/OCE' is in the bottom right.

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## Introduction

It is my pleasure to talk to you today about innovation through the prism of competition and collaboration.

In thinking about this topic, I naturally went to the innovation statistics that are commonly quoted that paint Australia in a relatively poor light, particularly with respect to our business to research collaboration effort.

I wondered whether businesses may not be collaborating because the Australian economic policy landscape has been so heavily dominated by competition policy for several decades.

Reforms that started in the early 1980s – floating the dollar, reduction in tariff protection, privatisation of public monopolies and strengthening of competition laws have been credited with driving Australia's strong productivity and economic growth during the 1990s.

But perhaps the competition mantra has become so pervasive that businesses are reluctant to collaborate?

Or are there other factors at play including the veracity of our innovation data?

I thought it was timely to explore the links between competition and collaboration and innovation – the role of government in supporting this activity – and the data and analysis we use to help shape effective policy.

Hence the title of today's speech: *Competition or collaboration: from which well does innovation spring?*

The conclusion I hope you draw from this session is that they are interconnected – that both competition and collaboration streams feed the well of innovation.

That means they are both important for policy and the long term prosperity of Australia.

But we need better data and evidence if we are really going to make sure policy makes a difference.

## Innovation

Let's start with innovation and why it is important.

According to estimates by the Organisation for Economic Co-operation and Development, as much as 50 per cent of long-term economic growth of its member countries can be attributed to innovation and this contribution is expected to grow.

Australian micro level data supports the macro view that innovation is crucial for economic growth.

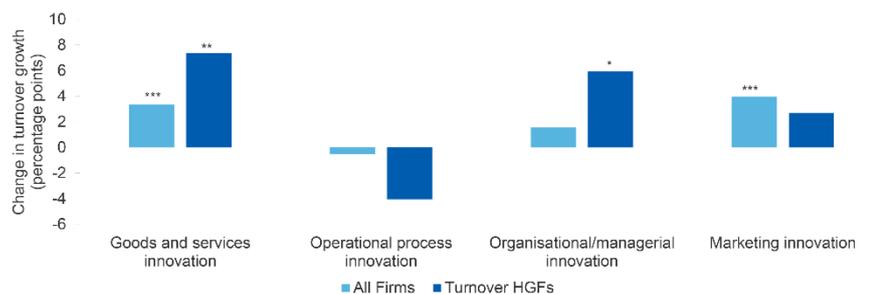
ABS data shows that innovation-active firms are more likely to report increases in sales, profitability, productivity and firm size than firms that do not innovate.

### Slide 2

#### Innovation is important for firm growth

Innovation in goods and services, and marketing has a positive impact on firm growth

Impact on turnover from undertaking different types of innovation, by turnover growth category, 2005–06 to 2012–13



Notes: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Source: ABS (2017) Business Longitudinal Analysis Data Environment (BLADE). Analysis by Department of Industry, Innovation and Science.

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And research conducted in my department shows that across all firms, innovation in goods and services increased turnover growth by an average of 3.3 percentage points, while innovation in marketing increased turnover growth by around 4 percentage points.

Further for firms identified as high growth firms – those growing faster than 20 per cent per annum for three consecutive years – innovation in goods and services increased turnover growth by around 7.4 percentage points.<sup>1</sup>

Simply put, innovation has significant benefits to the economy and to firms within the economy.

Fortunately many Australian businesses are recognising this.

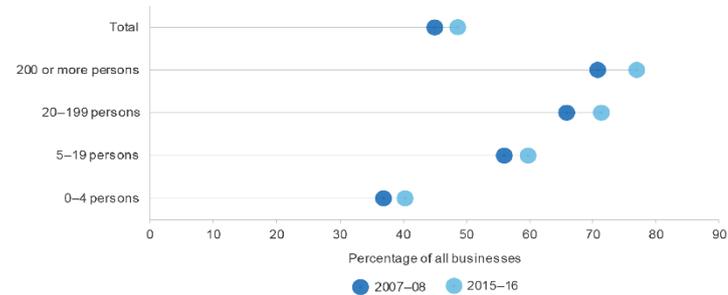
<sup>1</sup> Australian Government (2017) *Australian Innovation System Report 2017*, Department of Industry, Innovation and Science, Office of the Chief Economist, Canberra, pp. 56–63

### Slide 3

#### Innovation activity in Australia – firm level

The number of innovation-active firms is increasing across all firm sizes

**Innovation-active businesses, by business size, 2007–08 and 2015–16**



Source: ABS (2017) *Summary of IT Use and Innovation in Australian Businesses, 2015–16 and 2007–08*, cat. no. 8166.0

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In 2015–16, nearly 49 per cent of the employing firms in Australia were innovation-active — and this figure has been gradually increasing over time.

