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Using continuous improvement and innovation principles for strategic planning in a government department¹

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Abstract

Continuous Improvement and Innovation (CI&I) is both a management process and a management strategy. In this paper we describe how CI&I principles have been used in a strategic planning context by the research economists' group in the NSW Department of Primary Industries. We provide some background on the development of CI&I as a management concept and describe the steps involved in implementing the CI&I process in this context. We conclude with some observations about the usefulness of this approach for planning in a government department.

Keywords: Continuous improvement and innovation; process; strategy; planning; action.

What was the Issue?

Research economists in the NSW Department of Primary Industries (NSW DPI) are attached as specialist resources to the various Branches and Units in the Science and Research Division. They are mainly located at regional research centres and are managed on a day-to-day basis by local Research Leaders. They carry out world class research in the areas of impact evaluation, econometric modelling and cost-benefit analysis. In particular, they:

- conduct performance benchmarking of projects, programs, enterprises, industries and farming and eco-systems, at international, national, state, catchment, resource and farm levels, providing economic information relevant to decision-making;
- analyse the economic, environmental and social impacts of alternative technologies and resource management strategies for major production systems in the agricultural, fisheries and forestry industries of NSW;
- inform decision making about the Department's and primary industries' R&D strategic direction and appropriate resource allocation, assisting in identifying priorities for research and extension resources; and
- play a major role in assessing the returns to research and development at the state, national and international level.

The research economist group in NSW DPI is a highly qualified and highly productive team whose outputs are published in a range of international journals, Departmental reports and industry and

¹ This work was done several years ago when both authors were employed by the NSW Department of Primary Industries.

advisory outlets (see listings in Mullen and Vere 2003; Mullen 2004), and whose contributions are highly valued by the Department. This set of skills and experience have been recognised by all the major R&D Corporations, the Australian Research Council and the Australian Centre for International Agricultural Research, who have supported economics research in NSW DPI over many years. NSW DPI's research economists also make key contributions to the beef, sheep, weeds, cotton, salinity and invasive animals Cooperative Research Centres. Several research economists have adjunct appointments at the level of full or associate professor with the University of New England, University of Sydney and Charles Sturt University. NSW DPI research economists also supervise graduate students at Monash University and the University of Melbourne.

Even though research economists work independently, and are locally managed by their respective Research Leaders, they also design, plan and implement research projects that have common themes and objectives. Examples include developing a common set of farming systems models for the major NSW agricultural regions, developing a common understanding of environmental values, and undertaking program evaluation studies in a common format and using common assumptions. The Research Leader, Economics Research, leads and coordinates the research economists in the different Branches by:

- being involved in each individual annual performance assessment and work planning session,
- negotiating resource issues and work plans with senior management, and
- planning and leading biannual workshops where all the research economists meet to discuss departmental and industry issues, methods and techniques for solving a range of economic problems, and training and progression opportunities.

In recent years, succession planning has arisen as a major issue for the group. Three senior members of the group have retired or resigned in the past two years and another three members have indicated the probability of retirement during the next two years. These senior members publish widely, attract significant external funding and have levels of skills and experience that contribute to the high degree of credibility that the NSW DPI research economist group has both internally within DPI and externally. The danger is that losing these members will adversely affect the credibility, ongoing funding and resources available to the group. In addition, NSW DPI has suffered severe budget cuts over the past few years and there are organisational debates occurring about how economics resources in NSW DPI should be structured and managed.

Over the past few biannual research economist workshops these issues have been canvassed and following a presentation at the September 2007 workshop (Griffith et al. 2007), a decision was taken to use a formal Continuous Improvement and Innovation (CI&I) process to do some strategic thinking about what we want the research economist group to look like in a few years time and what we can do to make that happen. The CI&I process has been used to good effect in the CRC for Beef Genetic Technologies both to accelerate the adoption of new technology across the beef industry and to manage the CRC project (Griffith 2008), so it was decided to give it a try in this strategic planning context.

What is Continuous Improvement and Continuous Innovation?

Continuous Improvement

There is some debate about when the first recognised, concerted continuous improvement effort occurred. Schroeder and Robinson (1991) claim the first modern continuous improvement program occurred in 1894 in the United States at National Cash Register, while Radawski (1999) states that continuous improvement has its origins at Bell Laboratories in the 1930s. According to Imai (1986) the form of continuous improvement called 'kaizen' was developed in Japan in the 1940s (Ishikawa 1985; Deming 1986, 1993; Juran 1988, 1992). It is well-known that the Toyota Motor Company is a committed practitioner of continuous improvement principles.

