

2 September 2004

The AIC submission to the Working Group on the Metrics of Commercialisation.

As you are aware, the Australian Institute for Commercialisation was contracted by DEST to implement and undertake a survey on the commercialisation performance of publicly funded research organizations for 2001 and 2002.

As a result of implementing those surveys under instructions from the DEST Steering Committee, we worked with over one hundred research institutions to collect commercialisation performance data, collate the results, and prepare a final report according to DEST specifications. We learned a considerable amount not only about the metrics themselves, but also about areas relating to the survey instrument methodology and process that should be followed to optimize measurement outcomes and to achieve best institutional 'buy-in'. Metrics are of no use unless they can be reported and gathered. In our view, much of the subsequent rework that has apparently been necessary in the 2001 and 2002 surveys, and caused considerable delay in its release, could have been avoided had a better process been followed from the outset. We would suggest that the hands-on experience we gained could be a useful learning experience for future Steering Committees. We are therefore somewhat surprised that we have not been invited to be part of your Working Group.

We hope that the thoughts below and suggestions on the attached spreadsheet will prove useful in improving the metrics themselves.

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Submission to the Metrics of Commercialisation Working Group

Current systems for measuring commercialisation outcomes tend to focus on the *economic* returns from commercialisation related to wealth creation – for instance, the number of new companies formed and the amount of licensing income generated. These systems imply a definition of commercialisation as the derivation of economic returns from our R&D effort. We explore how such *economic* returns might be captured more broadly in the attached spreadsheet, and also further below.

Broader definitions of the concept of commercialisation might attempt to capture other methods of adoption of research outcomes – for instance technology diffusion, social, and environmental benefit. If these broader definitions are adopted, an entire suite of other metrics would need to be introduced to measure commercialisation.

But before we can begin to resolve these issues, an important first step is to determine exactly what we mean by the term “commercialisation”.

At the AIC we use the ‘commercialisation’ word each day. Yet only last month a leading business luminary pointed out that in all his time working in the US, he had never heard the word used once. In the US and Europe, the equivalent expression would be product development followed by business development. These are natural and implicit processes that companies undertake as part of their normal business. The processes start from a source of ideas, and if combined with a business application and enough financial capital, are part of a natural lifecycle required for companies to grow and prosper.

Commercialisation is indeed a contrived term in some sense, and in Australia at least, has come to represent to most stakeholders a specific form of product and business development, one typically driven by ideas that are sourced from a university, Cooperative Research Centre, or medical research institute. Such ideas are typically still seeking capital and perhaps even a market application.

It is the view of the AIC, therefore, that the starting point for the Working Group must be to agree a firm definition of the concept of commercialisation. Whether this definition is narrow or broad will determine the scope of the metrics collected. Our current assumption is that we are attempting to measure returns from publicly funded research.

Following is a brief position statement on “measurement” that may be useful to the Working Group.

THE AIC's POSITION ON "MEASUREMENT"

A general principle of good governance is:

"If you can't measure it, you can't manage it"

Australia is not correctly measuring the outcomes of commercialisation of its R&D spend and this results in an informational black hole which is inhibiting our development as a first tier innovator country.

We suggest the following benefits need to be quantified and tracked:

1. The **macroeconomic benefits** of additional public and private R&D spending
 - existing overseas studies need to be reviewed and an attempt made to do similar calculations for Australia – see the AIC's Erskine report and the Enquist reports for references.
2. The **benefits of existing commercialisation efforts**. Here the focus should be on value-added, rather than component outputs such as patents granted, licences or spin-out companies created. In particular:
 - The 2002 National Commercialisation Survey needs to be repeated with additional questions asked about value-creation (asking the right questions will influence thinking even if there are a number of NA replies.)
 - As well as asking participants to measure "overall value-added", particular questions can be asked, following Imperial College precedents, including:
 - No. of staff in spinouts (outcome measure of employment)
 - No of outside directors in spin-outs (ability to attract independent directors as a measure of viability)
 - Value of spin-outs as revealed by most recent financing of deals
 - For licences "value" could be estimated by applying an earnings multiple to annual revenue
 - For international patents granted, a research-based "value per patent" measure could perhaps be applied
 - To capture the value and efficiency of the "tech transfer" process, eg between CRCs and industrial partners, further discussion and research is needed. Interorganisational and intraorganisational transfers will require measures to define and control the process.
 - The sustainability of the outcomes should also be considered. For instance, rather than measuring the number of start-up companies created, the number of start-up companies surviving (over various time intervals) should also be tracked.
3. "Value added" in **existing private corporations** as a result of their R&D spending is especially hard to come to grips with, and may need to rely on some version of the approach in point 1 above.
4. A competent attempt to measure **value added as a result of past public R&D spending** could be especially useful. Such a study has been commissioned by the AIC (see 'The Economic Impact of the Commercialisation of Publicly Funded R&D in Australia'), and needs to come to terms with the long lead times (indeed to provide information on the timeframes involved) as well as the fact that not every R&D project will

produce commercial outcomes. (Raising the “success ratio” will be a vital part of improving Australia’s overall growth rate.)

The AIC’s work with Professors Stern and Gans should also be noted. Further work could be undertaken to consolidate and extend their **National Innovative Capacity** framework and relate its results more clearly to measurement items numbers 1 to 4 above, as well as to Australia’s overall competitiveness.

