

One Health CRC's Evaluation Framework

An introduction into
research evaluation

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Executive Summary

The aim of this document is to provide an introduction into research evaluation by explaining the role economics plays and interacts with other evaluation techniques to help ensure a successful research and development program. The two critical aspects of research evaluation are:

- **Why is the evaluation being done?**
- **The communication between the researcher and the evaluator.**

Failure to address either aspect will result in an evaluation that may end up becoming a waste of time.

Research evaluation provides a mechanism to understand the issues involved with all stages of research from the initial ideas, the work undertaken to the final adoption of the end product. This understanding then provides information concerning the costs associated with research, the benefits from research, how the research was adopted by the end user and how the research process went for both the researcher and investment partners.

Research evaluation is often defined as the dollars made from the funds spent undertaking the research. This approach ignores the true impact of research and how well the research meets the needs of and interacted with the key stakeholders. Although useful it can be exceptionally poorly done and this document contains a number of issues and clarifications aimed at negating the dreaded economic black box and smoke and mirror techniques that you may have experienced in the past.

By providing this introduction to the proposed research evaluation framework it is hoped that this document will stimulate discussion about how to incorporate research evaluation into the CRC.

Some common terminology:

- Costs = project costs
- Benefits = definition of the research solution
- Adoption = the proportion of the benefits you can claim
- Monitoring & evaluation = method to increase adoption

Acronym List

Adoption	The rate at which the research is taken up.
Benefits	Benefits refer to the \$ benefit made from the research
B/C Ratio	Benefit Cost Ratio = total discounted benefits/total discounted costs
CBA	Cost Benefit Analysis
Costs	Costs are the project costs from doing the research
Discount rate	The rate at which all values (future and past values)are brought back today's values
Ex-ante	An evaluation undertaken before the project starts
Ex-post	An evaluation that occurs once the funding has been spent
IRR	Internal Rate of Return: The discount rate at which the NPV = \$0
NPV	Net Present Value = Amount of money made from the research investment
Obsolescence	The rate at which people stop using your research

Background to the study

This report has been commissioned by the Biosecurity CRC for Emerging Infectious Diseases (Biosecurity CRC) to introduce the evaluation approach that will be used by One Health CRC (the second stage of the existing Biosecurity CRC) to analyse the research and development program undertaken by its members.

For simplicity this report uses the following terms:

1. research = cover research, development and extension ; and
2. evaluation = evaluation and monitoring

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What is Research Evaluation?

Introduction

Research evaluation is a process designed to ensure that all project resources are efficiently and effectively utilised to deliver high quality research needed by the end-user. It is an on-going review process that harness economics, social science (monitoring) and management techniques to achieve its end goal, in theory.

All too often the practice is:

“Oh hell we are being reviewed! How to we justify ourselves?”

“I know let’s use an economist to find a dollar value.”

Economic research evaluation is based on the premise that with unlimited wants and limited means, life is about choosing between the alternatives available to us (i.e. tradeoffs). Economists use cost benefit analysis (CBA) to identify the costs associated with a project and the benefits derived from the research, to determine the investment rationale. In ‘theory’ there is nothing economists cannot value and this framework allows economists to:

- find the dollar return from a completed, proposed or on-going project/s;
- determine the tradeoffs involved with selecting between alternative funding proposals;
- halting existing funding based on economic criteria; and
- utilise a range of techniques to highlight the risky nature of research.

All too often the practice is:

“Do you have any data on the completed projects?” “No”. “Well no worries I’ll build a case study that looks only at the market benefits and I’ll ignore society and the environment.”

Research monitoring is a system of checks and balances throughout a projects’ life aimed at ensuring a successful outcome from research. A successful project outcome will increase the economic value of the project as it aims to: keep research on track; meet the needs of the end-user; attempts to offset problems before they derail the project; and helps foster communication between all stakeholders. Monitoring can lead to a successful outcome but it cannot tell you the dollar value of a successful project.

Research programs have multiple criteria for success and when in isolation economic evaluations and monitoring systems do not always address these. Research evaluation is far more encompassing with the aim of understanding the needs of the research partners, the researchers, the issues that enabled or hindered research, and the outcomes (economic, social

and environmental) from the research. When evaluation is utilised correctly during the life of a project, it provides a quality assurance mechanism to help deliver a successful outcome (i.e. monitoring) and has collected the data required to undertake a CBA so that the return from the investment is analysed.

The aim of this report is to introduce the concepts behind the proposed research evaluation framework that will be used by One Health Cooperative Research Centre (hereafter One-Health CRC). To do this:

- firstly an introduction into evaluation and the proposed framework is outlined;
- secondly an in depth look at cost benefit analysis is provided;
- thirdly the benefits from evaluating research process are outlined;
- then fourthly the evaluation framework is presented and discussed; and
- finally everything is wrapped up.

Research Evaluation

The most important issue of any evaluation is: **“why are you doing it?”** Failure to identify the rationale behind the evaluation will reduce its effectiveness. The aim of most research evaluation is to secure funding. This involves:

- justification of new funding for One-Health CRC,
- explaining how well your last project did, to secure new or preserve existing funding;
- demonstrating that increased returns are possible if more funding was made available;
- countering any arguments into why the CRC should receive less funding;
- highlight the process aimed at ensuring a research outcome;
- illustrating how well the research was received by your peers, end users, extension agencies, funding providers; and
- incorporating lessons learnt to improve your processes/success of future work.

Defining your evaluation strategy is now a common requirement of any funding grant. When building an evaluation framework it is critical that the end users needs are identified and meet. For One-Health CRC the evaluation framework will be tailored to meet the needs of the Federal Government and the key stakeholders involved in its research programs. The framework developed here draws principally from the two recent reviews of federally funded research:

- the Mary O’Kane report which reviewed the CRC program (available [here](#)); and
- the National Innovation System review by Terry Cutler (available [here](#))

These reports highlight the increasing evaluation requirements for gaining and continuing to receive public funding (see sections below). These reports suggest that evaluation needs to be incorporated into the research process at the start, so baseline data can be collected to enable the economic, social and environmental benefits (i.e. a triple bottom line evaluation) of the research to be determined. Simply they are attempting to ensure that research meets the needs of the end-users so that it will be adopted. A high adoption of research, leads to greater returns from the investment outlay, which then allows government to take credit for building Australia’s capacity.

Although stating the need for an integrated evaluation system within research programs both reports only provide some basic concepts and suggestions for a framework. The aim of this report to synthesise data from these two reports with: a little evaluation and economic theory; and a significant helping of practical tips, to outline the proposed One-Health CRC evaluation framework.

The key points from both reports are:

Cutler's Recommendations

Recommendation 12.6: *That governments review the existing suite of programs and develop any new programs in the light of these principles. All program proposals should contain clear ex ante evaluation criteria, and provide for the provision or collection of relevant base line data before program implementation. Design principles and rules should be applied consistently (See proposed design principles in Chapter 4 and Annex 4).*

Recommendation 12.12: *The Australian Government, with the guidance of the National Innovation Council, should establish rigorous and consistent evaluation processes for innovation programs in line with the principle that the function should be carried out on an armslength and transparent basis.*

From Cutler

Box 8 Framework Principles for Innovation Interventions

1. Supports the development and effectiveness of the national innovation system.
2. Reflects and responds to demand-side needs and priorities.
3. Rationale for intervention and role of government is clearly identified.
4. The best placed jurisdiction(s) is/are responsible for design and delivery.
5. Innovation risk is assessed, accepted and incorporated into initiative design.
6. Initiatives are well designed with clarity about:
 - Purpose;
 - Expected outcome;
 - Key performance indicators;
 - Evaluation processes;
 - Return on investment (financial, economic or social); and
 - User/target.
7. Initiatives evaluated for impact on regional/national innovation system.

