

LANDSCAPES AND MINDSCAPES¹ MAKING SPACE FOR CREATIVE THINKING

A. R. Gleeson¹
July 2001

ABSTRACT

There is national concern about the state of the environment and the social fabric in rural Australia. This paper explores some of the constraints we place upon ourselves in dealing with these problems and how we might respond. The central themes of the paper are that our mindscapes, that is the pictures we have of rural Australia are agricultural centric, based on questionable analyses and reinforced by our institutional cultures, structures, and processes.

Australian agriculture and its domination of the Australian landscape continues to be driven by values, policies and practices which do not appear to align well with the values and aspirations of Australians generally. This mismatch is underpinned by long held fallacies about the economic performance and structure of Australian agriculture and by public and private sector organisations whose existence is heavily reliant upon continuation of the status quo.

Currently there are many advocates for changes in agricultural practices within existing agricultural production systems. However it is unlikely that these changes will be sufficient to contain the adverse ecological impact of past and current practices.

The ecological future of rural Australia and its relationship with suburban and urban Australia require a fundamental reassessment of the role and nature of Australian agriculture. Furthermore the desirable direction and pace of change require a greater understanding of the impact of dominant conceptual frameworks and of innovation systems on the nature of innovation. Such understandings should lead to greater diversity in institutional arrangements, particularly as they relate to agricultural, farm and rural innovation.

INTRODUCTION

Australians, both indigenous and non-indigenous, identify with the bush. We may not live there anymore but the bush is important to our identity.

Seventy-five percent of Australians believe in a distinctive Australian culture and sport and the bush are the major single determinants of this culture (Bennett, Emerson and Frow 1999). But one wonders whether endless fields of monocultural agriculture accurately depict the “bush” upon which our national identity is so strongly based.

Rural Australians claim that urban oriented policies and institutions disadvantage them. However all Australians are worse off when policies and institutions do little to strengthen the capacity of communities, whether they be rural or urban, to protect and nurture the ecological and social fabric.

¹ Synapse Research and Consulting
Email:syncons@ozemail.com.au-www.synapseconsulting.com.au

We need to respond to the national concern about the state of the environment and the social fabric in rural Australia.

This paper explores some of the constraints we place upon ourselves in dealing with these problems and how we might remove those constraints. The central theme of the paper is that our mindscapes, that is the pictures we have of rural Australia are agricultural centric, are based on questionable analyses, and are reinforced by our institutional cultures, structures, and processes. We blindfold ourselves with these mindscapes and we stumble down familiar pathways searching for solutions from amongst the institutions that are part of the problem.

OUR NARROW CONCEPTUAL FRAMEWORK

A concept is an idea, an abstract principle, a value, a belief and when these are shared they constitute culture, that is a socially constructed-shared system of meanings. Concepts may be arranged in frameworks that reflect their interrelationships and interdependencies. These frameworks signpost how we move from one reality to another.

“Concepts are tools for thinking not only about how reality gets made, but about how else it could possibly be made---without concepts all we have is nostalgia for how things once were, or impossible, unobtainable ideals” (Wark 1999).

Superficially it appears that our values, what we believe to be right and important, are subject to rapid change. For instance, we may have moved from the development ethos of the '50s and '60s to the mantra of ecological sustainable development thrown up in the '80s and the '90s. And now there may be emerging a nature-related spiritualism, at least in country Australia. However our thinking and importantly our innovation systems remain firmly rooted in a framework of commodification; that is in a framework driven by the desire to produce or acquire products for exchange, usually through market institutions. Our uncritical stampede into water pricing policy is a reflection of our continued belief in the capacity of this framework of commodification to give expression to our values.

We limit ourselves by denying our own spirituality and that of our First Settlers. We channel most if not all of our thinking and analyses through market based prisms. We operate within a commodified culture wherein an idea, an action, a plant, an animal has no value if it can't be priced. We seek to ensure that agriculture is market driven ignoring the reality that farming occurs within social and cultural contexts. We overemphasise the economic contribution of agriculture and deny the critical linkages and interdependencies between different economic activities (see below). We deny the cultural significance of landscapes and the place of food in our culture.

According to Frow (1997) commodification has three effects. First, it directs (narrowly) the use of resources. Second, it selects the generation of profit as the purpose of production. Third, it transforms previously (or potentially) common resources into private resources.

To these I would add that it breaks down the social constructs that guide and strengthen the actions of communities. It is not the inclusiveness of the common property right that leads to the tragedy of the commons but rather the breakdown of the social norms that might have governed the use of those resources held in common.

The commodification of our genetic commons is a classic example of this phenomenon. Kloppenburg (refer Frow 1997) wrote about the political economy of plant biotechnology, observing that capital systematically seeks not only to make a commodity of all use-values but also to create new needs whose satisfaction entails new use-values that can in turn be commodified. Investments in genetic resources have transformed a public resource into a private resource.

Richard Titmuss (refer Frow 1997) described the role of social policy as, on the one hand freeing people of the market constraint on giving to unnamed strangers and on the other, as restricting their freedom to decide to whom they give, that the gift as gift not appear as such either to the donee or to the donor. The gifting act is not defined by the object given but by the transactional or social context within which giving occurs.

This interpretation cuts across the concept of mutual obligation and calls into question the allocation via market mechanisms of the resources upon which life depends. For instance, as we move from seeing resources as nature's gifts, to seeing them as being traded between cultures and generations, we will become aware of the need to earn the right to purchase these resources. In that situation, materially rich societies and individuals will earn preferential rights to life.

Wiseman (1998) sees our task as managing economic globalisation, while holding together social solidarity and cultural identity. He calls for new policy frameworks and institutions, based on modern assessments of social values to do with work, family, and community, and on ecological values.

Wark (1999) highlights the difficulty of this task in discussing the interplay between the urban, suburban and rural parts of Australian culture, and in particular the resistance in the suburban hinterlands and rural and remote areas to urban culture and its values. Add to that, the conflict, plurality, discontinuity, contradiction, fragmentation, subjectivity, ambivalence, and populism of post-modern times.