And it's relatively high by international standards.

How can we help more Australian firms to innovate and stay competitive?

This is a key question that Australian governments have grappled with for a long time, particularly given the slowdown in productivity and economic growth in recent decades.

As an economist, you might expect me to say that market forces should create the incentives for businesses to innovate to maximise their profits.

But we know that markets often don't work the way the text books say they should.

There is an imperative for government to address market failures and create the right conditions for businesses and the economy to grow.

Governments need to put in place effective incentives to encourage persistent and frequent innovations, and help businesses manage disruptions that may come from innovation.

But to achieve this we need a strong evidence base.

The robustness of the data we collect, and the research and evaluation activities we undertake with this data, is crucial to supporting good innovation policy.

Let's go further into the innovation wellspring and look at the streams of competition and collaboration.

First to competition.

## Competition

Competition is generally considered to be a key factor in a well-functioning economy.

It pushes businesses to be efficient, to reduce costs and invest to increase profitability.

Competition also helps keep prices low for consumers, gives them more choice and prevents consumers from being exploited by businesses exercising market power.

But it turns out that the relationship between competition and innovation isn't that straightforward.

Joseph Schumpeter — one of the key economists to study innovation — argued that economic growth and development depends primarily on increases in productivity generated through innovation.

He introduced the idea of creative destruction — whereby innovation is driven by entry and exit of entrepreneurial firms in the market, under strong competitive pressures.

Innovative firms survive and non-innovative ones die.

Lack of competitive pressures may breed bureaucratic inertia and discourage innovation.<sup>2</sup>

But Schumpeter also reasoned that firms are motivated to invest in research and development under the expectation of securing monopoly rents from their discoveries.

To do so, companies need to be able to protect the returns on their innovation investments.

He suggested that profits derived from the possession of market power provides firms with the internal financial resources necessary to invest in innovative activity.

While there is a lack of consensus on exactly *how* competition affects innovation<sup>3</sup> there is broad agreement that competition spurs innovation.

And this is supported by the data — here and abroad — which points to a positive correlation between product market competition and productivity growth within a firm or industry.<sup>4</sup>

Research in the UK has shown foreign entry into the UK market has led to faster total factor productivity growth in domestic firms and led to faster aggregate productivity growth.

New firms can be an important way for new products and new production methods to be introduced into markets and can drive out poor performers.

New firms (or the threat of new firms) can also spur incumbent firms to improve productivity.<sup>5</sup>

But there is also evidence regarding complexity of the relationship between competition and innovation.

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<sup>2</sup> Scherer F M (1980) *Industrial market structure and economic performance*, 2nd edition, Chicago, IL: Rand McNally

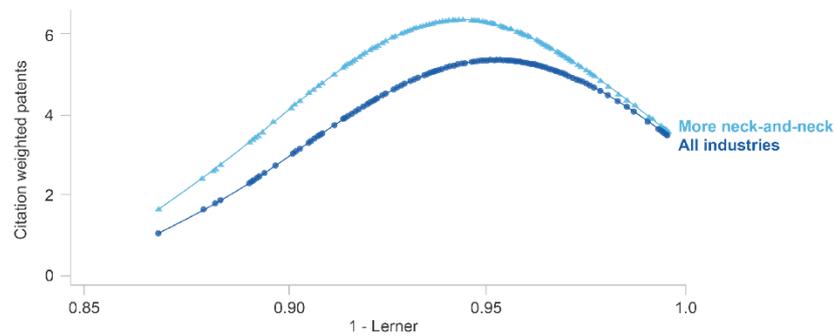
<sup>3</sup> Cohen W M (2010) "Fifty Years of Empirical Studies of Innovative Activity and Performance," *Handbook of the Economics of Innovation*, Vol. 1, pp. 129–213

<sup>4</sup> Blundell R, Griffith R and Van Reenen J (1995) "Dynamic Count Data Models of Technological Innovation," *Economic Journal*, Vol. 105, No. 429 (March 1995), pp. 333–344