APPENDIX MEASUREMENT ENVIRONMENT

Overview

In a number of studies **innovation** is identified as the driver for half of all economic growth. Despite general acceptance of this statement very little work has been done on the relationships between inputs to innovation driven growth (eg expenditure on R&D) and the results in economic growth terms. The Productivity Commission is currently undertaking research in this area.

Currently data collection on innovation-related expenditure and its benefits is very fragmented has a tendency to be input rather than results focused. This results in a series of indexes of indicators rather than measures of outcomes.

Background

Governments have scarce resources to achieve a wide range of social and economic outcomes. In order manage these resources to the best outcomes governments need to be able to measure the results of their expenditures.

Unlike private sector companies, governments also need to be cognizant of increasing the public good – which tends to be measured in terms of social and environmental returns as well as straight economic gain. The triple bottom line approach has been adopted by most Australian jurisdictions when justifying policy positions and budget bids.

Like other countries, Australian governments are struggling with need to measure the contribution of innovation related expenditure to economic growth outcomes, in order to inform policy development and ultimately investment decisions for the effective implementation of those policies.

Measurement of innovation is in its infancy in Australia. Currently there are a number of activities aimed at achieving this aim and there are a series of **innovation indicators** but Australia lacks any framework that ties these indicators to actual economic growth or increase in public good.

Current measures suffer from a tendency to be input based and lack the ability to account for time lapse between investment and outcome. In fact the outcome of economic growth has generally not been broken down into those indicators (eg increased highly skilled jobs, export earnings, growth in global market share) which do have a causal relationship to innovation based inputs and those which are secondary influences.

This creates an issue for proponents wishing to be involved in the formulation and implementation of effective innovation policy.

Current Environment

Within the Australia there are a number of activities aimed at addressing these issues:

- National Survey of Research Commercialisation Performance 2000/ 2001/ 2002; input based measures of the number of spinouts and licences, and giving a measure of value based on research expenditure by spinout/licence – fails to account for timelag – ie 2000 investment is not cause of 2000 spinouts.

- Australian Innovation Scorecard: benchmarks Australia's performance on fifteen headline indicators against other OECD countries against input indicators and no analysis of how this contributes to economic growth,
- Development of ABS Innovation statistics – based on OECD statistical indicators which are input based such as increased use of ICT – not causal relationship explored in terms of value creation/added;
- National Mapping Exercise, federal attempt to map the innovation system, a component by component approach that could be used to map the interaction between the parts;
- National Graduate School of Management project on research conducted by regions(states), breaks down research expenditure by type for both public and private sectors, will provide assistance in determining niche areas of strength for future policy focus
- Output metrics being developed by the IR&D Board, Austrade.

Internationally there are also a number of efforts to measure innovations contribution to economic growth:

- WEF Global Competitiveness Report which takes OECD, IMF and World Bank indicators and creates a number of indexes for Current Competitiveness, Growth Competitiveness and National Innovative Capacity. With the exception of the National Innovative Capacity Project these are indexes of indicators and do not explore the underlying relationship between these inputs and economic growth – it is assumed but no identification of how much of one leads to increase in another.
- NISTEP measurement system used by Japan to measure the contribution of science and technology to the economy, attempts to analyse indicators in a way which provides a measure of how these indicators will contribute this is then used to guide policy – has some methodological errors in relation to double counting of impact of inputs due to indicators used;

Against this background the AIC has conducted a number of activities to address gaps in the measurement of innovation and its benefits to the economy:

- Study on the return on investment from public sector research and development – aims to identify a series of economic measures that have a causal relation to R&D investment, the timeframe between investment and outcome and a multiplier effect that can be applied. This will be based on case studies of existing companies and is underway with the Melbourne Business School.
- (Gans and Stern) Innovative Capacity Framework: extends the work of Stern and Porter on national innovative capacity to examine the weaknesses in the Australian innovation system and identifying potential solutions. This ties indicators to outcomes that have been demonstrated to effect economic competitiveness.

Future Work

The AIC is floating a proposal to examine the UK Chancellor's 'Science and Innovation Investment Framework 2004-2014', in which the UK Government aims to increase the R&D intensity from 1.9% to 2.5% of GDP by 2014. The economic benefits and metrics to support this framework, and their applicability to the Australian environment, require study and consideration.

This must be presented in a coherent framework which allows informed decisions about the allocation of both government and private resources to be related to both triple bottom line

and conventional accounting of value for money/cost effectiveness. The development of such a framework will be dependent on the drawing together of multiple analyses that are currently being conducted to determine value from innovation.

The case must also address the question of causality – at present we have a series of unproven hypothesis about the linkage between innovation and economic growth and very little information about the interactions between innovation and other inputs to the economy. Governments need to be reassured that they are getting best value for money out of expenditure – at present the case is circumstantial rather than proven.

References:

WEF Global Competitiveness Report 2002

Assessing Australia's Innovative Capacity in the 21st Century: J Gans and S Stern, May 2003

Critical Factors In Successful R&D An International Comparison: Erskinomics Consulting Pty Ltd

Scope of 2004 Innovation Survey ABS Consultation Paper – May 2003

The Economic Impact of Science and Technology: A Survey of the Literature on Methodologies Dr Steve Pike, Systems and Value Pty Ltd

Mapping Australian Science and Innovation DEST