Mackay (1999) sees us as a society deeply divided on economic and employment grounds where depression is the fifth most common disorder treated by general practitioners. An eclectic mix of values is aligned on the one hand to materialism, security, and the traditional family and on the other to the post-modern values of uncertainty, relativism, and a more inclusive spirituality.

These concepts however are foreign to innovation policy. We begin and end in innovation policy (and elsewhere) with the premise that if we had perfect markets all our aspirations would be fulfilled. Once we accept this premise it is a simple step to define the role of Government, a dominant role in respect to agricultural innovation, in terms of market failure. And then we define social and ecological advantages and disadvantages in monetary terms, for instance through endless and often meaningless benefit-cost analyses. We apply competition as an end in itself, become disillusioned and reject competition policy. But competition and competition policy aren't the

problem. Rather the problem is that we have not agreed on what we want them to achieve.

Oxley (2000) believes that the perpetual problem in managing the environment lies in balancing respect for environmental values with economic values. This is muddled thinking. The economy doesn't have values. It is an artificial construct to help us to achieve our aspirations, aspirations that reflect our individual, social and spiritual values. The environment, on the other hand, is a natural construct which, depending on our culture, affects our individual, social and spiritual values.

We need to reject the simplistic notion that we have three separate spheres of policy: the economic, the environmental and the social - the "triple-bottom-line". The real struggle according to Frow (1997) is not between the ecological and the economic but between what can be properly bought and sold, and what cannot. We have been progressing from property rights that confer limited rights of exclusion to the concept of a property right as essentially the right to exclude all others. As more and more values are commodified, a social expectation arises that the right to exclude and to alienate becomes the expected norm for all forms of value.

Of course we need economic activity, jobs, profits and an equitable sharing of economic wealth. But against a lot of evidence to the contrary we presume that money is the only driver of action, in resource management and elsewhere (for a review of the determinants of natural resource behaviour see Synapse Research and Consulting and Capital Ag Consulting 2001).

We need to improve natural resource management, that is we need to improve or reduce the impact of people on our natural resource base. First and foremost this is a challenge in people management and in understanding the cultural and social dimensions of farming.

Technological developments will help. However without the recognition of existing sets of values and the evolution of new sets of values, of new social norms then we will continue to play a game of technological catch-up with each new technology designed to compensate for the downside of preceding technologies. The use of herbicides and pesticides and more recently the use of genetically modified organisms are contemporary illustrations of this phenomenon.

Land and Water Australia, the national research and development corporation primarily concerned with natural resource management, identifies two basic sources of our impacts on the natural resources. On the demand side there are the impacts of our consumption patterns, where we live -what we consume--what are our waste products --and on the supply side there are the impacts of our systems of production, our land use systems, our processing and packaging systems. They are interrelated and we need to deal with both.

Perhaps the way forward is to take solace from Frow's observation that, at the heart of most theories of the post-modern, is the extension of commodification to many areas of life, this which enables the machinery of economic growth to swallow more and more, destroying the very aspirations which seem to drive economic growth. Eventually, this system must surely self-destruct.

Or from Oxley:

"If the resource (say water) is not big enough we should make it more expensive to make sure it is used more effectively".

This is a formula based on the somewhat tenuous assertion that the rich are much more astute than the poor. History however tells us that such systems are politically unstable. We need to design more broadly based conceptual frameworks which truly reflect our social and ecological values, beliefs and aspirations.

THE LANGUAGE WE USE

The agricultural sector (broadly defined), has not adjusted well to changing commercial and environmental circumstances. To understand why this is so, we need to look at the innovation system that exists within the agricultural sector. This first step looks at two examples of how language constrains how we conceive our institutions.

Australian agricultural organisations and information are invariably misdescribed as being 'rural'. Hence, for instance we have the 'rural' research and development corporations although they are almost without exception concerned only with agriculture.

While agriculture and farming are forms of activity, 'farm' and 'rural' delineate location with rural being used to describe all things and activities occurring on land outside metropolitan areas. The interchangeable use of 'rural' and 'farm,' 'rural' and 'agriculture' and 'farm' and 'agriculture' leads to confusion, the classic being the assumption that agencies termed 'rural' actually deal with rural when in reality their charter is restricted to agriculture.

Given the history of Australian settlement and economic development, it is not surprising that strong and influential institutions evolved dedicated to serving the political, economic and (to a lesser extent) the social needs of farmers. This separatist approach produced a multiplicity of agricultural business support programs, rarely integrated, in either concept or delivery, with other programs that more broadly serve rural communities. However the interdependency of farm and community is widely accepted.

While there has been net migration of persons from remote rural and many inland towns, coastal areas and major regional centres have seen population growth (DPIE 1997). Delivery of services to rural areas has followed migration trends, and it is widely believed that farm families have been adversely affected. In an ABARE survey, farmers indicated that the viability of the local community was considered at least as important to farm families as the performance of the farm business itself (Gooday 1995). In the same survey, more than 25 per cent of respondents considered educational facilities the major issue facing farm families. Rural employment (or the lack of it) was considered a major issue by 20 per cent of respondents.

The idea of farm viability is another illustration of how language affects and reflects how we think about rural Australia. There is a focus in public policy, and hence in the

minds of Australians on the idea of farm viability, that is the capability of the farm's agricultural activities to financially support a farm household. In this sense there are parallels with the concept of a minimum award wage. Viability has also been used to describe the capability of the farmer to pay interest on debt.

The Soldier Settlement Scheme was perhaps the most infamous of schemes based around the idea of viability, as translated into the idea of a minimum living area. The same basic idea of a minimum living area and the related concept of the 'genuine' farmer have been carried forward into contemporary schemes. These include the Rural Adjustment Scheme (note 'rural', not farm), the South- West Scheme in Queensland and, more recently through the 1997 mid-term review of the Rural Adjustment Scheme into the FarmBis program.

The concept of farm viability leads to the belief that those who chose to operate an agricultural business should be able to earn a living from that business. Furthermore these ideas fortify the belief that the function of agriculture is to financially sustain the farm household and contribute to economic growth and exports.