<sup>5</sup> Aghion P, *et al.* (2004) "Entry and Productivity Growth: Evidence from Microlevel Panel Data," *Journal of the European Economic Association*, Vol. 2, No. 2/3, Papers and Proceedings of the Eighteenth Annual Congress of the European Economic Association (April-May 2004), pp. 265–276

## Slide 4

### Inverted U-shape – competition and innovation



Note:  $cjt$  is the competition measure based on Leamers Index  
Source: Adapted from Aghion P, et al. (2005) *Competition and Innovation: an Inverted-U Relationship*

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This figure shows the competition-innovation relationship taking the form of an inverted-U shape, with industries distributed across both the increasing and decreasing sections of the U-shape.<sup>6</sup>

The figure plots patents on the vertical axis and a measure of competition (1-Lerner Index) on the horizontal axis — the further right you go, the more competitive the market is.

The study concludes that more competition induces some firms to innovate to escape competition from close rivals.

This has a positive effect on productivity.

However, in sectors where some firms are clear leaders and others are playing catch up, an increase in competition reduces the gains that the leaders get from innovation, reducing their incentive to innovate.

And innovation appears to be stronger at any level of competition when firms in the industry are similar in terms of technological sophistication – the neck-and-neck firms in the chart.

The overall relationship between competition and innovation then depends on the industry composition and types of firms in each industry.

If the degree of competition is low to begin with, an increase in competition should result in faster innovation rates. And vice versa.

Or more simply, too much competition can be bad for innovation, but so can too little competition.

## Australian results

So what are the implications for Australia?

I mentioned before that Australia has suffered from a slowdown in productivity growth since the mid-90s.

Have changes in the competition landscape had a role in that?

A recent study by the Grattan Institute found that market power of firms in large, concentrated sectors in Australia is not that different from many other countries.

<sup>6</sup> Aghion P, et al. (2005) "Competition and Innovation: an Inverted-U Relationship," *The Quarterly Journal of Economics*, Vol. 120, No. 2 (May 2005), pp. 701–728

And this hasn't changed much in recent years.

Barriers to entry and market concentration account for only a small fraction of the variation in profit across firms.

But firms in some sectors that are protected by barriers to entry, do earn persistent high profits.<sup>7</sup>

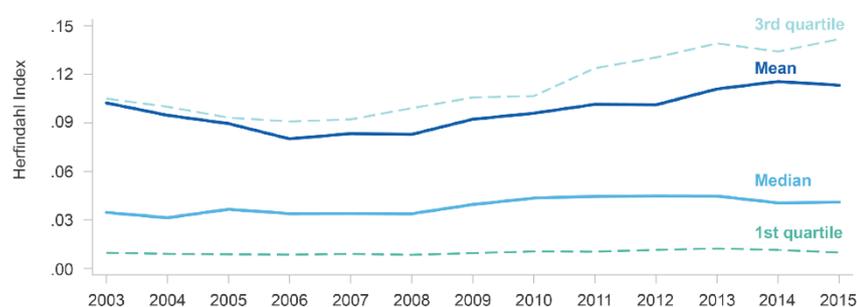
My department has been exploring this question using the Business Longitudinal Analysis Data Environment — also known as BLADE.

BLADE has extensive firm level data from tax records and ABS business surveys.

Amongst other things, we have been using it to study how competition has changed in Australia over time.

## Slide 5

### Competition in Australia's market sector



Source: Upcoming OCE research based on BLADE analysis

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Using BLADE we have found that the average market concentration in Australia has increased by a small amount from 2004 to 2014.

The increase in market concentration has been in tandem with a drop in firm entry.

But it would appear that only a small fraction of the drop in firm entry can be associated with the increasing market concentration.

Unfortunately there is scant evidence on whether changes in the competition landscape are having any impact on our innovation performance.

My office is undertaking a research project that explores the role of competition in innovation and whether competition affects the ability of firms to undertake innovation.

## What about policy?

It is important to recognise that competition policy is broader than just innovation and has many responsibilities and dimensions.

According to the Harper Review, competition policy should, among other things, “work in the long-term interests of consumers, and foster diversity and choice

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<sup>7</sup> Minifie J, Chisholm C and Percival L (2017) *Competition in Australia: Too little of a good thing?* Grattan Institute (December 2007)

as well as encouraging innovation, entrepreneurship and the entry of new firms".<sup>8</sup>

Given such broad responsibilities for competition policy, it is a difficult tool to wield to stimulate innovation.