Whoever is correct, continuous improvement has at least a 70 year history, has been built on tried and tested approaches (Radawski 1999) and has been applied in a wide range of contexts. Clark, Timms and Griffith (2008, Table 3.1) provide a partial list of 52 recent examples of the application of continuous improvement programs across seven different sectors of the economy. There are now a number of academic texts and a range of international peer-reviewed journals dedicated to the principles and practice of continuous improvement. Clark (2008) provides a valuable summary of the concepts, principles, processes, tools and techniques associated with continuous improvement.

A number of authors propose that innovation is also integral to both the concept and process of continuous improvement (Anderson, Rungtusanatham and Schroeder 1994; Winter 1994; Bessant and Francis 1999; Bessant 2003; Bessant and Francis 2005). Bessant and Francis (1999) define continuous improvement as an organisation-wide or system-wide process of focused and sustained incremental innovation. Shortell (1995) argues that culture either inhibits or supports continuous improvement, and that a culture that fosters openness, collaboration, teamwork and learning from mistakes is optimal for sustaining improvement and innovation. Thus, there is an inextricable link between continuous improvement and continuous innovation.

Continuous Innovation

Innovation is a widely researched phenomenon: Rogers (1995) reports over 3,000 papers on the 'diffusion of innovation'. There are two broad categories of innovation (Innovation Summit Working Groups 1999, Miller and Morris 1999):

- 'Incremental Innovation', similar to 'Continuous Innovation', and
- 'Radical Innovation', similar to 'Discontinuous Innovation'.

'Incremental Innovation' refers to any improvement made to existing products or processes (Innovation Summit Working Groups 1999). Continuous innovation is incremental and takes place within existing infrastructures. It builds on existing knowledge in existing markets without challenging underlying strategies or assumptions. Continuous innovation is characterised by convergent thinking - progressive refinements, sharper focus, and therefore increasing specialisation (Miller and Morris 1999). Continuous innovations are easier to achieve, as they draw on the existing market framework, infrastructure, and tacit knowledge of customers, suppliers and other stakeholders. As they are more narrowly and incrementally focused, they do not require conceptual leaps, massive amounts of new knowledge, nor the huge risks that accompany dealing with the unknown. Hence, they are also more comfortable innovation targets (Miller and Morris 1999).

'Radical Innovation' involves new ideas, developing or adapting new technology, or new ways of doing business (Innovation Summit Working Groups 1999). 'Discontinuous Innovation' brings forth conditions that emanate from fundamentally different new knowledge in one or more dimensions of a product or service compared with what has come before, offering significantly different performance attributes (Miller and Morris 1999). The difficulty in achieving successful discontinuous innovation is that it requires new knowledge, which is not available when you are looking only on the inside. Discontinuous innovation is characterised by lateral or divergent thinking, by looking outside defined boundaries and by discovery of new knowledge related to both market need and technological capability. Discontinuous innovations force major shifts in both architecture and capability (Miller and Morris 1999). Discontinuous innovations are successful in the marketplace only if a new value proposition offers a significant improvement on at least one of the three performance axes: features, benefits and costs.

The traditional view of innovation as simply R&D is no longer considered to be appropriate. Case studies gathered by the Business Council of Australia (2006) indicate that:

- innovative activity extends across all parts of a business – it is not confined to research work;
- the imperative to deliver customer value drives the need for, and nature of, innovation; and
- innovation, in some circumstances, has more to do with human capital than with technology and invention.

The concepts and outcomes of "Continuous Improvement" and "Continuous Innovation" were combined into one process, the Continuous Improvement and Innovation process (CI&I), and described by Clark and Timms (1999). The essence of CI&I is a process for 'focussing thinking and action for impact on performance'. CI&I can be thought of as both a management process and a management strategy. Relating the concept to business growth, Terziovski and Samson (2000) found one of the most significant predictors of high performance in small to medium sized enterprises to be the adoption of a CI&I management strategy.