It is little wonder then that Australian governments have difficulty with the concept of multi-functionality, that is that there are farm functions beyond the production of food and fibre products. This is so even though Australian farmers have fully embraced the idea that farms are not just for growing agricultural products. In fact about 45 percent of broadacre farmers earn two-thirds of their net income off-farm and two thirds of the tax paid by non-corporate farmers is paid on income earned from non-agricultural pursuits.

**Table 3.1 Farm and Off-Farm Income: Australian Farmers 1996 - 97
(Based on ABARE 1998)***

Industry	Farm Cash Income * \$'000	Off-Farm Income \$'000 (as % of Total Cash Income)	Share of Industry Population (%)	Share of Gross Value of Production
Wheat and other Crops (Farm Receipts \$<200K)	34	13 (28)	30	9
Mixed livestock-Crops (<\$100k)	12	20 (62)	33	11
Sheep (\$<100k)	6	22 (78)	49	19
Beef (\$<100k)	2	25 (92)	67	27
Sheep-Beef (\$<100k)	7	28 (80)	70	32
Dairy (\$<100k)	17	6 (26)	24	8

(Synapse 1999)

* The difference between the total cash receipts of the business and the total cash costs incurred by the business. It does not account for changes in trading stocks, depreciation or the imputed value of labour provided by owner managers and their families.

The growth in income in farm households from other than agricultural production has major implications for farm policy and the future of rural Australia; yet it is dismissed in ten words in a 150 page inter-governmental report on sustainable agriculture (SCARM 1998). It is noteworthy however that this single purpose mindset about farming has not been universal in Australia. For instance thirty years ago, the Council for Aboriginal Affairs recognised that, for economic, cultural and political purposes, Aborigines' leasehold should be multi-purpose, and that social purposes should be included in the definition of purpose. The needs of the Gurindji people at Wave Hill have been expressed as the protection of sacred and ceremonial places, the provision of a residential area and the provision of an area for a viable pastoral enterprise (see Rowse 2000).

ECONOMIC MYTHS AND REALITIES

The economic contribution of the farm sector

Australians, more particularly white Anglo-European farmers and their institutions, appear to believe that the principal or sole purpose of farming is to contribute to national economic growth through the production of food and fibre. From this starting point it is assumed that Australia must be competitive in global markets for agricultural products. Hence the need to increase the productivity and the value of agricultural production becomes the dominant or sole driver of agricultural and land policy and practice.

Our agricultural support institutions encourage us to believe that Australian farmers are doing a pretty fair job in achieving these economic goals.

For instance the 1998 inter-governmental assessment of Australia's recent performance in sustainable agriculture (SCARM 1998) concluded that:

“A long term downward trend in terms of trade has been largely offset by increases in productivity “(P.1); and that

“The real net value of farm production is slowly declining over time--the slight downward trend in real net farm income needs to be interpreted in conjunction with a measure of farm productivity” (P.17)

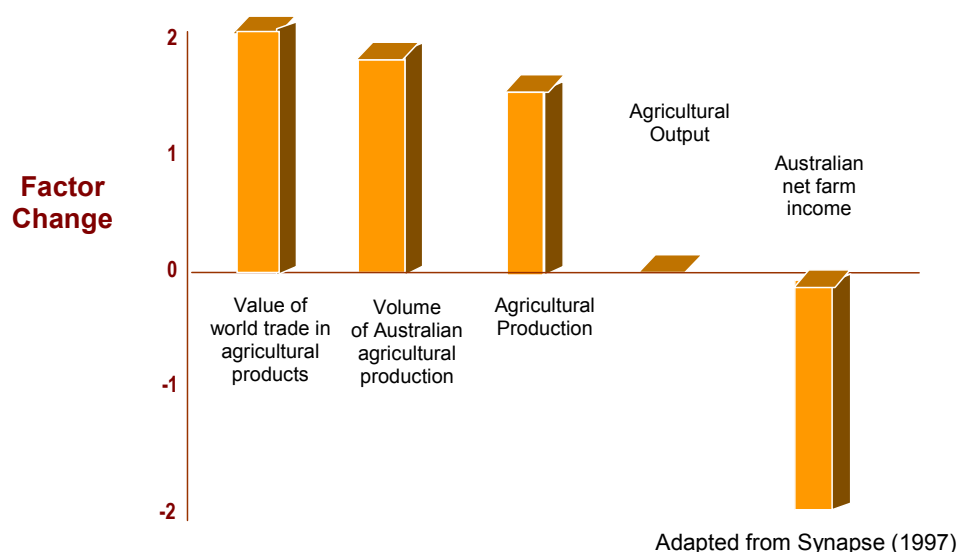
In 1999 the Australian Bureau of Agricultural and Resource Economics reported that:

"Between 1955-56 and 1998-99, the volume of farm production rose by 187 percent. Despite falling real prices for farm product, the real gross value of farm production rose by over 25 percent" (equivalent to 0.6% per year). "However, with rising costs of production, the net value of farm production fell by around 54 percent in real terms"

These statements are basically correct. However the picture they present contrasts to that conjured by the equally correct observation that, since the early 1970s there virtually has been no change in the real gross value of Australian agricultural output despite a two-fold increase in the real value of world trade in agricultural products. Furthermore aggregate real net farm income in the mid- 1990s was only one third of what it was twenty years earlier (see Figure 1).

Clearly against the benchmark of economic performance agriculture is an increasingly unattractive investment. The more general point here however is how one presents or reads the figures depends on what institutional baggage one carries.

Figure 1: Agricultural Economic Performance, Australia 1971/72-1994/95 (1994/95 dollars)



The export contribution of the farm sector.

Our agricultural support institutions encourage us also to take an overly optimistic view of the export performance of the farm sector.

It is widely held that about 75 to 80 % by value of Australian agricultural products are exported (See ABS 1996; DPIE 1997; SCARM 1998) leading to the impression that the domestic market is relatively small for most agricultural commodities (SCARM 1998). It is amazing that this misunderstanding has persisted for as long as it has given the corollary that about half of the value of domestic consumption of non-manufactured food and fibre products of about \$11 billion must come then from imports.