O'Kane Recommendations

7.4 *That a common core of evaluation metrics be developed that apply across all CRCs and would allow for cross-comparison between them. These should include, at minimum metrics on research quality, end-user uptake, international connections for national benefit, and research education. As well as reporting on core evaluation metrics, it is recommended that CRCs, in their annual report, report on measures specific to their CRC and agree at the time the CRC is awarded*

Tips for the evaluation framework from the O’Kane report are:

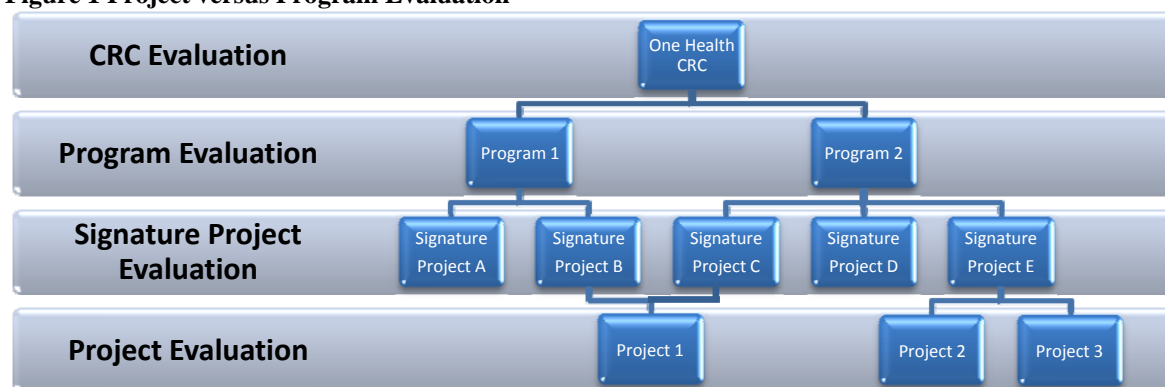
- *Page xiii triple-bottom-line evaluations are required.*
- *Page xiii adequate return on investment by partners.*
- *Page xv public good argument is valid*
- *Page xv evaluate the success of end-user adoption.*
- *Page xix identification of risk.*

After reading the above points there are two questions that quickly spring to mind:

- firstly what does all the previous gobblegook really mean for One-Health CRC?; and
- why don’t we wait until the government releases its evaluation check list?

Well firstly it’s impractical to undertake a full evaluation of each project within the One-Health CRC, primarily, due to the cost. Ideally, as Figure 1 illustrates a series of projects will be reviewed to derive the benefits of the One-Health CRC research portfolio. It has been suggested that the ‘Signature Projects’ will primarily form the basis of any future analysis. However, other projects undertaken by One-Health CRC may also be included to illustrate how these components helped lead to outcomes within the programs.

Figure 1 Project versus Program Evaluation



Secondly, there is no such thing as a ‘one size fits all’ evaluation framework and if we relied on using the ‘to be developed’ government framework, significant benefits from for One-Health CRC’s research program may be overlooked. Emerging disease issues have a number of unique characteristics that need to be considered, examined and potentially countered when determining the benefits from research, one of which is that the: **“disease may never actually reach Australia”** (see risk and uncertainty section).

What will the base framework look like?

As mentioned the framework has to remain flexible but at the very least attempt to follow the outline provided in Table 1. This framework needs to be able to drill down to determine the benefits and costs associated with each partner and other beneficiaries from the results. Then the other research outputs will be examined (journals, etc) to evidence the research rigour based on a series of criteria. This outline provides the annual benefits and costs associated with each item by stakeholder groups, by region (local government authority, statistical division or other), by state, for Australia, and by international impacts, if applicable.

Table 1 The Evaluation Framework

Large Detail	Small Detail	Annual Benefits & Costs by Year	TOTAL
Data by Region/Partner	Economic Social Environmental		
Australian Benefits	Economic Social Environmental		
International Benefits	Economic People trained by country Networks established		
TOTAL Benefits			
Other research outcomes	Journals, PhD's, etc		

Depending upon the extent to which the evaluation process continues other information concerning the design, application and communication process involved throughout the research project can be examined. This last part will help provide a research management review aimed at finding out:

- the experiences of the research team and the funding partners involved;
- identifying impediments to adoption; and
- areas where further collaborative research may progress.

The evaluation methodology will utilise a triple bottom line framework aimed at illustrating the benefits from the work and where/when possible illustrate how well the research was carried out to meet the end-users requirements. Once again for each of the actual role the evaluation framework will differ significantly for each project as:

- there may be no evaluation done on the project;
- a 'back of the envelope' evaluation will suffice;
- significantly review of signature projects; and
- in special cases the evaluation framework may help identify the actual research issues funding bodies need addressed and then prioritise the research plan.

So what is a 'Triple Bottom Line Evaluation'?

Cost benefit analysis (CBA) is about listing the pros and cons of a project into a logical framework and then bringing all values back into a common time frame so that we can compare the benefits of alternative investments. CBA is highly subjective in the way project costs and benefits can be determined. This subjectivity occurs because:

- there are numerous economic techniques to value goods and services,
- the analysis may investigate: a local area; a regional, a country, or determine worldwide impacts
- the assumptions used often over simplify complex issues;
- the overuse of externalities: externalities are issues that are discussed about but not quantified;
- the way risk and uncertainty is dealt with; and
- the discount rate used.

A triple bottom line evaluation is where the impacts to the economy, society and the environment are explicitly considered. This term has come about to counter the subjective nature CBA and overuse of assumptions to ignore the impacts to society and the environment. In short, it insists that the evaluation at least discusses the other impacts in some detail and not just treat them as vague externalities.

What's Your Role in the Process?

For most people in One-Health CRC the evaluation process will involve having a yarn at the start of a major project to discuss how the evaluation process may work for that particular project. There may be the need for: data to be collected during the project; developing a case study; helping to fill in expert opinion; asking the evaluator to justify key assumptions; and answering questions to help guide the evaluation process. Communication will be the key for getting the evaluation right. Good communication will avoid problems such as terminology, acronyms, what is expected and what is possible.

Summary

There will be increasing pressure to evaluate the funding One-Health CRC receives both from the principal funder (government) and the key stakeholders. By setting up an evaluation process that can not only inform the participants of the benefits from collaboration but also provide a feedback loop into the research program future adoption of the results will increase. The main way of getting everything right is talking so that barriers in communication are negated.

By undertaking an evaluation process it will mean that when the question concerning the value of your research is asked, you will have the answer ready.

CBA & the Triple Bottom Line

Introduction

Cost benefit analysis (CBA) provides...

"...an analytic framework for organising thoughts, listing the pros and cons of alternatives, and determining values for all the relevant factors so that alternatives can be ranked." (Schmid, 1989, p1).

CBA is widely accepted and used to justify current or finalised project expenditure, argue for the need for funding; or justify the decision to support one project over another project. A typical CBA lists all the annual costs (funding required to undertake the work) is compared to the annual benefits from the work, to a given point of time, and then all costs and benefits are discounted back to a single point in time. Benefits are generally derived from case studies which compare what happened with the research and what might have happened if the investment was not made. This is called the ‘with’ versus ‘without’ scenario in CBA.

