



Measuring the impact of research

The context for metric development

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Research has impact

- Impacts are diverse
- Achieved through a diversity of pathways
- Can take a long time
- Depend on prior and current research
- Are contingent on non-research factors
- Measuring the contribution of research or a particular research project to an identified impact is difficult

Purpose of impact metrics

- Demonstrate that research has impact
- Measure the impact that research has had
- Measure the impact of a particular program, institution or project
 - Should focus on what impact the research aimed to achieve
- Understand the means through which research has had impact

Research impact can take many forms

- Tend to focus on the positive
- Different sectors aim to achieve different kinds of impact
 - Business expenditure on R&D 2008-09
 - \$16.9 billion
 - Higher education expenditure on R&D 2008-09
 - \$6.7 billion

Socio-economic objectives

	Business	Higher Education
Economic development	94.4	23.8
Society	3.0	49.7
Environment	1.0	7.8
Expanding knowledge	0.1	17.9

Type of activity

- Pure basic research
 - 0.5 per cent of business R&D
 - business performs 4 per cent of national effort
 - 28.9 per cent of higher education research
 - Higher education performs 86.4 per cent of national effort
- Aims to create opportunities beyond those that currently exist

Type of activity

- Experimental development
 - 60.5 per cent of business R&D
 - Business performs 89.1 per cent of national effort
 - 9.2 per cent of higher education research
 - Higher education performs 5 per cent of national effort
- Aims to respond to already identified and characterised opportunities

Planning research for impact

- Overly optimistic
 - A few decades hence, energy may be free, just like unmetered air. (John von Neumann 1956)
- Overly pessimistic
 - There is not the slightest indication that [nuclear energy] will ever be obtainable. It would mean that the atom would have to be shattered at will. (Albert Einstein 1932)
 - Anyone who expects a source of power from the transformation of [the nuclei of] atoms is talking moonshine (Lord Rutherford 1933)

Planning research for impact

- Where did that come from?
 - Prediction is very difficult, especially about the future (Niels Bohr) (Yogi Berra)
 - [X-rays] will prove to be a hoax. (Lord Kelvin 1883)
 - Quantum mechanics
 - Theory of relativity
 - *Helicobacter pylori* as the cause of gastro-duodenal ulcers
 - Internet

Research v Researcher impact

- Research is competitive
 - If you do not get there, someone else will
- Research projects do not exist in isolation
 - How many beans make five is an immense question, depending on how many preliminary beans preceded them (Christopher Fry)
- Hindsight studies demonstrate a single impact may rely on research from many disciplines and institutions.

Research v researcher impact

- Impact comes from actions other than those by researchers
 - Route to impact does not have to involve researchers
 - Researchers might not have had the imagination to envisage the potential uses
 - Lasers – ‘a solution looking for a purpose’
- Investment to achieve impact may be considerably greater than cost of research

Likelihood of impact

- 3000 raw ideas
- 300 receive minimal work
- 125 become small projects (potential patent)
- 9 become significant development projects
- 4 advance to major development
- 1.7 reach commercial launch
- 59% of these achieve economic profit.

Likelihood of impact

- Venture capital experience – a Highland Capital Partners
 - Receive 10 000 plausible business plans pa
 - Conduct around 1000 meetings
 - Arrange 400 company visits
 - Invest in 10 to 20
- If one investment a year makes the grade, success rate is 1 in 10 000 to 1 in 5000

Pathways to business innovation

Source of idea	Per cent
Universities or other HE institutions	2.6
Government agencies	4.1
Private non-profit research institutions	1.0
Commercial labs /R&D enterprises	1.5
Web sites, journals, research papers, publications	27.8
Professional conferences, seminars, meetings, trade shows	21.6
Industry associations	18.1
Consultants	17.5
Within the business	60.7
Customers	39.2
Suppliers	30.2

Innovation in Australian Business, 2008-09

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/ProductsbyCatalogue/06B08353E0EABA96CA25712A00161216?OpenDocument>

Excellence leads to impact

- Excellence is a precondition
 - A study of papers cited in Australian owned US patents showed that papers highly cited in patents are highly cited in papers in high impact journals (F Narin et al 2000)
- But only because excellence is context dependent
 - Criteria for excellence in business research very different from those applied to pure research

Conclusion

- Be clear why you want to measure impact
- Look for the impacts the research aimed to achieve
- Think carefully about the boundaries of the impacts you want to assess
- Quantitative assessments at the project level mean little – demonstrating impact is easy, measuring it is not.

Conclusion

- There's no sense in being precise when you don't even know what you're talking about. (John von Neumann)