The reality is that comparable production, export and import statistics across individual industry sectors are not readily available. However the proportion by value of exported agricultural products is inflated by comparing the value of production at the farm gate with the value of processed exports. Analyses that take this factor into account conclude that the proportion of agricultural products exported directly or embedded in manufactured products lies between 33% (DITAC 1993) and 50 percent (ABS 2000). The ABS estimates that approximately 50 % of this contribution of

agriculture to exports is represented by agricultural value embedded in manufacturing exports.

A similar picture emerges from an examination of the export statistics for the food and fibre industries which together account for about 30% of Australian merchandise exports. Over the ten years to 1996/97, the ratio of imports to exports of non-manufactured food and fibre products² was about 1:4.5, that is, values of imports equated to about 23% of exports. In the manufactured food and fibre products industries³, the ratio was approximately reversed, with exports equating to about 18% of imports (ABS 1998). Overall, the value of Australian food and fibre imports are about half as much as the value of food and fibre exports, with net exports in 1996/97 being valued at about \$12 billion.

No up-to-date, comprehensive analysis is readily available on the competitive position of Australia as an exporter of food. However available data on trade in unprocessed food reveal that Australia slipped from seventh to seventeenth place as a world exporter over the period 1989-1992. In processed food exports, Australia went backwards: its ranking in the world's top 30 exporters slipped over three decades from sixth to eleventh place in 1967-1987 and from thirteenth to fourteenth place in 1989-1992 (Heilbron and Larkin, 1995).

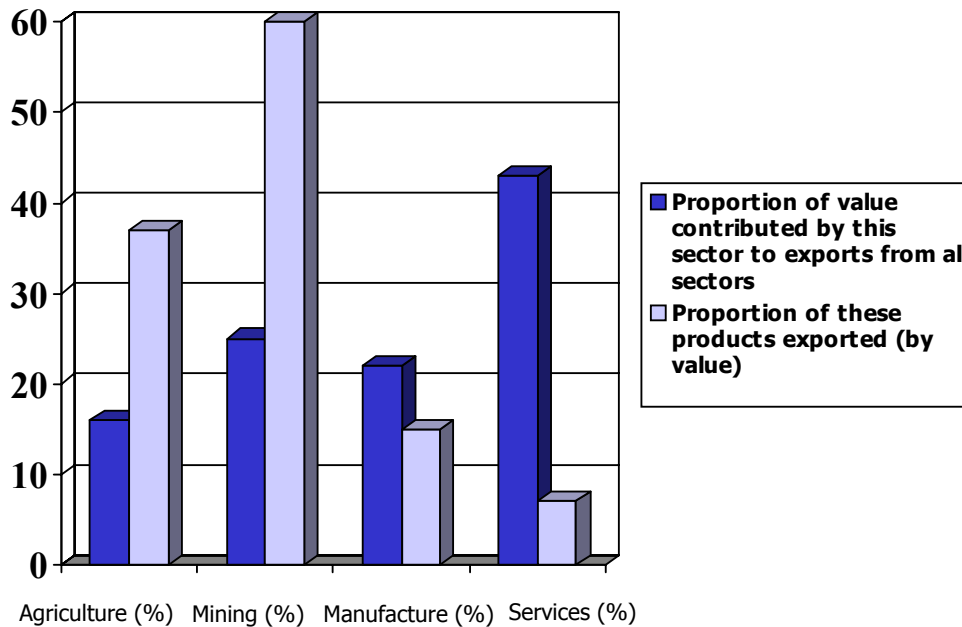
The position of Australia in key Asian food markets is bleak. Penetration of the Japanese and Korean food markets has been disappointing overall. Australia's share of the Japan food market in 1995, for example, was 6.8%, and was erratic over the previous five-year period. Australia was not among the top suppliers in any of the big, high-growth categories of Japan's food imports over this period (Heilbron and Larkin, 1997).

Another widely held misbelief is that Australians, and particularly the urban café society service sector, rely heavily on 'rural' exports. However sectoral interdependency is a feature of maturing economies. The most recent Australian data relate to the mid 1980's and even at that time, when both direct and indirect inputs are taken into account, the service sector contributed about 40% of the value added to Australian exports compared to about only 14% from the agricultural sector (*see* Deeley, 1991).

² Standard International Trade Classifications 0, 1, 2 except 27 and 28.

³ Standard International Trade Classifications 61, 62, 63, 64, 65, 84 and 85.

Table 1: Export Performance



* The agricultural statistics in this figure differ somewhat from the more recent estimates provided by the Australian Bureau of Statistics (ABS 2000)

Other strong linkages also exist, for instance, in marketing and product chain relationships, competition for scarce resources, and skill and attribute building. However, the physical isolation of most agricultural production from population centres and markets, and the complex web of institutional, cultural, political and demographic factors, frequently produces more rhetoric than substance in the recognition of external linkages.

Changes in the patterns of trade, rising standards of living, and the maturing of economies produce ever greater levels of economic connectedness within and between countries. This interconnectedness impacts on industrialised societies generally, and on rural communities and agricultural producers more specifically, particularly by altering the relative weight of factors which determine competitiveness. The continuing impact on rural Australia depends on our willingness and capacity to manage these trends. Institutions must be redesigned to achieve greater regional differentiation and identification, without losing their connectedness with other regions and nations.

Employment

ABARE began a 1999 report to the Department of Transport and Regional Services,

"Agriculture is the dominant industry in inland and remote Australia"

Literally this may be true depending on how one defines and aggregates industries. However, as shown in the same report agriculture accounts for only 15% of

employment in inland and remote Australia. Furthermore in the twenty years to the early 1990s, employment in agriculture in rural Australia halved, while total employment in rural Australia doubled (see Synapse 1998).

Assistance

Policy considerations of assistance to agriculture are anchored fundamentally on two somewhat contradictory beliefs. The first belief is that productivity is less in assisted industries and the second is that Australia will benefit from a lowering of assistance to agriculture in countries that compete with Australia. Furthermore it is believed that subsidising Australian agriculture is not a realistic option because it is assumed that our relatively small population is inescapably linked with small expenditures on agriculture and the resource base from taxes and /or consumer transfers. This presumption is fortified by misconceptions about the ratio of exports to domestic consumption.