Shared Process

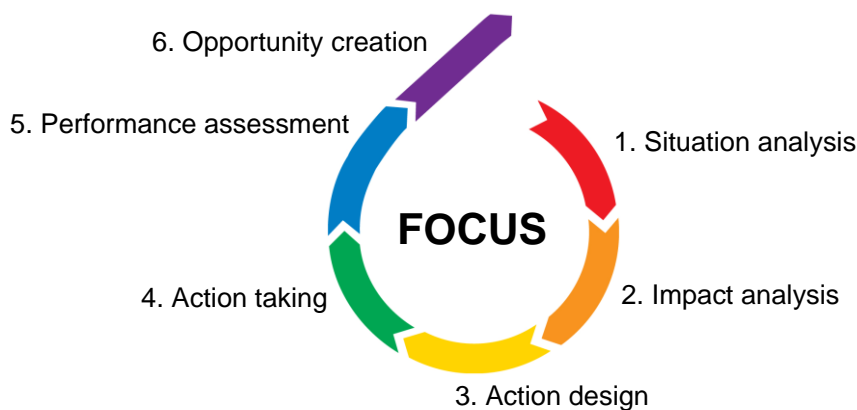
For effective and efficient continuous improvement in teams, organisations, networks and partnerships, it is essential that the continuous improvement process (and its methods, tools and technologies) is a 'shared process' (Eidt 1992; Montana 1992; Gobeli and Brown 1993; Rounthwaite

and Shell 1995; Barthezzaghi, Corso and Verganti 1997; Gieskes and ten Broeke 2000). The shared process of CI&I commonly used is described in Timms and Clark (2007) and is represented by the diagram shown in Figure 1. The CI&I process recognises that individuals are dealing with a unique situation requiring unique decisions to improve the situation. Therefore the process is specifically designed to be used by individuals in teams, partnerships, networks and organisations².

Focus – this is the first component of any CI&I process. “Focusing” thinking and action means identifying a clear need for improvement, choosing boundaries in which to concentrate effort, and setting the specific target outcomes required to meet the need. A clear, shared and agreed focus can save time, effort, money and other resources. The most important thing about a focus is that it should be SMARTT: **S**pecific, **M**easurable, **A**chievable, **R**elevant, **T**argeted and **T**ime-lined. The Focus influences all aspects of the CI&I process.

Situation Analysis – the purpose of this first stage is to analyse a context or situation in relation to the Focus and identify opportunities for improvement. The challenge is to identify or create opportunities that are based on actual needs rather than symptoms. It is important not to limit thinking and possibilities at this stage – opportunities can range from simple to complex, and short term to longer term options, as long as they appear to have the potential to contribute to the focus. Constraints, issues and problems can all be rethought of as opportunities for improvement. At the end of a situation analysis you have a list of opportunities for improvement.

Figure 1. The six key stages of CI&I designed to achieve improvements and innovations



Impact Analysis – here the opportunities developed in the Situation Analysis are analysed or evaluated to determine which ones to take forward to action. An effective Impact Analysis will help ensure resources are only invested in those opportunities that will have most effect or payoff in relation to achieving the Focus or target outcomes. Impact Analysis can also help to avoid investing time and effort in opportunities that are beyond your control. An effective Impact Analysis will also take into consideration issues such as risk, time to payoff, and the consequences of not investing in an improvement opportunity.

Action Design – in CI&I the need to “design” action is emphasised. The action design stage takes into account and includes planning but is more than scheduling resources to complete tasks. Design can help you think about doing things differently, or doing different things, to achieve your focus and

² There are a number of alternative methodologies for achieving these same objectives. Clark, Timms and Griffith (2008, Table 3.3) provide a comparison between CI&I and other approaches based on key attributes, design features, outputs and outcomes. There are also a large range of tools that can be applied at each stage of the CI&I process. Some of these are listed in Clark, Timms and Griffith (2008, Table 3.2).

targets. Action design includes specifying Critical Success Factors (CSFs) and Key Performance Indicators (KPIs) to be able to tell if your action is working.

Action Implementation – There are three important components to this step: monitoring actions and results, regular feedback to stay on track, and support to maintain momentum and motivation.

Performance Assessment – This step involves analysing and interpreting the results achieved, and not achieved, in relation to the Focus and target outcomes. It also involves assessing which methods worked well and which did not. Performance Assessment is made easier if specific KPIs are established during Action Design and monitored during Action Implementation.