Competition policy should accommodate the new sources of competition as technology evolves, and still remain flexible to strike the right balance between supporting consumer welfare and providing incentives to innovate.

Another component of competition policy that is more squarely aimed at innovation is intellectual property protection.

IP rights create certainty and incentives for businesses to innovate as they allow firms to derive financial benefit from inventions and creations and support other firms and individuals to use this IP.

The Productivity Commission's *Inquiry on Intellectual Property Arrangements* suggests that Australia's current IP system may require adjustment so it avoids stifling competition.

However, as outlined in the Harper Review of Competition Policy, determining the appropriate 'extent' of IP protection is complex.<sup>9</sup>

Here, too much IP protection can stifle competition and too little can diminish firm's incentives to innovate – a similar trend to the inverted U shape we saw earlier.

Colleagues in the department and IP Australia are exploring these issues.

For example, IP Australia is undertaking a project that will look at whether there is a performance premium for firms that exercise IP rights.

This work will help us understand how our IP system impacts on competition and innovation.

With more unit level data on Australian firms, we can continue to expand our research and analysis into the dynamics of competition and use this to inform policy settings.

## Collaboration

So what about the other stream feeding this well of innovation – collaboration.

Collaboration's link to innovation is more straightforward and an active role for government in supporting collaboration is clearer than in competition policy.

Knowledge can be a highly specialised and fragmented resource.

Conventional markets are not always effective at supporting knowledge transfer and spillovers.

In order to translate knowledge into economic gains, support is required to connect the different actors.

So there is a clear role for government to intervene.

There is strong evidence on the positive economic impacts of collaboration, including for SMEs.

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<sup>8</sup> Harper I, *et al.* (2015) *Competition Policy Review*, Final Report (March 2015), Australian Government, pp. 15–16

<sup>9</sup> Harper I, *et al.* (2015) *Competition Policy Review*, Final Report (March 2015), Australian Government, p. 103

International studies have found that while business to researcher collaboration helps to improve innovation for firms of all sizes, this is particularly the case for small firms.

Collaboration helps to reduce costs and overcome market imperfections for SMEs while boosting capabilities and reducing material disadvantages compared to large firms.<sup>10</sup>

A European study showed that small firms doubled their likelihood of producing technological innovations when they collaborated while for large firms the increase was around 9 percent.<sup>11</sup>

The study found that vertical collaboration—with suppliers and clients—has the greatest impact on firm innovativeness.

And research on Dutch firms<sup>12</sup> also found that business to university collaboration is instrumental in creating innovations generating sales of products that are novel to the market, which result in firm growth.

In Australia, the evidence is similarly positive.

## Australian data

Universities Australia released research in February this year that pointed to a \$4.50 return for each dollar Australian companies invest in university research.

The study suggested that each business that collaborates with a university gets around \$660,000 per year in benefit from doing so.

The Australian Industry Group report *Joining Forces* also found innovation is an important strategy in how businesses stay competitive and that collaboration makes innovation easier and more successful.

In partnership with Swinburne University, my Department undertook research that shows collaboration is an important driver of productivity growth.

Using data from around 7,000 Australian small and medium enterprises we found a significant link between collaboration on innovation and productivity growth — the impact of collaboration on innovation increased annual productivity growth by 4.1 per cent.<sup>13</sup>

We have other research in the pipeline that will build the evidence base and deepen our understanding of the relationship between collaboration and innovation.

## How does Australia perform?

Having established that collaboration is important for firm performance, how do Australian firms perform?

The Australian Innovation System Report that my department produces notes that Australian businesses do not collaborate on innovation as frequently or as deeply as their overseas counterparts based on a range of indicators – the 2017

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<sup>10</sup> Nieto M J and Santamaria L (2010) “Technological Collaboration: Bridging the Innovation Gap between Small and Large Firms,” *Journal of Small Business Management*, Vol. 48, Issue 1 (January 2010), pp. 44–69

<sup>11</sup> Ibid. pp. 44–69

<sup>12</sup> Belderbos R, Carree M and Lokshin B (2004) “Cooperative R&D and firm performance,” *Research Policy*, Vol. 33, Issue 10 (December 2004), pp. 1477–1492

<sup>13</sup> Australian Government (2017) *Australian Innovation System Report 2017*, Department of Industry, Innovation and Science, Office of the Chief Economist, Canberra, p. 15

Australian Innovation System Report included 12 indicators of Business-Research collaboration in Australia.