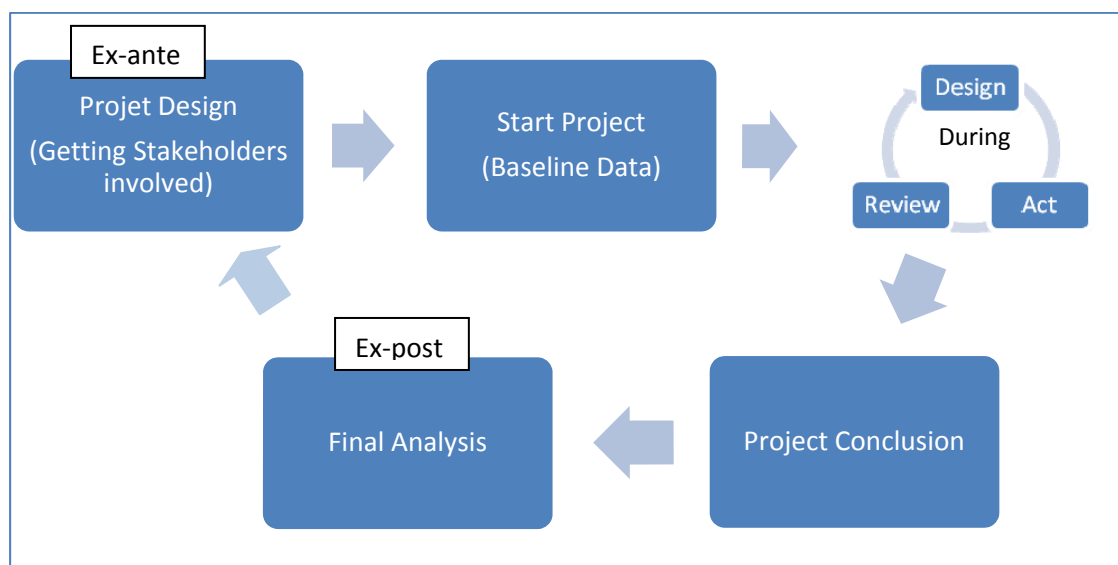
How does CBA fit into Evaluation?

A CBA can be performed throughout the life of a project/programme right from its conception through to its review as illustrated in Table 2 and Figure 2. There are no major

Table 2 Evaluation and Funding Cycle

Evaluation Type	Benefits	Funding
Ex-ante	What the research may be worth	To receive funding
Ex-post	What the research delivered	To justify funding already spent
During	What are the benefits delivered to date	Review current project to potentially adjust funding or the scope of the research

Figure 2 Evaluation and the Funding Cycle



differences in doing a project or program review as the principles are the same it's just a matter of time and resources. However, more assumptions have to be made when the evaluation increases in scope. Evaluation is generally associated with funding:

An Ex-ante evaluation (i.e. I'm applying for funding) would be something like:

- if this disease entered Australia it would cause \$50m damage, cause suffering to 1,000 individuals and wipe out one wildlife species;
- this research will attempt to find a cure, it will cost \$5 million, it has a 50% chance of success, and the research will benefit Australia as only \$20m is damaged, only 100 individuals will suffer and the wildlife species will be saved; and
- then we use CBA tools to determine the return on the proposed investment.

An Ex-post evaluation (i.e. I'm proving that the funding was well spent) would be something like:

- this research has delivered a test that cuts down the identification time of a disease from one week to one day (i.e. the delivered benefit) and there are no costs of adopting the test for the end users as the technology replaces an existing test using the same equipment. In fact in this case the time saving is actually a benefit for the testing lab as resources are freed up thus leading to increased productivity;
- without this test the disease could have spread rapidly costing Australia \$150m in containment costs, caused the death of 10,000 individuals and would not have impacted on any native wildlife species;
- this test prevents the disease gaining hold as counter measures can be mobilised at a faster rate, it then only costs \$10 million to contain, and only the initial 2 individuals infected died.

An evaluation during research may take two distinct approaches:

1. Firstly it might either be used to continue or ask for more funding by:
 - reviewing the assumptions used in an ex-ante study to see if the probability of a successful outcome has changed or if the new information learnt alters the probability of microbial resistance;
 - performing a new evaluation (if no ex-ante evaluation exists) to determine the potential value of the current program; but
2. Secondly and more importantly it might fully review the project and redirect research to deliver outcomes more in tune with the end-users needs.

Evaluation plays an important part of the research, development and extension cycle by allowing all involved to see how the work has progressed

CBA Framework

Table 3 outlines a typical CBA framework. Here the annual project costs, benefits from the research and the cash flow (benefits – costs) are illustrated. These nominal (i.e. the physical dollar amount spent by year) values are then discounted (a process to bring all benefits and costs back to a single point in time, in Table 3 a 5% discount rate has been used) to obtain the discounted values (nominal value * discount rate). This then allows for the outcome of the investment to be determined.

There are three methods for determining the economic value of a project:

- Net Present Value (**NPV**) = total discounted benefits – total discount costs;
Any return over \$0 is considered to breakeven
In Table 3 the NPV = \$1.67 million
This means the investment would return \$1.67 million after 10 years.
- Benefit Cost Ratio (**B/C Ratio**) = total discounted benefits/total discounted costs;
A B/C Ratio = \$1 is considered to break even
In Table 3 the B/C Ratio = (\$4.7m/\$3.0m) = \$1.55
This means for every dollar invested \$1.55 was returned
- Internal Rate of Return (**IRR**) = discount rate at which NPV = \$0
When NPV = \$0 breakeven has occurred
In Table 3 the IRR is 19%
This means that the discount rate would have to increase from 5% to 19%, and at that time the project would then breakeven.

Table 3 CBA Framework

YEAR	Nominal			Discount Rate (5%)	Discounted		
	Costs	Benefits	Cash Flow		Costs	Benefits	Cash Flow
1	\$500,000	\$0	-\$500,000	0.95	\$476,190	\$0	-\$476,190
2	\$750,000	\$0	-\$750,000	0.91	\$680,272	\$0	-\$680,272
3	\$750,000	\$0	-\$750,000	0.86	\$647,878	\$0	-\$647,878
4	\$750,000	\$0	-\$750,000	0.82	\$617,027	\$0	-\$617,027
4	\$500,000	\$324,000	-\$176,000	0.78	\$391,763	\$253,862	-\$137,901
5	\$300,000	\$648,000	\$348,000	0.75	\$223,865	\$483,548	\$259,683
6		\$972,000	\$972,000	0.71	\$0	\$690,782	\$690,782
7		\$1,296,000	\$1,296,000	0.68	\$0	\$877,184	\$877,184
8		\$1,512,000	\$1,512,000	0.64	\$0	\$974,649	\$974,649
9		\$1,296,000	\$1,296,000	0.61	\$0	\$795,632	\$795,632
10		\$1,080,000	\$1,080,000	0.58	\$0	\$631,454	\$631,454
TOTAL	\$3,550,000	\$7,128,000	\$3,578,000		\$3,036,995	\$4,707,110	\$1,670,115

Please note: NPV, B/C ratio and IRR may not rate projects in the same order so you must determine which method of comparison you would most like to use and/or which project is rated the best by more than one method. For example you may wish to use the B/C ratio to determine which project will provide the greatest dollar return for every dollar invested or the project which has been rated first by two of the methods.

In practice project costs are generally easy to obtain as we know how much it costs to employ individuals and we generally know the costs of establishing, maintaining and running research. The problem in CBA is the determination of the benefits, especially future benefits, as we in fact are often rubbing the crystal ball to help make judgements on: if a successful outcome was obtained; if the research provided a practical solution or provided new theories and knowledge; if a disease outbreak was prevented; if a human life was saved; if a native species was saved; and/or the severity of a disease outbreak was reduced. It is how the benefits of CBA are determined that special care must be undertaken to how the outcomes from the research are quantified and discussed.