In the 1980s and the 1990s, assistance to agriculture excluding most environmental expenditures ran at about \$2 billion per year. This level of assistance equates to between 50 and 100% of net farm income and is about ten times the net amount paid in tax on agricultural income by primary producers other than by the minority who operate in a company structure. Nationally this net tax paid by primary producers on agricultural income would barely pay for 50 % of the costs of the Department of Primary Industries in Queensland.

ACCEPTING THE NEED FOR CHANGE

This paper began with a discussion of how the existing conceptual framework, our language about rural Australia, and our misconceptions about the economic performance of agriculture constrain our abilities to address environmental and social issues in rural Australia.

Through our narrow commodified conceptual framework we seek to maximise material gains and we ignore the cultural and social framework within which agriculture operates.

Through misunderstandings arising from our interchangeable use of terms such as rural, farm and agriculture we look to agriculture to play the dominant role in the economic contribution of the non-metropolitan sector; and we are fortified in this exercise by the self interest of agricultural institutions. However, at best the real gross economic contribution of the agricultural sector is barely changing, it contributes less to exports than is generally believed and its contributions to national profit and tax revenue are small relative to the level of economic assistance afforded it.

On the environmental front we can take some simple pointers on where we stand:

- Australians place a high value on the environment and Australia has the wealth, skills, and opportunity to be a world leader in natural resource management.
- We need to and can build sustained competitive advantage based on sound natural resource management.

- We need adaptable and precautionary resource management systems because we do not have a full understanding of our ecology.
- Over the last 50 years (and earlier) our agricultural industries have not performed well on environmental grounds and there is little to suggest that this will markedly improve within the existing policy and institutional frameworks.

Initiatives in the 1980's to promote ecologically sustainable development were captured largely by existing industries leading to the concept of sustainable agriculture as outlined in, for instance three inter-governmental reports-“Sustainable Agriculture” (SCARM 1991), “Sustainable Agriculture: Tracking the Indicators for Australia and New Zealand” (SCARM 1993) and “Sustainable Agriculture: Assessing Australia's Recent Performance” (SCARM 1998).

Sustainable agriculture was defined as the use of farming practices and systems which maintain or enhance:

- the economic viability of agricultural production;
- the natural resource base; and
- other ecosystems which are influenced by agricultural activities. (SCARM 1991).

In the context of this paper two points (from many others) in these reports are of particular interest.

First the 1993 report defined the key on-site financial indicator as ‘change in long term real net farm (value of) output’ and the 1998 report stated that ‘no clear trend (in real net farm income) is evident from the short time series available. However the report noted that the real net value of farm production is ‘slowly declining over time’. The actual data show a fall from an index of about 3.5 in the mid 1950's to about 1.0 in the mid 1990's. One wonders at what rate a decline ceases to be slow and might be described as rapid.

Second the 1993 report defined the on-site social indicator of sustainable agriculture as ‘change in the level of managerial skill of farmers, landowners and land managers in finance, farming practice and environmental stewardship’. One suspects this choice of indicator reflects the interests and competencies of the authors rather than a need to monitor the social health of farm community, including for instance that of the large migratory casual workforce.

Not only did existing industries largely capture the ecological sustainability debate but they quickly sought public help to defray the private costs of ecological sustainability. Twenty years on this game is still being played out.

For example, it is unlikely that taxpayers will reap a useful return from the use of public funds to breed a salt tolerant cereal for growing in salt affected areas of the Murray Darling Basin; a publicly funded program to support diversification from growing wool to growing sheep meat in the Gascoyne region of Western Australia masquerades as a regional resource management program; public funds are allocated to improving on-farm water use efficiency in Queensland with no measures in place to redirect the saved water; future generations will pay for the environmental damage

fostered by the cyclical dumping of taxpayers' money into the Queensland sugar industry; billions of dollars of consumer money are supporting 'adjustment' in the dairy industry with seemingly little or no consideration of environmental consequences; and so on.

But the problems are more deep-rooted than is reflected in even these misguided sectoral programs. The problem is anchored by inappropriate mindsets.

One of Australia's most accomplished trade negotiators, observes that Australia has secured enormous benefits from adopting modern farming techniques (Oxley 2000). This has generated wealth to improve standards of living, and has also made Australia an important supplier of food to the world. "Is not," Oxley asks, "the alteration of landscape to make the continent a global supplier of food a worthwhile thing to have done?" Oxley acknowledges that there are some real environmental problems on the coast, but to add salt to the wound the potential problem he instances is uncertainty about whether the high-rise buildings on the Gold Coast in Queensland will withstand the very heavy storms that hit every few years.

Obviously the values underpinning these observations influence Australian strategies in world trade negotiations. But are they the values of Australians, and more particularly, are they the values of tomorrow's Australians?

It is hardly suprising that Wiseman (1998) concludes that the achievement of international consensus on crucial environmental issues has been made more difficult by international trade agreements that oppose and prevent international environmental regulation.

The ecological impact of human economic activity is clearly the greatest threat to ecological sustainability yet it is widely believed that agricultural profitability must precede ecological sustainability. Surely, the economic returns from current uses of resources should not determine how those resources should be managed in the future. And in any event while agriculture is significant in economic, social and cultural terms the net economic returns from agriculture are generally overstated.

And to again quote Wiseman:

"It is not enough to teach people how to swim better in a tide, a time comes when people have to do more than swim more effectively. They have to get together and say this river seems to be going in the wrong direction and somehow it has to be stopped---and it has to be redirected".

ACCEPTING THE NEED FOR INSIGHTFUL THINKING

We may learn from what has been but we will not move forward by adopting the thinking and strategies that led us to where we are. We need to be continually searching for new representations of the problem. We need to imagine a different future. To do this we need to remove obstacles to insightful thinking.