We have some areas of strength such as the percentage of Government performed R&D that is financed by industry and the percentage of patent applications attributed to industry and universities.

## Slide 6

### Collaboration indicators

Measuring the state of business-research collaboration in Australia



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But the data suggests there is a lot of room to improve.

It is estimated that 86.3 per cent of Australia's innovation-active businesses undertook no collaboration at all in 2015–16.

In terms of business-business collaboration on product and process innovation, Australia ranks 25th out of 32 OECD countries, with less than one in four innovative firms collaborating.

On the percentage of innovation-active SMEs collaborating on innovation with higher education or other non-commercial research institutions, we are also 27th out of 27 in the OECD.

So the majority of R&D activities are being conducted in-house, not involving partnership organisations.

Now, there are some problems with our existing statistics, as the Chief Scientist, Alan Finkel pointed out in his speech to the AFR Innovation Summit in September last year.

I'm happy to elaborate on those issues later if you like.

And for the careful readers of the budget, you would already know we are going to undertake some work over the coming year to improve the way we measure innovation, including the collaboration statistics.

But despite these problems, there are enough data points and anecdotal evidence to suggest that we could be doing better.

So why don't businesses collaborate more?

The data we have suggests most businesses do not collaborate because either they do not perceive it is beneficial to them or they are simply unaware of how such collaboration might improve their business performance.

We are going to have new data coming from the ABS' Business Characteristics Survey later this year to help us better understand the barriers.

Meanwhile, we are also collecting new evidence.

My department undertook a qualitative research project in 2017 on business to researcher collaboration through our internal innovation lab, known as BizLab, using a design thinking methodology.

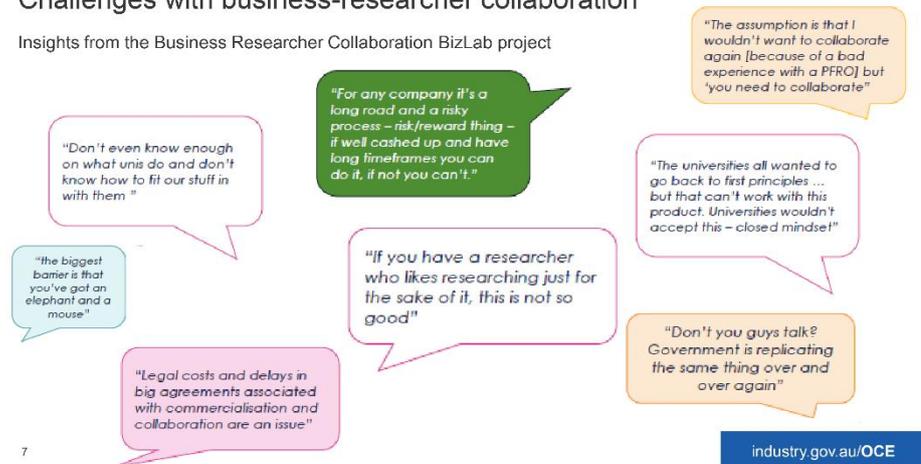
This ethnographic study involved thirty small and medium enterprises from across the country and various sectors to refresh our understanding of what helps and hinders businesses in collaborating with our publicly funded research organisations.

For many firms interviewed, collaboration was seen as integral to their commercial success and they collaborated in a range of ways, including through formal joint arrangements, fee for service research contracts and student placements.

## Slide 7

### Challenges with business-researcher collaboration

Insights from the Business Researcher Collaboration BizLab project



However, some businesses were not aware of the benefits of collaboration, many had difficulty finding research partners, and others lacked the skills required to manage projects and successfully translate research results into commercial outcomes.

A key finding from this research is that businesses are looking for a 'warm handshake' – a personal connection, someone to help guide them through the collaboration process.

We also found that some research organisations are not responsive to business needs and lack business acumen and they also struggle to connect with a suitable collaboration partner.

The next stage of this project is to develop potential policy solutions, and that work is almost complete.

