EVALUATING SUCCESS IN ACHIEVING ADOPTION OF NEW TECHNOLOGIES[1]

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INTRODUCTION

There are many ways to think about evaluation. I have come to a definition over the years based on the literature (for example Patton 1997) and experience as follows:
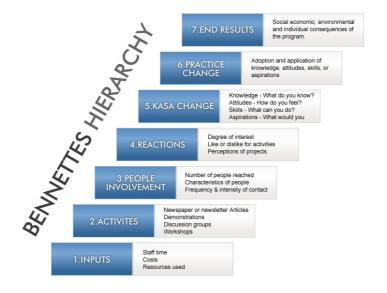
> *Evaluation is about the **systematic collection and analysis** of processes, outputs and outcomes to allow us to make **statements, judgments, claims and conclusions** which have the potential to impact on **current and future decision-making**.*

The notion of evaluating '*success in achieving the adoption of new technologies*' implies that the evaluation focus is that of making claims about practice change resulting from an intervention. This could be to *monitor* progress and make process adjustments where necessary - or to be able to *demonstrate* that objectives have been met. The term 'achieving' adoption is also in the *present continuous* tense and implies evaluating whether you are *on the way* to achieving adoption. This is particularly important when changes in practice can occur over a long time frame – maybe years after a specific project is completed! By looking at changes in **K**nowledge, **A**ttitude, **S**kills and **A**spirations (KASA) – the intermediate stage of 'achieving adoption' can be monitored.

The problem with just focusing on measuring the level of adoption of new technologies on their own is that it that it may not answer the "why" question – why was adoption successful/unsuccessful (what were the critical factors with the process, the technology, its development, or the environment in which it was being adopted). There are also issues relating to 'successful decisions not to adopt ('not suitable at this time'…'not relevant to the specific enterprise situation') and the positive - and negative –impacts/consequences of adoption.

MODIFIED BENNETT'S HIERARCHY

For the purposes of this brief presentation, I will use a modified "Bennett's Hierarchy as a framework. Bennett's Hierarchy is a logical progression of stages/levels of a project from its resource base to the community outcomes. The logic reads something like: ***If** you have sufficient resources to undertake the right activities/processes, **and** involve the appropriate people **and** you achieve a positive reaction it can **lead** to desirable changes in Knowledge, Attitude, Skills and Aspirations which **provide the basis** for practice change (technology adoption) and **hence** positive community/industry outcomes.*

After Bennett (1975)

The framework can be separated out into '*internal project factors*' (Bennett's levels 1 & 2); '*direct effects'* (Bennett's levels 3, 4 & 5), and *broader outcomes (Bennett's level 7)*. The extra dimension that I add is that of *Context*. Context reminds us to be aware of the social, economic and industry environment in which a project is set and what might change over time. For example, high interest rates might inhibit capital expenditure or impending new legislation might 'force' adoption.

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The following table builds in these extra dimensions and also adds the 'horizontal logic' of the evaluation. This logic says: '**If these are the objectives/indicators that we want to monitor/measure, then we need this data and we can collect it by using these different methods**'.

Evaluation Levels	Bennett's Hiearchy (+context)	Objectives/ Indicators	Information needed to measure/monitor	Evaluation methods to capture information
Broader impact	Social-economic-environmental outcomes			
Direct effects	Practice changes			
	KASA changes			
	Reactions			
	People Involvement			
Internal project factors	Activities/process/ "*Technology fit*"			
	Resources			
Outside project control	Context/ Related projects.			

In terms of evaluating success in achieving adoption of new technologies we are dealing largely with the shaded cells – **KASA** and **Practice (KASAP)** change. As suggested earlier, however, the observed changes can only really be *understood* in the context of the total Matrix. Low adoption rates could be because the right people weren't involved, or there were insufficient resources available, or because the "technology fit" was poor because of top down processes used etc. Likewise, just because there is apparent 'success' in adoption, it does not mean that the intended social, economic or environmental impacts were achieved. Note too that KASAP changes can also be monitored in project staff and other stakeholders – very pertinent when technology development is occurring in a participative, interactive process.