Creation and Synthesis – the last of the six key stages of the CI&I process is Creation and Synthesis. This involves two components: creating new questions and ideas about achieving improvement, and using the results from the Performance Assessment and the creative thinking to synthesise specific opportunities for improvements and innovations into the future.

Re-Focus – each time the process is completed a new situation has been created from which different improvements and innovations are possible.

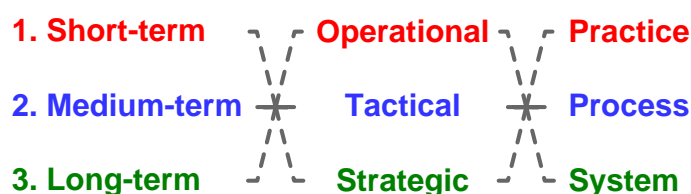
Thus in summary, the CI&I process and the associated toolkit helps all partners to scope, analyse, prioritise, achieve, report and support improvements and innovations, and promote the adoption of actions, methods and technologies that have greatest benefit. The process also helps re-focus thinking and action for further improvements and innovations.

In implementing this process, three broad assumptions are made. First, that the concepts of partnerships, networks and clusters, and the theory behind these concepts, can enhance individual, business and industry (including government) improvement and innovation systems (Gilbertson 2002; Hill 2002; Albury 2005; Bessant 2005; Hartley 2005; Moore 2005; Wyatt 2005; Smart, Bessant and Gupta 2007; BCA 2006; Davis et al. 2008; Ferlie and Shortell 2001; OECD 2004; Hyland, Marceau and Sloan 2006; Clark 2008). Shared and agreed focuses for action, and supportive approaches to action planning and assessment, lead to better achievement of desired improvements and more rewarding outcomes. However, while partnerships can agreed on and plan joint actions to achieve target outcomes, it is individual partners who actually take those actions. Thus individuals have to develop their own action plans for what they wish to achieve, as a way of contributing towards the broader partnership focus and target outcomes.

Second, that each individual partner and each partnership may have several different focuses going at any one time with varying time-frames. Figure 2 illustrates the types of focus that are appropriate. A range of shorter-term through to longer-term focuses is thought to be able to:

- more rapidly achieve improvements & rewarding results;
- more efficiently generate a greater range of improvements;
- more efficiently capture improvement ideas to share and learn about; and
- better maintain interest and motivation.

Figure 2. Types of focus



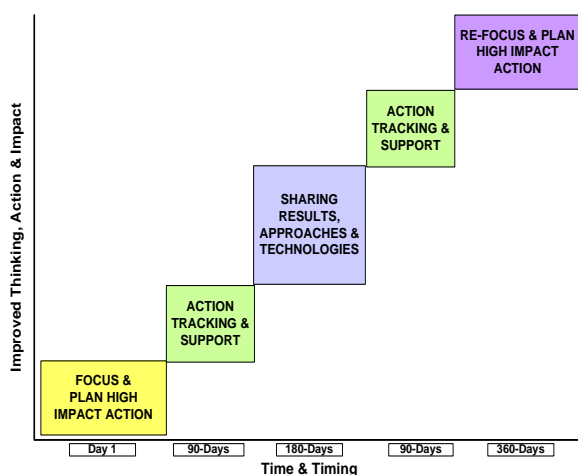
Third, in line with the overall focus to achieve results within a specified time frame and the need for partners to maintain interest and motivation, that the partnership should meet at least every 90 days to follow the CI&I steps described in Figure 1 above. Thus, teams are encouraged to meet, share results and support each other regularly (30, 90 & 180 days) (Figure 3).

CI&I has most often been applied to improving enterprise and organisation performance in manufacturing industries, where there is a strong and direct focus on business productivity and profitability. However, it is now being increasingly applied to improving the thinking and actions of individuals, partnerships and networks in a wide range of contexts including agriculture, health services and Government and community services (see for example Hamilton, Crompton and More 1991; Bunning 1992b; Swiss 1992; Offner 1993; Smith 1993a, 1993b; Morgan and Murgatroyd 1994; Anschutz 1995; Berman and West 1995; Kaboolian 2000; Fryer, Antony and Douglas 2007).

How Did We Implement CI&I in a Strategic Planning Context?