# Evaluation

## Slide 8

### Commonwealth collaboration initiatives

<b>Department of Industry, Innovation and Science</b>
Cooperative Research Centres, Entrepreneurs' Program/Innovation Connections, Advanced Manufacturing Fund, Global Innovation Strategy
<b>Department of Education and Training</b>
Research Block Grants, Australian Mathematical Sciences Institute National Research Internships Program, National Collaborative Research Infrastructure Strategy, Academic Centres of Cyber Security Excellence
<b>Australian Research Council</b>
Linkage Program - Centres of Excellence Scheme, Industrial Transformation Research Program, Linkage Infrastructure, Equipment and Facilities Scheme, Linkage Projects, Engagement and Impact Assessment tool
<b>Department of Health</b>
Biomedical Translation Fund, Medical Research Future Fund



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But at the Commonwealth government level, there is already a wide range of programs aimed at promoting collaboration on innovation.

A recent stocktake of programs counted over thirty programs and sub programs across ten different agencies — each one targeted towards fostering some form of collaboration and addressing some aspects of market failure.

On top of this there are numerous state level programs.

So while I strongly support the BizLab work on developing and testing new ideas to promote collaboration, I would really like to see better evidence about what works within the existing program suite.

We do have some good evidence for some programs.

As it turns out, the CRC program is one of those.

The 2012 Allens review found that CRC produced technologies, products and processes generated \$8.6 billion of impacts already materialised from 1991 to 2012 and a further \$5.9 billion of impacts estimated to occur over the five years to 2017.

It also found that the program had a high benefit to cost ratio – of 3 to 1 and many benefits came in the form of export growth.

In terms of collaboration effort, CRCs are – as we would expect – doing their fair share of heavy lifting.

There are 1174 active collaborations across current CRCs and CRC-Ps.

859 research and industry organisations are collaborating in current CRCs which includes 57 international organisations spanning 17 countries.

And we know 315 collaborations between industry and researchers have been supported by CRC Projects.

This sort of data is important for government to understand the effectiveness of our programs.

And we want to build this knowledge base further.

As some of you know, the Department is currently undertaking a monitoring evaluation of the CRC program.

A key focus of the evaluation is to look at the data we are collecting and how we are measuring the success of the program.

Improving the data will put us in a better position to undertake impact evaluations in future.

We are scheduled to do another impact evaluation in 2018–19, so the current work should set us up well for that.

We are also currently undertaking a monitoring evaluation of the Entrepreneurs Program, which includes analysis of the Innovation Connections element which is strongly focused on business research collaboration.

Early results from program participants in this program also suggest strong positive impacts.

I'm sure there are other evaluations of other programs listed on this slide.

The point is that we need comprehensive, comparable evidence that can help inform future planning, assessment and decision-making.

For the Industry portfolio, we are instituting a rigorous approach to program evaluation, which includes making sure programs are set up well at the start to be evaluated down the track and regular check-in evaluations.

We are also increasingly using sophisticated data analytics techniques with the firm level data from BLADE to do impact evaluation.

This involves comparing the firms that participated in a program with a counterfactual or control group.

We need to do evaluations, data collection, research and analysis to implement good policies and programs and get the best value for taxpayer's money.

## **Interplay between collaboration and competition**

So where does this leave us? How do the streams of competition and collaboration interact?

The interplay of collaboration and competition shows that they are both important parts of the ecosystem for our economy.

People often think that competition happens at the expense of collaboration.

But this is not the case and we need to change this mindset.

Collaboration and competition do not have to be mutually exclusive and they are not.

Government has a role to support both competition and collaboration based on economic welfare and market failures.

Fostering competition can help firms innovate more, reduce production costs and increase prosperity in the economy.

But finding the right level of protection from competition to stimulate investment is tricky.

Collaboration helps increase the likelihood of firms innovating and increases spill over effects.

This is especially true for small and medium sized firms — which face market constraints but are some of the biggest beneficiaries of collaboration.

We saw collaboration is a way for SMEs to compete with the resources of large firms.

So in a way collaboration can also help increase competition.

But we need better evidence on what works in terms of government policies and we should make sure this evidence is put to good use in developing new initiatives in this space.

## **Conclude**

In conclusion, given that innovation is vital for increasing prosperity and creating growth, government policy needs to help create a collaborative and competitive innovation ecosystem that puts Australia closer to the frontier of innovation.

But we have to know more about what works so we can help direct scarce government resources to the interventions that have the most impact.

Thank you.