BENCHMARKING

Central to evaluating changes in KASAP is the concept of benchmarking. It is very difficult to makes statements about change levels in adoption without some kind of benchmarking. It can be very frustrating coming in at the end of a project and being asked to evaluate the extent of change without some meaningful data about the KASAP of the "target group" (although there are techniques to *try* to gain this information retrospectively) at the start of the project.

Benchmarking, in this context, is about systematically measuring the state of something (the use of certain practices, the holding of certain attitudes, the extent of vegetation etc) at one point in time so that it can be measured again at a later point in time to be able to make statements about the extent of changes over the period. Benchmarking doesn't always mean undertaking surveys (although they can of course be useful). Examples of different types of benchmarking are given in the following table.

KASAP elements being benchmarked	Samples of approaches
Knowledge	▪ Surveys (tick boxes, agree disagree) ▪ "Tests"-'*what would you use when...*' ▪ Group 'debriefs'…'*before this project started, what did you know about…*'
Attitudes	▪ Focus Groups ▪ Surveys (use of attitude scales) ▪ Numbers/comments to 'letters to the editor/meetings' about the specific area ▪ Number of project proposals submitted with specific elements (eg environmental) ▪ Participation in relevant activities
Skills	▪ Surveys – *how confident do you feel about you ability to…* ▪ Level of training course/workshop participation
Aspirations	▪ Focus Groups ▪ Surveys – '*what do you intend/want*' ▪ Levels of inquiries

Practice	▪ Surveys – '*do you use/undertake..*'
	▪ Observation – eg using geographical and/or time grids; Satellites/GIS
	▪ Sales and/or level of use of support services.
	▪ Stories – 'most significant change'

Note that some forms of data collection are more relevant to different areas. For example focus groups are excellent for benchmarking changes in attitudes. They were used successfully, for example, to monitor the changes in attitude of cotton producers to Integrated Pest Management over a period of 5 years (Coutts & Christianson 2004). The table below is drawn from the benchmarking report. The format of the table does capture the intent of benchmarking: *What was the situation prior to the start of the project; what did we do to attempt to change this situation; what is the new situation after we have implemented our activities; what does this tell us and what should we do next?*

Understanding/attitudes of IPM				
1997	▪ What we did	**2001**	Implications	What next?
1. A very positive attitude towards the concept of IPM and its theoretical use in the cotton industry.　　2.There was a general recognition that chemicals were not a long term solution. IPM was viewed as being primarily about controlling insect pests with minimal chemical usage. Often associated with the perception of low yield and delayed maturity.　　3.Consultants and extension officers appeared to have a broader understanding of IPM than growers.　　4. Lack of a clearly defined concept of a way to put tools together to form a management system.	▪ IPM information made available – incl. IPM Guidelines ▪ Focussed research ▪ Support of AWM groups ▪ Extension with a consistent message. ▪ Benchmarking ▪ Damage /compensation trials	IPM was entrenched to a degree in the thinking and practice of growers. The aim of IPM was seen as reducing the use of chemicals – using more strategically. Some saw a future without spraying as the ultimate goal.　　Some consultants emphasised the IPM was more than just about insect control – also weed and disease management.	Positive　　Continued focus on pesticides and reducing their use/using soft options may be limiting the concept of IPM as a truly integrated management system. It does seem to have been a good starting point - a "safety net" while confidence is building in IPM.　　Move towards whole farming systems	Extension activities to address broader issues / IPM in farming systems context. Include components in IPM course; Support AWM groups in moving towards other issues Provide a conduit between growers and researchers to help information flow and keep extension message up-to-date　　Harness the growing interest in whole farm / regional planning to facilitate IPM eg managing/enhancing natural enemies using grain crops and/or non-crop vegetation.　　Cross industry linkages needed. Support joint

Focus Groups don't provide the data needed however, to monitor the rate of practice change for example.

The approaches to measuring KASAP demonstrate that, benchmarking (or evaluating) doesn't immediately mean 'surveying' or even focus groups. Unobtrusive measures such as observation can be very effective. For example, in a five year soil conservation project in the Darling Downs region in the 1990s, a grid was developed on a map of the target region, and every 6 months the randomly selected paddocks were visited and it was noted what soil management/tillage approaches were evident. These days, satellite imagery is being used more and more to monitor changes in cropping practice and environmental impacts.