The research economist group was essentially unfamiliar with the CI&I methodology at the start of this process and we did not have the time or the resources to engage in any formal capacity-building. Further, we wanted to confine our attention to those improvements and innovations we could make when working as a group, that is, on those research projects that have common themes and objectives. For the time being we wanted to exclude those improvements and innovations we could make when working as individual economists, even if this meant being part of larger teams of other research or advisory staff. We also had the situation of a number of new and/or part-time members of the group.

Figure 3. Suggested partnership schedule



Thus a deliberate softly, softly approach was followed. At the start of the process in June 2008 we heard from several Branch directors about the current situation in NSW DPI, recent changes in higher level strategies and priorities, and expectations about future financial and other constraints. Concurrently, the Research leader, Economics Research outlined his views about staffing issues and other resource constraints, and his expectations about what the group of 10 CR-funded positions should aim to achieve in terms of annual measurable outputs over the next few years:

- Publish 15 papers in refereed economics journals;
- Present 15 conference papers;
- Employ 5 research assistants on industry funds;
- Publish crop budgets in 3 zones annually and livestock budgets biannually;
- Raise \$500,000 in industry funds;
- Conduct 4 evaluations of DPI R&D investments and assist in applying DPI's investment framework;
- Maintain skills in farm management, econometrics, benefit-cost analysis, impact assessment of R&D, demand and supply response, simulation modelling, etc.

Finally, material on the CI&I process (the Clark, Timms and Griffith (2008) review paper) was distributed and agreement was sought on a regular basis from the group about where we were

headed and the steps involved in getting there. And although we had discussed the need for the development of a specific focus and some target outcomes related to this focus, we chose not to formally develop these at this stage.

Inverse Thinking about Opportunities for Improvement

We then did a brainstorming session using the inverse thinking tool, where we asked the question “How do we ensure the research economics group *does not* succeed in the future?” Each member of the group was asked to write down five items. The items were then listed and grouped into six theme areas, as shown in Table 1.

Table 1. List of Opportunities for Improvement

<p><i>continuity of funding/credibility</i></p> <ul style="list-style-type: none"> no support to maintain staff numbers no external funds coming in (5) lack of interest from RDCs in funding economics work (3) loss of reputation with funders and central agencies
<p><i>succession planning</i></p> <ul style="list-style-type: none"> lack of DAs to provide agronomic input to budgets not replace senior staff – not maintain critical mass not plan for Lloyd’s retirement and ongoing budget process
<p><i>strategic alignment</i></p> <ul style="list-style-type: none"> not having capacity for responding to DPI strategic priorities–left behind/left out not working with industry including R&D funders not relating work to DPI strategic plan (2) lack of support from executive
<p><i>communication and reporting</i></p> <ul style="list-style-type: none"> do not collaborate within the group or with outside people do not communicate within the group or with outside people
<p><i>time conflicts</i></p> <ul style="list-style-type: none"> too many competing demands, being pulled off onto other projects no planning time available for project applications too many other demands-policy/regulatory/extension lack of time to support/mentor/develop skills lack of time to write journal articles not having a clear focus
<p><i>ongoing skills/experience/capacity</i></p> <ul style="list-style-type: none"> stop doing research evaluations stop doing professional development don’t provide a rewarding professional work environment stop investing in skills (2) don’t plan for specialisation in core skills not setting up mentoring schemes/team projects don’t do long term projects focus only on short term projects lack of training opportunities

Table 2. Impact and Influence Scores

Opportunity	Continuity of funding	Succession planning	Strategic alignment	Comm.	Time Conflicts	Skills & Experience
Average Impact	7.56	7.44	7.67	6.22	6.56	8.67
Average Influence	4.89	2.89	5.11	5.78	4.78	4.89