CBA versus Triple Bottom Line

Economists treat economic, social and environmental issues differently as it is far easier to investigate costs and benefits that are traded on an open market, for example we know:

- how much it costs to buy cattle;
- what it costs to look after a patient in intensive care; and
- the costs for disease eradication in a native species.

Rather than items that are not traded on the open market (non-market goods), for example what is the dollar value of:

- being 95% versus 100% healthy; and
- one koala,
- 25% of the koala population, and
- all koala's being extinct?

There are a range of tools to determine the dollar value of non-market goods (see later) but in practical experience placing a dollar value on an item such as a koala can be often be counterproductive. From experience some decision makers have a healthy or unhealthy scepticism of these approaches depending upon your subjective view.

When dealing with human and environmental issues it is often better to concentrate on costs (i.e. project costs) and quantify the benefit in terms of the number of people saved or number of quokkas preserved by region. This then allows the research benefits to be displayed in terms of:

- \$/individual saved (cost-effectiveness); or
- \$/type of individual saved and quality improvement from the research output:
 - in health its referred to as Quality Adjusted Life Year (QALY); or
 - cost-utility analysis for everyone else; and
- by displaying regional results policy makers become engaged in the analysis.

The phrase 'triple bottom line' was derived to make sure that some form of quantification of benefits and costs to society and the environment was noted. In practical terms both CBA and 'triple bottom line' are interchangeable as good CBAs do take these factors into account.

In layman's terms:

CBA = How much money was made from the investment

**Triple Bottom Line= How much money was made from the investment
+ how society benefited
+ how the environment benefited**

Valuing Benefits and Costs

Items are either a cost (e.g. research staff costs) or a benefit (e.g. reduced costs from adopting the research outcome). In this evaluation framework only the direct CRC project costs will be in the costs column. All costs of adopting the research are dealt with in the benefits section as when we do the analysis we are talking about the benefits derived from the CRC project costs.

Benefits then are divided into two main groups:

- **Market**, where an existing market exists for an item. This is something that is easily expressed in dollar terms, for example the cost of treating a patient or impact a disease has on a commercial livestock; and
- **Non-Market**, where no market exists for the item. In other words an item that is not easily expressed in dollar terms, for example what is the value from 10 wombats dying from an exotic pathogen entering the country?

Most evaluations will obviously concentrate on market goods as they are relatively easy to work out the dollar impact a project/program can have. While non-market goods are generally referred to as externalities and are often not evaluated as the complexity in determining these costs and benefits can be significant (see latter).

It is also important to note that issues such as shadow prices (incorrect market signals caused by interference i.e. government subsidies) will not be dealt with as this raises further complexities into the analysis that unless you get into the ramifications of R&D on international trade are really beyond the scope of any analysis the CRC will do .

Project Benefits

The economic benefits of the research are defined as the difference between the project existing and the project not existing (we call this the 'with' versus 'without' scenario). There are a whole range of economic techniques that can be used to work out the potential benefits of a project but by far the simplest and easiest to communicate is the change in operating costs and benefits from the research an individual or group would face. For example using this new technique in disease detection improves the cost of rechecking results for false

positive and false negative results by \$/test. This figure is very easy to understand and communicate.

If the evaluation is designed correctly all data should be broken down into as small as possible sections and then built up, this would include the benefits by location (shire, region, state, country) and the impacts in tangible terms (i.e. \$/ha, \$/stock, \$/people, \$/native animals). These small numbers can then be quickly aggregated to larger groups but having them at your fingertips to explain concepts to stakeholders is vital. Before we delve into how benefits are determined we firstly are going to discuss the issues associated with non-market evaluation of benefits.

Non-Market Evaluation

Non-market issues (i.e. the value of an ecosystem or the dollar value of a koala) are often treated as externalities and therefore a dollar value is not placed upon the issue/s during an evaluation. As discussed (see section on CBA versus Triple Bottom Line) sometimes instead of determining the \$ benefit, either cost effectiveness or cost utility analysis (QALY) is used. However, these two approaches do not provide a dollar value of research rather they just help decision makers to make tradeoffs. By ignoring the non-market impacts of research however, you negate its true value. Non-market evaluation attempts to rectify this by placing a value on something where a market does not exist. To do this economists approach this task by either using: stated preferences (i.e. informed by direct opinion); or revealed preferences (i.e. determined from responses given). However, non-market evaluation is an area of great debate within the economics community as there are fundamental ethical questions associated with the theories and the approaches undertaken.

Some common non-market evaluations strategies are:

-
- | | | |
|-------------------------|-------------------------|---------------------------|
| • Contingency Valuation | • Benefit Transfer | • Green Accounting |
| • Hedonic Pricing | • Goal Programming | • Choice Modelling |
| • Travel Cost Method | • Safe Minimum Standard | • Multi-Criteria Analysis |
-

These tools can be used but they are expensive in time and resources and they often require the use of surveys to help determine individuals, revealed or stated, preferences for options. Some arbitrarily impose a limit on the good or resources to obtain scarcity to derive market signals. In order for these surveys to work the individual you are surveying must be supplied with enough information so that they can make an informed opinion. It is very easy to misuse these surveys. While using other studies i.e. 'Benefit transfer' (where previous studies in other areas or countries are superimposed on your issue) have low costs but the adaptability of those results may be misleading.

The outcomes of such evaluations are not always well received and sometimes can have a detrimental impact on the overall discussion. The recent economic evaluation undertaken for the CRC used a case study which suggested each Australian household was willing to pay \$0.70 per annum for 20 years to prevent the loss of one species. In context this suggests the

each household is willing to forgo about ½ litre of petrol a year to save a species. In 1993-94 the average weekly household budget was over \$600¹ so \$0.70 per annum to save a species implies that the ecosystems has no value. We know this is false and instead it is often far better to explain the impact on non-market issues.

From practical experience quantifying and discussing the issue non-market issue in terms that people understand provides far better acceptance from a wider range of people. For example, if I say that this new test is likely to save 1,000 people a year, it becomes a tangible concept that people can understand. While I could also argue the prevention of a disease entering Australia, will prevent the mortality of about 30% of an endangered native species and this provides the endangered species with greater resilience against other threats.

Case Studies, Data & the Necessary Evil of Assumptions

CBA primarily is an analysis of what would have occurred both with and without the project. The best way to analyse the change is to get an economic snapshot of what is happening now, before the project commences and/or the technology is adopted, and then compare it to what occurs at the time of evaluation and use that to forecast forward. Unfortunately this rarely happens and then economists have to rely on case studies littered with assumptions and stapled together data.

Assumptions are the life blood of CBA and they help shape the scenarios used at quantifying current and future benefits. They also allow an economist to ignore certain events and or issues by stating they are externalities, i.e. issues outside the scope of the analysis.

Assumptions are greatly influenced by the subjective nature of the reviewer and the group funding the evaluation. An individual’s subjectivity can kill a CBA very quickly as their personal bias may lead to a questionable end conclusion. Therefore it is compulsory for the evaluator to demonstrate or discuss the model and/or methodology with the research group before the final results are stated to iron out potential shortfalls (data and assumptions) and explain why some issues will not be evaluated.

The case study is where the evaluation is most likely to fall over. The person doing the valuation must fully understand the issue/s that they are evaluating. It is highly recommended that the person doing the CBA must sit down with the project leader and discuss all the issues and items that need to be evaluated and why. At this stage agreement about how the evaluation will progress, and the scope of the evaluation must be set which then helps details the assumptions, externalities and identify who gets extra data if required.