The 'Story Approach' included in the Matrix refers to what is now called the "Most Significant Change" approach (Dart 2000). This is about systematically collecting *narratives* over time from those people who are involved in making changes. Stories could be considered as a 'free form' of survey. Rather than looking for answers to specific questions, the opportunity is made to capture what is happening through the words of those who are making changes (or 'adopting'). Stories don't need to be long (a paragraph…), but need to capture elements of the changes made, the reasons for it (your project activities?) and/ or the impact the change has made. Stories can be used as written to illustrate 'real changes' presented in statistics. They can also be analysed to identify the different types of change, different impacts and, if there are enough of the stories collected systematically, the extent of the change. As opposed to surveys at specific times, stories can be collected over the life of the database. The following example comes from an AusAid funded project I have been evaluating in Paua New Guinea – the story was written down from one of the DPI officers who visited the village some months after a training event promoting the use of household gardens.

> *As soon 'Lawrence' finished from the training he doubtfully started (establishing) his backyard gardening. He has never planted any vegetables around his backyard. Consequently his initial cropping was a matter of doing trials to ascertain his basic skill and knowledge he acquired in his training. To his surprise he found that his vegetables were performing extremely well in his first cropping. The words spread to nearby wards and people came in numbers to see his gardening style. They came not only to see but also to seek information. He also discovered for himself that the returns were good in terms of simple road-side sales and family consumption – he believes that these sales brought in a further 250 Kina* into the household income.*

Such stories add 'impact' to mere statistics. When *stories* were used as part of the evaluation of Target 10 (Dairying) in Victoria, booklets of 'success stories' were presented to managers and politicians who then used them as they spoke about the project to others.

A final point on evaluating 'adoption', is that sometimes key **P**ractice change outcomes are concerned with less tangible changes such as: *ability to make better decisions; more confidence in dealing with difficult situations; increased networking; ability to access information and resources* etc. These are the elements that endure beyond the adoption of some specific technology or management practice. In this case, data gathering techniques and questions need to be geared towards benchmarking and analysing these elements as well.

ATTRIBUTION

An element of measuring change and adoption is that of 'attribution' – or making claims about how the change that a particular project or intervention caused. The issue of attribution is dealt with in a number of ways:

- If the technology/approach is new – and yours is the only project developing/promoting it – attribution is relatively easy. If there is adoption/change, then the project can logically claim it.
- If there are a number of projects/initiatives/sources directed at a technology change, then you can attempt to identify the specific contributions of your project and the spheres of logical influence (for example the key geographical areas, socio-economic groups, farming types etc) for your project. A key approach is *asking* people how they came to make a change – and to what degree they attributed their decision to your project activities (though some research has shown that people 'graze' for information and may have difficulty in such attribution).
- Alternatively, you can overtly recognise that as you 'go up the Hierarchy', attribution is inevitably 'fuzzier'. A range of projects, agencies and external factors impact on adoption. In this case the direct attribution of 'adoption' to your project is less important than the fact that change/adoption is occurring relevant to the project objectives. The focus becomes getting the lower Hierarchy Levels 'right' so that your contribution is (logically) maximised.

FINAL COMMENTS

Evaluating success in achieving adoption of new technologies is achievable with the systematic collection and analysis of relevant data. The relevance can be determined through the use of logical frameworks such as the modified Bennett's presented. As highlighted in this paper, benchmarking is critical to being able to make statements about the level of change over time.

This paper started with a caution about focusing on evaluating adoption without looking at the lower and higher levels of the evaluation hierarchy. The lower levels provide the foundation and explanation of success –or failure. The higher level tells you whether the adoption of the targeted technologies is having the beneficial impacts expected! Overriding this, keeping an eye on the 'context' is critical. Drought and low prices for example, can work against the best managed project!

Evaluation is a critical management and reporting process. It is not something to be added on – or left (only) to an external evaluator. It should be integral to project activities. In this way a robust process can be in place to effectively evaluate success in achieving adoption of new technologies (and many other aspects as well!)

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