Figure 4. Impact and Influence Diagram

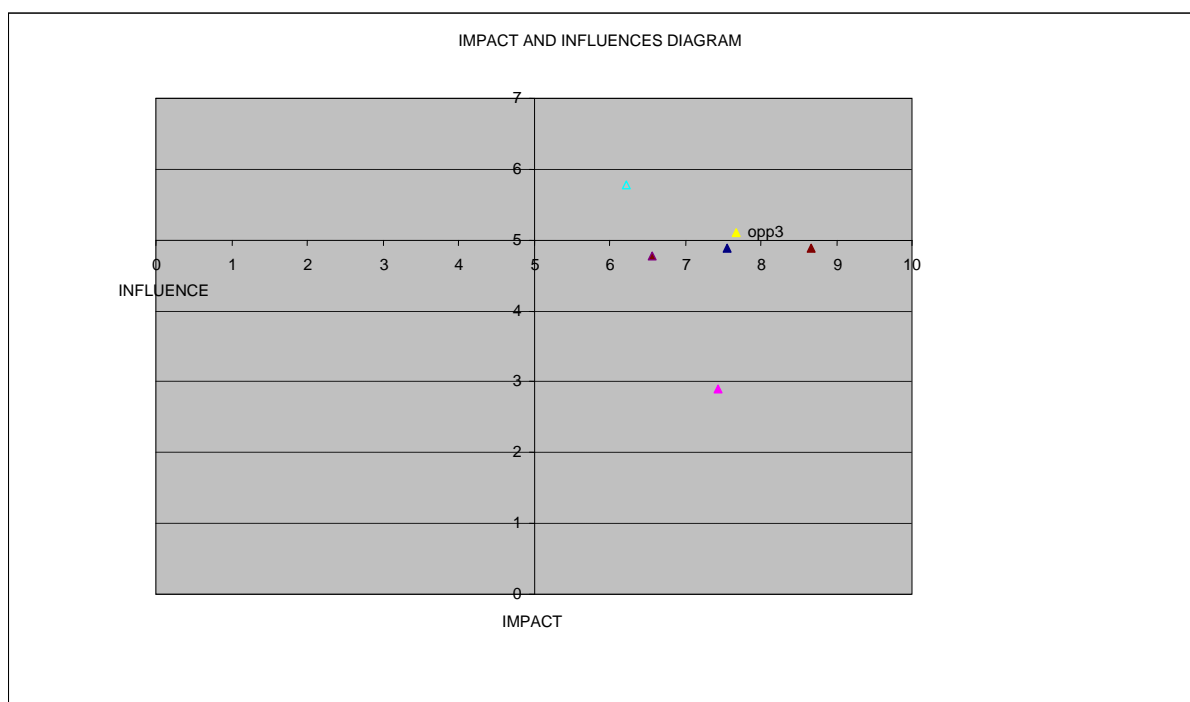
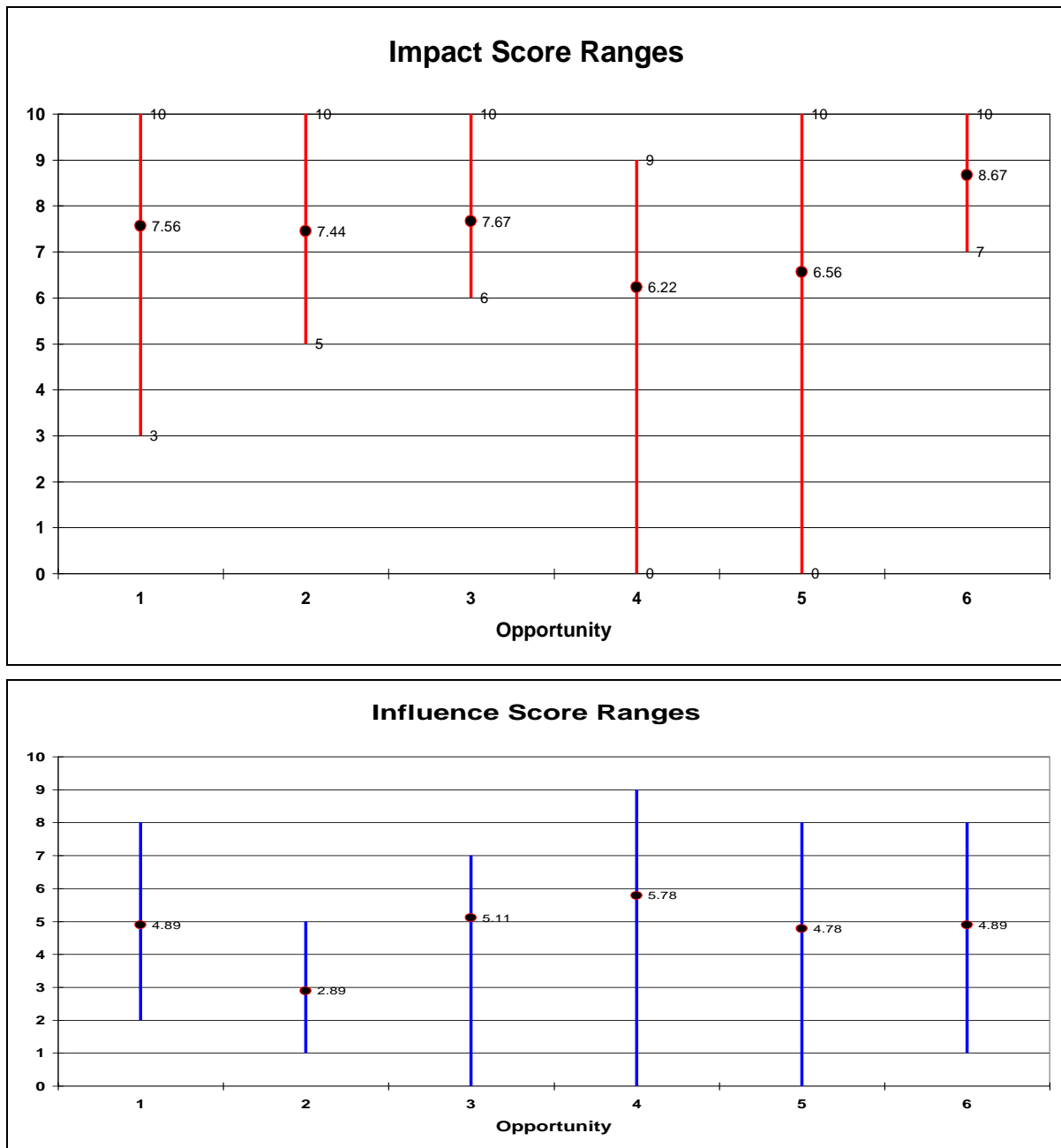