• What is the real issue/s	• Data
• What is the scope/scale	• Uncertainty and risk

¹

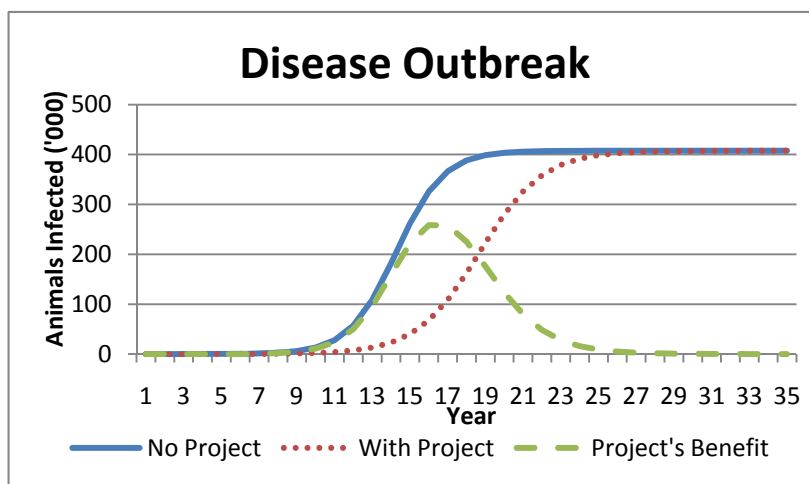
<http://www.abs.gov.au/AUSSTATS/abs@.nsf/2f762f95845417aecca25706c00834efa/a3f85291a76be4faca2570ec001b24e3!OpenDocument>

Any CBA must provide some basic sensitivity analysis on the results and data used. By identifying the sensitive variables, further investigation may be undertaken to justify the values you have used. At the very least anecdotal evidence or agreement with the research group must be obtained to support the key sensitive data used.

Hypothetical Case Studies

Three hypothetical examples of defining research benefits are covered in this section. This is by no way a complete list of all benefits and the evaluation process would have to identify the potential benefits each project may achieve.

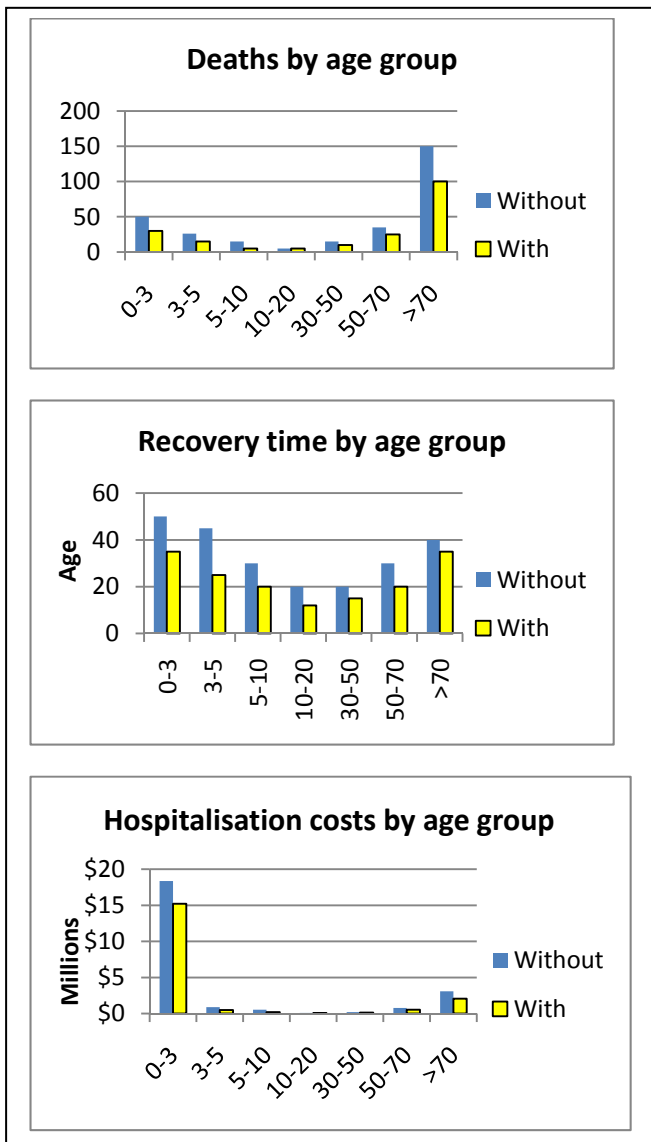
Figure 3 Rate of Disease Spread



The first example in Figure 5 describes the 'with' versus 'without' project benefits here the project has slowed the rate at which the same number of animals are infected. By slowing the rate of infection the benefits are described in the number of animals not affected. Therefore the project benefits from

this may be by slowing the infection rate the project has bought time for area wide management to occur which lead to the disease being halted and eradicated;

- in agriculture this may mean:
 - production systems may be able to adjust via the introduction of hygiene systems that negates the disease entering their stock; and
 - slowing the disease may keep valuable markets (domestic and international) open for longer.
- for society
 - the preservation of international markets keep 1,000 jobs at the abattoir; and
 - as the disease was halted, as fewer animals were infected, less stock had to be destroyed and the government compensating costs to stock owners declined.
- The environment may benefit by:
 - reducing the risk of the disease affecting native animals; and
 - by containing and eradicating the disease fewer animals died and the impact to the population was negligible and natural resilience allowed the animals to bounce back to natural levels quickly. If the disease has spread the species may have been wiped out.



The second hypothetical example involves the development of a new diagnostic test. This test allows a disease to be more rapidly detected and with greater accuracy. With a faster and more accurate test the correct medical intervention occurs at a faster rate. This means that less people die, they spend less time in hospital and treatment costs are reduced.

In this case society benefits as 106 less people die, the recovery time is shortened which reduces the total number of hospital beds by approximately 14,000 days. By freeing up the strain on the hospitals it means that resources are then available for any other unforeseen catastrophe.

From the economic point of view, yes we can place a \$ value on life but there are a lot of ethical arguments in this field. It would be recommended that a better way for the economic benefit is simply valuing the costs associated with treatment by age group (medical costs,

cost per day in hospital, on-going medical costs, etc) which are easily tangible items to deal with.

In this case there are a really no environmental benefits from this research and in certain cases the economic and social benefits from the research may not be easily expressed in dollar terms.

The third hypothetical example is research testing the impact an exotic disease may have on native marsupials. The research is aimed at understanding the risk of transmission between domestic pets and marsupials in the peri-urban community. The end result from the analysis is that the disease in question will not transmit between domestic pets and native marsupials. In this case the benefits are a lot harder to quantify and realistically the discussion would have to concentrate on the benefits from gaining knowledge. The argument here is that any future import risk assessment associated with that disease can now make a more informed decision concerning the risk to the environment and lead to a better decision. Quantifying this research in dollar terms is then exceptionally difficult so the evaluation would

concentrate on the outputs in terms of scientific rigour, journals and the communication between all groups.

These three case studies assumed that the research had a 100% adoption. It's important to understand by what economists mean by adoption.

Adoption

Generally what happens is that the initial research benefits apply to the whole problem. In other words what is the benefit from preventing a disease outbreak? In this case we determine the \$value, the impact on humans and the impact on the environment of the disease. Then we examine the research project and attempt to determine what % of preventing this disease is attributed to the project. In order to do this we need to know the evaluation life of a project and then we apply a maximum adoption and an annual adoption rate.