One of the key obstacles to insight is fixation on a particular image or way of thinking. If, for instance, we visualise a landscape dominated by introduced pasture species, fences and watering points, then it is impossible to conceive of it not being

occupied by domestic livestock. We then try narrowly to define the problem and find the solution in the economic, social and ecological frameworks of livestock production. Furthermore, the dominance of scientific and economic disciplines often leads us to seek an explanation based on analysis of facts. The valuable potential contributions of imagination and intuition are lost.

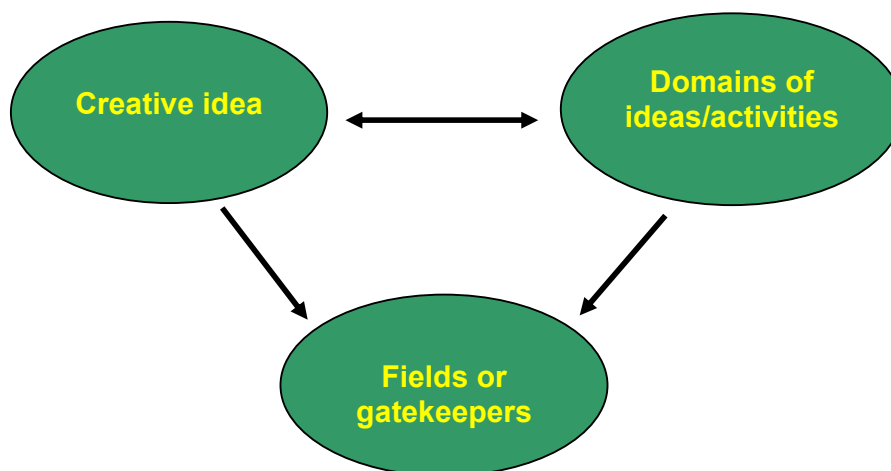
"...Insight and a consequent drive for achievement...fuel a thought process which is basically creative and intuitive rather than rational. Strategists do not reject analysis...but they use it only to stimulate the creative process...to test new ideas."
(Ohmae, 1982).

Before delving more deeply into the processes leading to insight it is useful to reflect on the broader context within which creativity occurs.

Creativity has been defined in many ways but principally in terms of outcomes and processes (see Gleeson, Russell and Woods 1999). A combination of these perspectives provides us with a useful starting point in understanding creativity.

Creativity is the capacity to produce new or original ideas, insights, restructurings, inventions or artistic objects that are accepted by appropriate people as being of scientific, aesthetic, social or technological value (after Vernon 1989)
Creativity is not determined entirely by the person with the creative idea, but is the outcome of a system of influences arising from the creative person; the domain or discipline within which the creative person is operating, and the gatekeepers of ideas and practice. In agriculture these gatekeepers include members of the Boards and Advisory Committees of the rural research and development corporations and influential farm leaders.

Figure 2 A Systems Approach



“Creativity lies not in the head (or hand) of the artist or in the domain of practices or in the set of judges: rather the phenomenon of creativity can

only - or, at any rate more fully - be understood as a function of interactions among these three nodes”.

(Gardner 1993)

A domain is a set of symbolic rules and procedures such as mathematics, music and legal systems, nested in culture, the symbolic knowledge shared by a particular society. Creativity is affected by the narrowness of the domain, the manner by which the domain information is sorted and accessed, for instance as words, equations, rhythm and pitch and the breadth and depth of interest in a domain (Csikszentmihalyi 1996). Different kinds of mental skills are required for different domains depending on what symbols and symbol systems are used.

A field is all the individuals who act as gatekeepers to the domain, including, for instance, teachers, industry people, administrators of R&D funds, journalists and other communicators, scientific editorial panels and referees. Fields affect creativity by:

- being reactive or proactive in stimulating and supporting novelty
- being well or poorly versed in the domain
- choosing the size of the filter for new ideas with either too open or closed a filter being counter productive, and by
- being well connected or not to the rest of the social system whereby they can channel support for their domain.

Domains and fields can affect each other for the knowledge base may restrict the field or the field may not be competent to represent the domain. Gardner (1993) hypothesises that creativity results from an individual's capacity to exploit or create misfits or asynchronies between herself, the domain and or the field.

The creative processes have been variously described (see Csikszentmihalyi 1996) as including preparation, incubation, insight, evaluation and elaboration.

During preparation the problem solver/finder becomes immersed in a set of problematic issues that are interesting and arouse curiosity. The really important breakthroughs appear to come from reformulating old problems or discovering new ones rather than by just solving existing or presented problems. In incubation ideas churn around below the threshold of consciousness and many will identify with the following comments from creative scientists as quoted by Csikszentmihalyi (1996):

“I am fooling around not doing anything, which probably means that this is a creative period, although of course you don't know until afterward. I think it is important to be idle - people who keep themselves busy all the time are generally not creative. So I am not ashamed of being idle.”

Both cognitive and psychoanalytic accounts of what happens during incubation assume that some form of information processing keeps going on in the mind even when we are not aware of it. The cognitive theories, unlike the psychoanalytic ones, do not attribute any direction to this subconscious thought. However even though sub-conscious thinking may not follow rational lines it nevertheless follows patterns established during conscious learning. The knowledge of the domain and the concerns of the field become part of the way our minds are organised. Evaluation has

to do with deciding whether the insight is valuable and worth pursuing and elaboration is expansion and justifying the creative idea, product or process.

The components of the insight experience are open to much debate. However the reality probably is that the presence and relative importance of the various facets of insight vary between problem types, persons and environments. Different types of problems elicit or constrain different insight processes and different problem solvers may use different processes to solve the same problem. Generally however insight involves a cognitive restructuring leading to a representation of the problem.

Schooler, Fallshore and Fiore (1996) after reviewing various presentations of insight, defined insight as being the sudden transition from a non-solution state to a solution state. In other words insight is the process whereby one moves from not knowing to knowing.

Schooler and his colleagues list the causes of impasses to insight as being:

- overemphasis of irrelevant clues: in other words the more the problem solver spins his or her cognitive wheels the deeper the rut he or she finds themselves in.
- under emphasis of relevant clues: a failure to see the clue by not recognising the relationships between the problem and information acquired in the past or by not mentally searching the right place, for instance from not understanding the domain.