Figure 5. Impact and Influence Ranges



Impact and Influence to Filter the Number of Opportunities

Once we had the list of opportunities for improvement, we then used the impact and influence tool to filter out those opportunities by theme area where as individuals we had little influence on making a change or where a change if implemented would have little impact on what we wanted to achieve as a group. Each member of the group assigned a value of 0 (no impact or influence) to 10 (substantial impact or influence) for each of the six theme areas. The scores were averaged as shown in Table 2, and then graphed as shown in Figure 4 and Figure 5.

Obviously, we want to concentrate only on those opportunities where we can have a significant influence on making a change and where a change if implemented would have a significant chance of achieving what we want to do as a group.

In terms of the average scores, all theme areas rated high for potential impact but only two themes ranked high for ability to influence, although three others were borderline. In terms of the range of scores, two themes showed wide ranges for both impact and influence, which showed the divergence of views about these themes. We decided to exclude the opportunity about succession planning from future consideration on the basis of the low average influence score, the quite tight range of scores and the fact that no individual member of the group rated it above 5. The other five opportunities were carried forward for further investigation.

Initial Commencement of a Group Action Plan

For each of the five remaining opportunity areas, we then used the action design tool to start thinking about the development of a group action plan to design and implement changes to generate improvements and innovations. Initially at the June 2008 workshop we jointly developed and agreed on a draft set of Critical Success Factors (CSFs) for one of the theme areas (Table 3), and then subgroups developed and submitted drafts for the other four theme areas prior to the next meeting in October.

Note again that although we had discussed the need for the development of a specific focus and some target outcomes related to this focus, we chose not to formally develop these at this stage.

Table 3. Draft Critical Success Factors for the Communications Theme

Focus: Better Communication		
Critical Success Factors	Key Performance Indicators	Key Actions
What things are absolutely necessary for success	How will we know we have these things in place	What do we have to do to ensure success and when
Research economist group holds effective biannual face to face meetings		
Research economist group communicates activities and achievements with each other		
Research economist group communicates achievements internally and externally		
Research economist group involved in industry and professional events		

Development of Group Action Plans

When the group reconvened for the October 2008 we had draft action design frameworks for the five theme areas. Some subgroups had gone further than just CSFs and had attempted to populate the associated Key Performance Indicator (KPI) and Key Action (KA) boxes as well. Different subgroups reviewed what was available for each theme area, suggesting new wordings or new entries for the

CSFs and filling in the KPI and KA boxes as required. These were then brought back to the whole group and discussed and changes made where agreed.