Evaluation Life:

- Number of years we do the evaluation for. This is generally limited to around about 30 and in extreme cases 50 years due to the nature of discounting (as the return from future years is negligible, see next section) and the case study cannot realistically see that far into the future.

Adoption:

- Maximum Adoption: Maximum number of people/organisations or percentage of the benefits this project can claim. If the outcome
- Adoption Rate: Rate at which the technology is taken on board by the maximum number of adopters.
- Obsolescence Rate: This is the rate at which the technology becomes obsolete as new technology comes along. It's a bit like a reverse adoption and in practice its rarely used.

These things can be highly subjective especially from the researcher's point of view and the evaluator should always use a note of caution. There will generally be a fair bit of discussion about these issues as they ultimately determine the return on the investment. It is important to remember that 100% adoption is unlikely as other solutions to the problem will exist and it takes time for the research to be implemented by the end user for a variety of issues.

Discounting

Discounting is probably the hardest concept in CBA to understand. Since CBA attempts to find all costs and benefits on a yearly basis the question becomes how to you compare benefits and costs per year. Discounting relies on the premise that people would prefer to have money now than latter (e.g. lottery payouts, a lower amount now or the full amount spread over 20 years).

Please note that the greater the discount rate the faster all future values approach zero (this is why the evaluation life is generally restricted to 30 years). So projects whose benefits do not occur for a long time face a negative bias and this is a major problem for long term projects.

Note Public v Private Discount Rates

A public discount rate is generally applied to anything that deals with government funding, while a private discount rate is generally what a private company would expect to return on its investment and consequently is always greater than a public discount rate due to the notion of opportunity cost of the invested capital.

It is best to contact the Treasury Department or the organisation you are doing the evaluation for to find out what discount rate you should use. A good guide for the moment would be a public discount rate of about (5, 8% or 10%). While a private discount rate at the moment would be about 10 to 16%.

Remember the higher the discount rate the more it will be biased against projects where benefits are further in the future. It is advisable when dealing with environmental issues that arguments for using a low discount rate should be used as a lot of the potential benefits could be externalities that could swing the results.

Risk & Uncertainty

Risk and uncertainty is a major issue in CBA as predicting the future, the success of a project and adoption of the research efforts are exceptionally difficult. While reviewing what has occurred is easier there are still problems associated with estimating how long the benefits will actually occur for and in practice not all project costs are correct.

The major limitation in the economic benefits when dealing with biosecurity is that the analysis often needs to be able to deal with low probability but high consequence events. This poses significant challenges to highlight the potential outcomes of adverse events. If the work prevents the disease entering Australia the question that springs immediately to mind did the pre-border quarantine strategy do anything at all i.e. would current quarantine strategies have kept the disease out anyway?

Biosecurity

This evaluation framework will utilise a state contingent approach to detail the uncertainties and outcomes from alternative scenarios thereby dealing with the range of events possible in the future. Such an approach details the consequence of events occurring. The example illustrated below is the economic consequence of a new disease entering Australia: the first table outlines the economic consequence of entry and establishment by a disease; the second table highlights the risk of entry before research takes place; and the third table details the perceived success from the research by lowering the probability of entry.

Economic impacts from disease entry

		Economic Impacts (\$millions)		
		Low	Medium	High
No Entry		\$0		
Entry	Low	\$0 - \$5	\$0 - \$8	\$5 - \$10
	Medium	\$0 - \$12	\$4 - \$20	\$9- \$45
	High	\$10 - \$19	\$25 - \$69	\$50 - \$100

Probability of outcome before research

		Economic Impacts (\$millions)		
		Low	Medium	High
No Entry		20%		
Entry	Low	20%	8%	5%
	Medium	15%	8%	5%
	High	10%	7%	2%

If a disease entered the expected impacts would lie between \$4.77 to \$16.52 million per annum. If however, the research changed the probability of the disease entering Australia (as per the next table) then the impacts are between \$1.4 to \$7.16 million per annum from risk of entry. The annual benefit of research is then between \$3.37 to \$9.36 million per annum.. However, if the disease getting entered Australian then the worst outbreak could cost \$50 to \$100 per annum and under the best possible outbreak scenario there would only be \$0 to \$5 million lost. This sort of information then highlights the range of outcomes to decision makers and they can alter the risk of entry based upon their beliefs.

Probability of outcome after research

		Economic Impacts (\$millions)		
		Low	Medium	High
No Entry		40%		
Entry	Low	30%	12%	1%
	Medium	7%	3%	2%
	High	3%	1%	1%

Obviously we could also adjust the economic impact of the outbreak to alter the scenarios derived at obtaining the economic loss downwards to highlight the better response from dealing with the exotic incursion.

Sensitivity Analysis

Any analysis must include some basic sensitivity on the major assumptions. This just helps determines what assumptions have the major influence on the analysis. But determining the greatest area of sensitivity it means that more research about the assumption should be

undertaken even if it is just anecdotal. As this or these assumptions, which potentially suffer from subjectivity, will be the one/s that will be scrutinised greatly by an individual reviewing/challenging the findings

For example the adoption rate of a technique/technological advance by end users is one area which would need significant backing by anecdotal evidence especially dealing with individuals not directly involved in any trials.

Cost v Time v Decision Making

It is important to remember that CBA is just a tool that helps guide decision makers. It is not sole piece of information considered by the individual who has the final say in which projects gets funded. This is a common misinterpretation by people. This is important to remember as the greater the scope of the evaluation, the greater the cost in time and resources. Often it is prudent to describe and if possible quantify in terms of numbers non market goods and services (% of individuals saved from infection; or % of native species not affect) rather than spend money on quantifying these issues (please see the non-market evaluation section).

It is also important to realise that an easily defensible ‘back of the envelope study’ will often give you an answer that will not change the recommendation to the decision maker even if a full blown analysis is done. But a thorough analysis or detailed explanation of other issues not examined will be needed when the results from a CBA are borderline to help justify why you should get funding.

It is vital when possible that the analysis should provide tangible values for the decision maker to absorb quickly to help bring the results into perspective (i.e. \$/Ha. \$/treatment, \$/person, \$/region, etc). Unfortunately despite a great and well analysed evaluation the final decision comes down to one individual (or a group) who may not be swayed by the evaluation, no matter the CBA outcome.

Program versus Project Evaluation

Project evaluation is when we review an individual research project that aims to deliver a set goal (i.e. development of a new test to detect a given disease), a

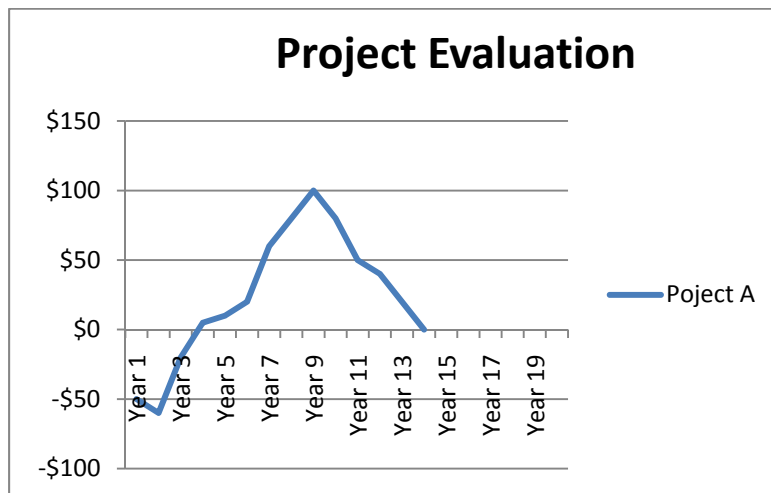
An economic evaluation is not required for every project in the Biosecurity CRC because:

- of time and resource constraints;
- several projects may lead towards the same goal; and
- outcomes may not be easily quantified in economic terms (public benefit).