Impasses may be overcome by improving solving recognition or by searching for a new problem. Improving solving recognition can come about by de-emphasizing inappropriate problem elements by, for instance, delaying so as to forget or by changing the physical or psychological contexts, for example by showering or walking. These strategies assist in removing mental obstacles to insight. Improving solving recognition may also be achieved by accessing appropriate problem elements by, for instance, encountering new information, by cues surfacing from the unconscious or by a combination of both whereby the environment may set into action unconscious retrieval processes that ultimately bring to the consciousness a cue that can prompt recognition of the solution. These concepts explain why insights occur frequently when the creator gives up on a particular problem and turns to other activities.

Simonton (1996) maintains that information processing below the thresholds of awareness is far from sophisticated and that, in all likelihood, the unconscious mind is simply the repository of some rather primitive associations that can form linkages that the conscious mind would deem preposterous. Once these intuitive insights emerge the conscious mind gets involved in verification and elaboration. However the line between consciousness and unconsciousness is not hard and fast. Simonton quotes the Nobel laureate Max Planck attributing to great scientists “ a vivid intuitive imagination, for new ideas are not generated by deduction but by a creative imagination.”

In contrast to this thinking by association approach Mayer (1996) lists five interrelated views wherein insight is held to be:

- the completion of a coherent structure linking the problem and the goal (the schema view).
- looking at the problem in a new way by reorganising the visual information, the decisive step, according to Kohler (1969), being a restructuring of the given material.
- mentally redefining and clarifying the problem, such as reformulating the givens or the goal.
- removing mental blocks, for instance by removing functional fixedness, or
- focusing on the structural relations, rather than the surface features, of one problem and applying them to another.

The overlapping thread to many of these non-association views is that problem and/or goal representation through one or more forms is a central feature of insight. In fact Dominowski and Dallob (1996) characterise insight as a form of understanding of a problem and its solution that can result from restructuring, a change in a person's perception of a problem situation. This generalisation has significant implications for the management of R&D, for it highlights the importance of the scientist being able to reformulate the problem and hence to have undergone a process of immersion and possibly a period of incubation. It also lends support to the suggestion by Finke (1996) that techniques for generating preinventive forms and for exploring their creative possibilities might facilitate creative thinking in scientific training, a component he observes as being seldom emphasised. However it should be noted that the representation process generally only applies to situations in which the problem solver does not know what to do to achieve the goal, that is to insight problems, and then not universally so.

The first step in searching for a new problem representation is the recognition that one is lost, as occurs for example when one accepts an unexpected finding as valid and rejects existing theory. Finke, Ward and Smith (1992), proposed a two stage model of divergent insight involving the generation of preinventive structures or mental representations and the exploration and interpretation of these representations.

The generative processes include retrieval, reassociation and synthesis of existing forms, analogical transfer wherein there is a transfer of relationships between contexts and categorical reduction wherein a familiar structure is mentally reduced to more primitive forms. The resultant preinventive structures can take the form of visual patterns, object forms, mental blends, category exemplars or mental models. Such structures promote creative insight and discovery particularly if they are novel, ambiguous leading to a variety of possible interpretations, possess a sense of meaningfulness or deeper significance, possess emergent features, possess incongruities and are divergent in that they may have different uses within a variety of contexts.

The exploratory processes include attribute finding, conceptual interpretation, functional inference, contextual shifting, hypothesis testing and searching for limitations. Attribute finding refers to the systematic search for emergent features, for example the search for unusual or unexpected features in a preinventive association of ideas. Conceptual interpretation refers to the finding of a theoretical interpretation of a preinventive structure or more generally to the application of one's knowledge to the task of creative exploration. Functional inference refers to the process of exploring

the potential uses of a preinventive structure and hence it is important in evaluating and testing mental models. Contextual shifting is considering a preinventive structure in a new or different context. Preinventive structures can also be explored for their possible value in testing hypotheses or solving problems and they can be searched for limitations to provide insights into which ideas or approaches will not work.

Perkins (1996) provides an interesting perspective on human insight in a comparison of it with the phenomenon of biological evolution within which he maintains that each involves a long search, a precipitating event and a rapid culmination of events. He maintains that these generative breakthrough events or episodes of sudden innovation might occur in any creative system, including for instance in biological evolution.

Perkins visualises the work of a creative system as a process of search through a space of possibilities or a “possibility space” and there are two extreme kinds of topography- or mindscapes- possessed by possibility spaces. The first is a Homing space with a clue rich character enabling relatively easy resolution to the problem through convergent thinking by persons expert enough to know the signs. The second is a Klondike space with vast relatively clueless regions in the midst of which occur small pockets rich with clues and in which rapid progress can be made. Typical earmarks of insights or more generally, generative breakthrough events such as suddenness are consequences of the Klondike topography and may have little to do with intelligence.

Perkins describes insights and evolution as being generative breakthrough events each having common features except in that evolution, as it is traditionally understood, does not possess the feature of improved understanding. However human processes of search often are well adapted to the topographies of Klondike spaces and such processes are described as being insightful in that they are well adapted to cope with search in a Klondike space, with insight being the consequence of insightful searching of Klondike spaces. More insightful systems make more discoveries. In contrast, evolution as classically conceived by Darwin lacks this insightfulness. It is a brute-force process. However, some modern conceptions of evolution suggest that evolution may be smarter than Darwin imagined. On a vastly greater time scale than human beings, genes in their passages from generation to generation may function in an insightful way (*see* Wesson 1991).

One feature of the search through a possibility space is that goals may shift as the search proceeds and that the aim of the search process becomes to find a state of the search space that satisfies the current state of the evolving goal. Getzels and Csikszentmihalyi (1976) found sudden shifts in goals to be a hallmark of what they term problem finding, a trait related to creative productivity. Similarly the possibility space may change during the actual course of the search either from the recognition of pre-existing knowledge or the discovery of new knowledge. This evolution of the possibility space might be what underpins the evolution of research goals and the related practice of “skunking”, that is progression along research pathways outside the boundaries of established programs.