This process resulted in a fully populated action design sheet for each theme area. Different subgroups then assessed whether there was any duplication in any component of the action designs across the five theme areas. This resulted in the deletion of one whole theme area, and the incorporation of several elements into other themes. The final four theme areas were Communication; Skills and Experience; Strategic Planning and Alignment; and Time Commitments. These agreed action designs for each theme area are now a formal statement of what the research economist group wants to achieve in these areas to improve the way it functions and contributes to the broader NSW DPI priorities and strategies. The agreed action design for the strategic planning and alignment theme is given in Table 4.

Defining a Group Focus and Group Target Outcomes

Concurrent with the development of the group action designs was discussion and agreement on a formal statement of the focus of the research economist group over the next couple of years and the associated target outcomes that reflect the detail contained in the action designs.

The agreed group Focus was as follows:

A measurable improvement each year in the capacity of the group to deliver relevant, credible and timely information for internal and external clients, based on independent economics research

The agreed group Target Outcomes attached to this Focus were as follows:

- Improved capacity and capability to deliver valued economic information

Table 4. Agreed Action Design Framework for the Strategic Planning and Alignment Theme

Focus: Strategic Planning and Alignment		
Research economist group provides an economic perspective to strategic planning with respect to the use of research and extension resources in NSW DPI		
Critical Success Factors	Key Performance Indicators	Key Actions
<i>What things are absolutely necessary for success</i>	<i>How will we know we have these things in place</i>	<i>What do we have to do to ensure success and when</i>
Research economist group better contributes to priority setting processes in DPI	<ul style="list-style-type: none"> • Framework for investment processes adopted at sub-branch level • Framework for investment questions included in project approval process 	<ul style="list-style-type: none"> • Group drafts a revised pro forma and presents to S&R BOM • Group negotiates with selected branches and units
Research economist group contributes to S&R discussion papers on four priority areas	<ul style="list-style-type: none"> • 'Link' economist contribute to Situation Papers 	<ul style="list-style-type: none"> • Identify 'link' economists to relevant directors
Research economist group more aware of NSW DPI research priorities	<ul style="list-style-type: none"> • Workplans and monthly reports structured around DPI priorities 	<ul style="list-style-type: none"> • Research Leaders/Managers provide a summary of current issues at each 6-monthly meeting
Research economist group assists DPI in meeting accountability requirements	<ul style="list-style-type: none"> • Members complete 4 impact assessments each year 	<ul style="list-style-type: none"> • Members and research leaders identify and agree on areas of research and extension investment to be assessed
Research economist group assist S&R in developing strategic alignments with other economic research and policy development groups within and outside DPI	<ul style="list-style-type: none"> • Better alignment of group workplans with DPI and external groups 	<ul style="list-style-type: none"> • Members liaise with internal and external partners
Research economist group assist S&R in securing project funding from other economic research and policy development groups within and outside DPI	<ul style="list-style-type: none"> • Mechanism in place to review opportunities. • Number of applications made. • Number and total value of external funds attracted. • Number of internally funded positions 	<ul style="list-style-type: none"> • Members review opportunities and priorities and select target fund • Members apply for project funding and commence project if successful
Research economist group is responsive and adaptive to emerging priority research issues	<ul style="list-style-type: none"> • Representatives of the economists' group contributes to strategic planning of staff resources at least annually 	<ul style="list-style-type: none"> • Members keep abreast of emerging priority research issues of interest to NSW DPI, prepare short summaries and add to a list on a shared web site so they can be reported on

- Closer alignment of work programs with NSW DPI key strategy areas
- More responsive and adaptive work programs to meet emerging priority issues
- More supportive and communicative network of economists
- Sufficient staff and financial resources to meet client needs

Where to From Here?

Members of the research economics group are now designing their individual action plans, for the CSFs that they have some ability to influence, and that accord with the agreed group focus, target outcomes and action plans. These individual action plans will be reported at the next biannual meeting in March/April 2009 for feedback, comment and support. A consolidated list of the individual action plans will also be constructed to check whether any elements of the overall group design have been missed and if so whether it requires improvement.

Over time it is hoped that this CI&I approach to better designing and implementing actions that have an overt focus on improving the contribution of research economists to NSW DPI strategies and priorities as a group can be integrated into the agency-wide performance assessment and work planning processes that guide all staff members.

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