This is an overarching framework that will discuss evaluation concepts and strategies at alternative levels:

- **Project:** where an individual project is evaluated;
- **Program:** where a selection of projects are evaluated to provide an assessment of how well the program has achieved its goals; and
- **Biosecurity CRC level:** where the success of the CRC’s funding is evaluated.

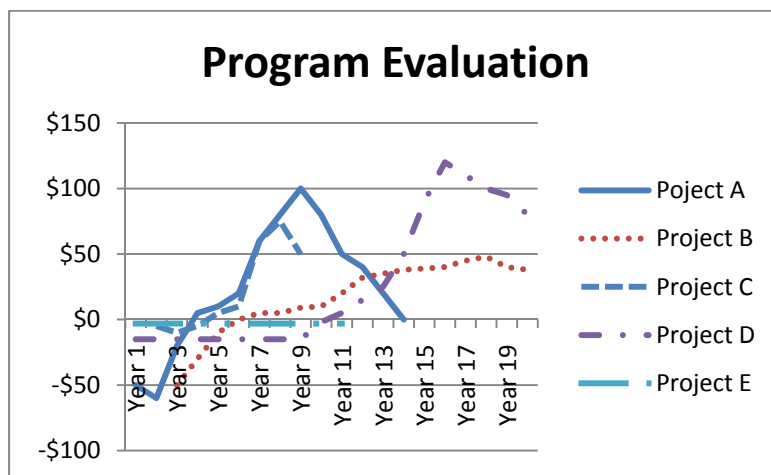
Figure 4 Project Evaluation



Project evaluation is when one single project is reviewed (as illustrated in Figure 3, while Figure 4 reviews a series of projects to determine the return from a program.

- Project A is very typical of an evaluation, where the costs are incurred at the start, the project then returns positive benefits and these erode over time either due to change in technology or funding was not secured to enable the benefits from the work continue over time.
- Project B may mimic a project where research results were utilised once an adjustment in the current culture had occurred and then the adoption was for a long time.
- Project C may be a situation where there was a pressing need for a solution to an immediate problem and once the short term remedy was supplied it was replaced by a more long term solution (i.e. Project B).

Figure 5 Program Evaluation



- Project D illustrates blue sky research that took a long time to develop and then had significant practical use and was highly sort after; and
- Project E may have been blue sky research that failed to generate anything and after 10 years of funding the project was cancelled.

When reviewing programs you should expect to see projects that do not have any return due to the nature of risk and failure especially when tackling blue sky research. In this case when there are no economic returns, the other parts of the triple bottom line and research process review become critical. As there would have been papers, PhDs, etc which are quantifiable but not in dollar terms.

Summary

CBA can be a very useful tool in helping to argue the benefits of your R&D program as it is a widely accepted methodology. However the issues involved with assumptions, externalities and subjectivity must be checked and nullified where possible so that the evaluation is as transparent as possible. It is very powerful but can easily be misused. My personal

recommendation is never to put dollar values on non-market issues like environmental benefits rather use things like...

...by adopting this technique it saves over 25% of all kangaroos in WA being infected..

.. this then gets you out of a few problems with non-market evaluations as there is a whole raft of arguments out there about the true value of nature!

It is also important that in any evaluation the scope and breadth of analysis of the benefits is determined by the resources thrown at it. But you can spend significant sums of money attempting to evaluate impacts but it may actually not lead to a better decision. So the fundamental recommendation is be able to talk to the person undertaking the analysis. If they don't communicate well with you and the case study and assumptions are poorly justified the final decision maker will often tear the analysis apart.

Project Management Evaluation

Introduction

Economic evaluation will provide information concerning the dollar, social and environmental impacts of a project. Generally it will not evaluate: the way the funding provider perceives the working relationship with you; the internal and external impediments to the research outcomes; the key individuals paramount to the project's success; and the way the project was managed. These are vital questions for not only understanding why projects costs overrun, helping develop solutions to counter business impediments, the likelihood of locking in long term funding with clients, being able alter current strategies to prevent miscommunication to ensure that the projects outcomes are what the client believes they will receive; and providing staff with the necessary skills or training to help them meet the goals of the CRC.

By allowing staff their say in how things unfolded you are engaging your primary asset and providing them with an opportunity to reflect on their perceptions of how things could have been better performed. While allowing stakeholders their say and acting on their comments to improve their research experience you will find that 'word of mouth' can have significant benefits. Not only for funding from people they have communicated with but also when it comes time for external reviews. If your clients enjoy working with you and believe in the work that you are doing their support at critical times can be exceptionally influential.

Often a simple open ended survey is often all that is needed to gain a significant corporate knowledge that has negated existing problems. An open ended survey is based on a series of open ended questions that are designed to let the interviewee talk freely and the skill of the interviewer is important as they need to be able to direct the discussion towards finding the underlying causes.

Project Management Benefits by Group

Qualitative evaluations add depth to the rich picture of impact from research work that supports the findings from the triple bottom line evaluation process. It is important that this process should be seen as project management and not a blame game exercise as there are often very good reasons why things went wrong especially with Blue Sky R&D. The principal aims of the survey are: to make sure that the work is being completed (i.e. aims were too ambitious); it has not been under funded (\$); or under resourced (people); and that the client is as happy as possible not only with the outcome but the process as well. By identifying these issues during a project, it may negate stress to staff and allow for a revision of the time frame, resources, or project goals to lead to a far more successful project.

The process involves talking with five principal groups: funding client; the stakeholders involved; collaborators; the project staff; and the end users of the research findings.

The inclusion of the client and stakeholders in the review allows for:

- understanding of how likely further work is to be commissioned;
- acknowledges their support of the project;
- their relationship with the staff involved;
- their perception of the final outcome;
- identify areas where the work may have been improved; and
- this feedback allows for future project redesign to meet their needs.

By interviewing collaborator:

- their effort and support are acknowledged;
- peer review is obtained; and
- the likelihood of future collaborate work is assessed;

By including staff in the review:

- you are acknowledging their efforts;
- helping identifies skills/training needed to help deliver higher quality future research;
- information concerning impediments to their output; and
- finding out about future aspirations and new areas of research.

The inclusion of end-users of the research allows for information to be collected about:

- adoption issues;
- the ability of the outcomes to integrate into their current systems;
- did they have to redesign their entire systems to adopt the research outputs; and
- issues that may help researchers design a better output.

By engaging with these groups when evaluating projects critical information to help with long term planning, ensure staff and enjoying their work, checking that the research is on target and, if run during the project, it may negate problems from developing. When the staff, funding bodies and end-users are in agreement then the research program is on a winner. While important information is obtained by less favourable comments and then you have the ability to react positively to rectify these.

The Researcher & Stakeholder Survey

A simple survey based tool or semi-structured interviews can be used to gain insight into the perceived outcomes from these 5 target groups. There are a series of suggested questions below which need to be modified to suit particular projects for the types of values we should focus on. Our goal should be to deliver on brief, on time and on budget (and for our staff to enjoy themselves).

This is not a definitive list, the phrasing and the order of the questions to be asked should be left up to the individual carrying out the exercise.

1. Client survey (client = who provides the \$\$):

Quality of Products or Services, e.g.:

- we used a rigorous scientific approach
- the deliverables meet your requirements
- we effectively communicated the results
- impacts are evident or envisaged from the results
- we delivered value for money invested

Quality of Processes, e.g.:

- we understand your business or industry
- we interpreted your requirements
- we developed the plan against your requirements
- Negotiating the contract
- Administering the contract
- Being responsive during the course of the work
- Keeping to schedules
- Managing issues and complaints
- Maintaining effective communication

2. Stakeholder's survey (stakeholder = end user or participant in the research project e.g. testing laboratory, vets, etc):

Quality of Products or Services, e.g.:

- we used a rigorous scientific approach
- the deliverables meet your requirements
- we effectively communicated the results
- impacts are evident or envisaged from the results

Quality of Processes, e.g.:

- we understand your business or industry
- Being responsive during the course of the work
- Keeping to schedules
- Managing issues
- Maintaining effective communication

3. Collaborator's or Peer survey (other research organisations):

Quality of Products or Services, e.g.:

- we used a rigorous scientific approach
- we effectively communicated the results
- impacts are evident or envisaged from the results

Quality of Processes, e.g.:

- We were responsive during the course of the work
- Keeping to schedules
- Managing issues
- Maintaining effective communication

4. Staff survey:

Principle investigator:

- Did we deliver on brief, on time, on budget
- Comments on quality of products/services and processes
- Other outcomes – e.g. papers, presentations, publications
- Communication during and at the end of the work (with clients, stakeholders, collaborators and staff)

Project staff:

- Did we deliver on brief, on time, on budget
- Comments on quality of products/services and processes
- New skills developed
- Other outcomes – e.g. papers, presentations, publications
- Communication during and at the end of the work (with stakeholders, collaborators, principle investigator and other project staff)
- Did you enjoy working on the project?

5. End user survey:

Quality of Products or Services, e.g.:

- Where did you find out about it? (enough information, easy to access etc)
- Why did you adopt or didn't adopt this new technique?
- What impact did this work have on your property/local ecosystem
- What do you believe the benefits are (numbers required even if its just x no. of Ha planted to native vegetation as a proportion of total farm size)
- Where there any negatives from this new technique? If yes find out numbers if possible?
- What could have been done to make it better?

Quality of Process, e.g.:

- What do you need to happen before you would use this technique/technology?
- Would you like to be involved in the process (again, or for the first time)? And why, why not?
- How well did you relate to the person giving you information about the product/service? Or wasn't there enough done in the extension phase?
- Anything else?

In the process you start the staff survey first and from there you should be able to gather names/contacts to help with the surveys of the other individuals involved in the project.

Summary

By understanding how the research process unfolded valuable information can be obtained that not only helps develop the capacity within One-Health CRC but build stronger links with the industry partners, funding organisations and end-users should be obtained as it allows for communication to flow between the groups. A successful research enterprise is one where the needs of the end-users, industry partners and the CRC itself are recognised and research objectives are tailored to meet all needs and this is what both the Cutler and O’Kane reports were striving to get across.

A research project that meets the needs of all involved and continues to communicate the process will have great support during and at the conclusion of the project.

The Evaluation Framework

Introduction

There are a number of things that should be considered when undertaking research evaluation that really are not covered in any theoretical handbook and only come from practical experience. This document and framework provides a starting point for discussion about the need and rationale behind research evaluation. It is expected that this framework will remain flexible to help tailor the final approach used in each evaluation and that over time the process will be refined to improve the process and experience for all involved.

The aim of this evaluation framework is to:

- Quantify the return/success from the investment;
- How successful has it been for the researcher/s; and
- How successful has it been from the stakeholder/s point of view?

This framework will need to provide information about:

- Who benefited, by how much, in what area;
- Impediments to successful outcomes or adoption by the end user;
- The project's success from a staff point of view: quality of work; publications; peer acceptance of results; identify the impediments to greater success; and highlight unexpected outcomes;
- The communication between participants, identify areas where research may evolve during the project, provide discussion on where future work may go and who is involved; and
- Projects are allowed to fail in dollar terms, especially blue-sky R&D, as sometimes the outcomes and skills generated from this work provides the basis for new and exciting research or prevents future work from heading up a blind alley. Often we learn far more from failure than success and there are always non dollar benefits from this type of work.

Proposed Evaluation Structure:

A triple bottom line framework will be used to help explicitly detail the benefits to the economy, the society and the environment. At least initially:

- only dollar value quantification will occur on market goods and services (e.g. \$ value of beef exports saved, \$ value of treatment costs saved, \$ saved from adopting a better diagnostic test, etc); and
- non-market goods and services will be quantified in values that people can understand (e.g. 300 people did not die, the health of 100,000 people improved, and 25% of frogs in Tasmania were saved from extinction) and not in dollar values.

Once again there is flexibility in this approach but hopefully the issues and difficulties associated with non-market evaluation have been explained coherently.

Table 4 provides an illustration of how the framework may look.

Table 4 Annual Benefits of Research (\$'m)

		Year 1	...	Year n	TOTAL
ACT	Economic				
	Cattle	\$0.2		\$2.5	\$10.3
	...				
	Sheep	\$0.0		\$0.3	\$2.1
	Social				
	Lives saved	0		3	10
	...				
Lives improved	10		15	80	
Native Species					
Kangaroos	0		0	0	
..					
Wombats	5		5	60	
...
TOTAL Australian Benefits	Economic				
	Cattle	\$100		\$500	\$2,300
	...				
	Sheep	\$25		\$250	\$900
	Social				
	Lives saved	140		130	1,245
	...				
Lives improved	112,000		140,000	1.4 M	
Native Species					
Kangaroos	500,000		1.1 M	4.3 M	
..					
Wombats	15,000		15,000	150,000	
International benefits	<ul style="list-style-type: none"> • Economic • People trained by country • Networks established 				
TOTAL Benefits	Economic				
	Cattle	\$100 million		500	\$2,300
	...				
	Sheep	\$25 million		\$250	\$900
	Social				
	Lives saved	140		130	1,245
	...				
Lives improved	112,000		140,000	1.4 M	
Native Species					
Kangaroos	500,000		1.2 M	4.3 M	
..					
Wombats	15,000		15,000	150,000	

The reports generated ideally should have a structure that looks something like this:

- 1. Introduction**
- 2. Background to Project**
 - Identify the disease/issues being researched
 - Describe the research project (goals, aims)
 - Project Costs (total = CRC + Other)
 - What did the research project actually achieve
- 3. Overarching Evaluation Methodology**
 - **Describe General Approach**
 - **Quantification of Benefits:**
 - **Economic:**
 - **Social**
 - **Environmental**
- 4. Results From the Triple Bottom Line Approach**
 - Place all results into a CBA framework
- 5. Project Evaluation**
 - Staff opinions
 - Stakeholders/End users opinions
- 6. Policy Implications / Areas of Further Study**
- 7. Concluding Comments**

Summary

The final evaluation framework will be a joint decision between the evaluator and the researcher. Sometimes one or more of these issues will be ignored due to a range of impediments but at the very least a discussion of why they were not quantified in dollar terms or physical units should be made.

Final Comments

Evaluation and monitoring go hand in hand with a research program. Ideally if established and acted upon it should be an asset to the project and program that ensures that the work you do is well accepted by your end-users, peers and you have adequate funding for the tasks at hand. Proper research evaluation involves communicate and lots of questions.

This report is just a basic introduction into the relationship between project management, monitoring and evaluation. They should not be viewed as independent parts of the process rather they should be considered an integrated part of the research and development package aimed at getting the valuable work you have done to an eager end user waiting to use all the work you have done.

REMEMBER
There is nothing worse
than having all your
efforts hide in the back
of a filing cabinet.