The constraint for insight problem solving is to see where to go whereas the constraint for the non-insight problem solving is to move successfully to the readily perceived or prescribed destination. These problems require different skills, logical argument

being predictive of non-insight problem solving but not of insight problem solving. Non-insight problem solving places demands on the solver's ability to maintain a representation of the problem and the goal conditions. However an excessive or inflexible premature prescription of a problem may limit problem representation and the power of insight. Additionally, verbalisation can cause an over emphasis on reportable processes rather than the non-reportable processes frequently associated with insight problem solving.

Studies of simulated scientific research (in vitro) and actual scientific research (in vivo) have been conducted by Dunbar and his colleagues at McGill University, Montreal and summarised by Dunbar (1996). These studies demonstrated that the generation of alternative hypotheses to explain inconsistent evidence required the setting of new goals but that this conceptual reconstruction rarely occurred without social interaction with other scientists. Analogical reasoning was an important source of knowledge and conceptual change and this may arise from the same (local) domain from a similar (regional) domain or from a different (long-distance) domain. Furthermore the social structure of the research team was found to be critical as to whether analogues were used. Social interactions and cognitive representations interact to produce conceptual change when surprising findings occur, the researcher believes these findings are not due to error and when other persons challenge the researcher's interpretation of the findings. Dunbar concluded that members of a research group should have different but overlapping research backgrounds and analogical reasoning should be encouraged in part by providing opportunities for researchers to interact and discuss research.

So in summary what lessons can we take from our understandings of creativity and insight:

First creative products are both novel and useful and their generation involves creative people, domains and fields.

Second creative persons need to draw on both conscious and sub-conscious processes involving both intuitive and logical thinking.

Third creative persons need adequate time to explore possibility spaces and, in circumstances requiring insightful processes, there is likely to be a need for representation of the problem.

Csikszentmihalyi and his colleagues analysed the narrative accounts of creative individuals to conclude:

- Insight is part of an extended mental process preceded by periods of conscious preparation and subconscious incubation and followed by periods of conscious evaluation and elaboration. The length of this process is usually much greater for problem finding as compared to problem solving situations.
- Problem finding insights are characterised by the synthesis of information derived from more than one symbolic domain.
- The processes that come before and after insight are heavily dependent on social interaction, in the form of face-to-face encounters.
- To achieve a problem-finding synthesis, the following prerequisites must be met: (1) thorough knowledge of one or more symbolic domains; (2) thorough

immersion in an endeavour that practices the domain; (3) focus of attention on a problematic area of the domain; (4) ability to internalise information relevant to the problematic area; (5) ability to let the relevant information interact with information from other domains at a subconscious level where parallel processing takes place; (6) ability to recognise a new configuration emerging from this interaction that helps resolve the problematic situation; and (7) evaluation and elaboration of the insight in ways that are understandable and valuable to the field.

Hennessey and Amabile (1988) in a review of the literature on the effects of external stimuli on motivation and creativity observed that as early as 1954 Carl Rogers talked about the “conditions for creativity” and the importance of setting up situations of psychological safety and freedom, providing an environment in which external evaluation is absent. Hennessey and Amabile support the suggestion made by Lepper and Greene (1975) that the intrinsically motivated person feels freer to take risks because those risks carry virtually no liability save any that is self-imposed. They concluded that motivation, broadly assessed quality of performance and creativity are reduced by surveillance, understanding the task to be a means to an end rather than an end in itself, deadlines and prior, actual and expected evaluation.

We can understand that to be creative persons need to be motivated and that the influence of certain factors on motivation may differ between persons depending on their psychological response to those factors. However to understand what drives the motivated person to be creative we need to look for a more innate urge. This is the urge, to use Csikszentmihalyi’s terminology, of persons to experience the state of flow.

Persons experience flow when they are in control of their consciousness or at least when they understand that such control is possible. Such persons will be totally immersed in a challenge. They control the information flowing into their consciousness. The opposite state is inner chaos leading to existential dread, the fear of there being no meaning to life.

If there is one clear message from our understanding of creativity it is that if creative people do not enjoy their work then they will not be creative. In accepting the need for insightful thinking we need to legitimise the idea of work as fun.

ACCEPTING THE NEED FOR INSTITUTIONAL RENEWAL

Institutions are supra-individual sources of systematic human behaviour. Institutions include traditions, families, schools, corporations, government bodies and markets (Ball 1996). It is these institutions that enable and are responsible for the exercise of political power to manage a nation’s affairs, that is for governance (Weller 2000). It is these institutions that convey to the individual the power to act in the public good (Saul 1997).

Institutional support for innovation in rural Australia is largely directed towards agricultural research, development and extension. This effort if we include that managed by the Rural Research and Development Corporations (RDCs), is substantial, in the order of \$1 billion per year. Australian agricultural R&D represents

about 10 per cent of all Australian R&D, and 3 per cent of the international agricultural R&D market. Public funding accounts for about 85 per cent of the expenditure, and comprises about half the assistance provided to the agricultural sector.

The execution of agricultural R&D is principally confined to the public sector, including tertiary institutions. The private sector is largely excluded from competing for funding. RDCs are mostly commodity-based partnerships between the Federal government and individual groups of agricultural industries. They account for about two-thirds of the influence on the direction and hence on the expenditure of agricultural R&D (Gleeson, Russell and Woods 1999).

Support for rural innovation is dominated by support for the farm-based component of the agricultural systems. In Queensland, for instance, in the mid 1990s agricultural RD&E accounted for approximately 70 per cent of State government support for all RD&E, virtually all of which was allocated to the Department of Primary Industries; with the influence over expenditure coming mainly from the national commodity based RDCs.

The RDC's are focussed primarily on optimising the profitability and environmental sustainability of existing farm-based agricultural enterprises. This factor and the dominance of the public sector in agricultural R&D and extension lead to a lack of diversity and what is generally considered to be a low- risk environment. The reality is however that it is a high-risk environment for it largely ignores what we know about the requirements for creativity and revolutionary innovation.

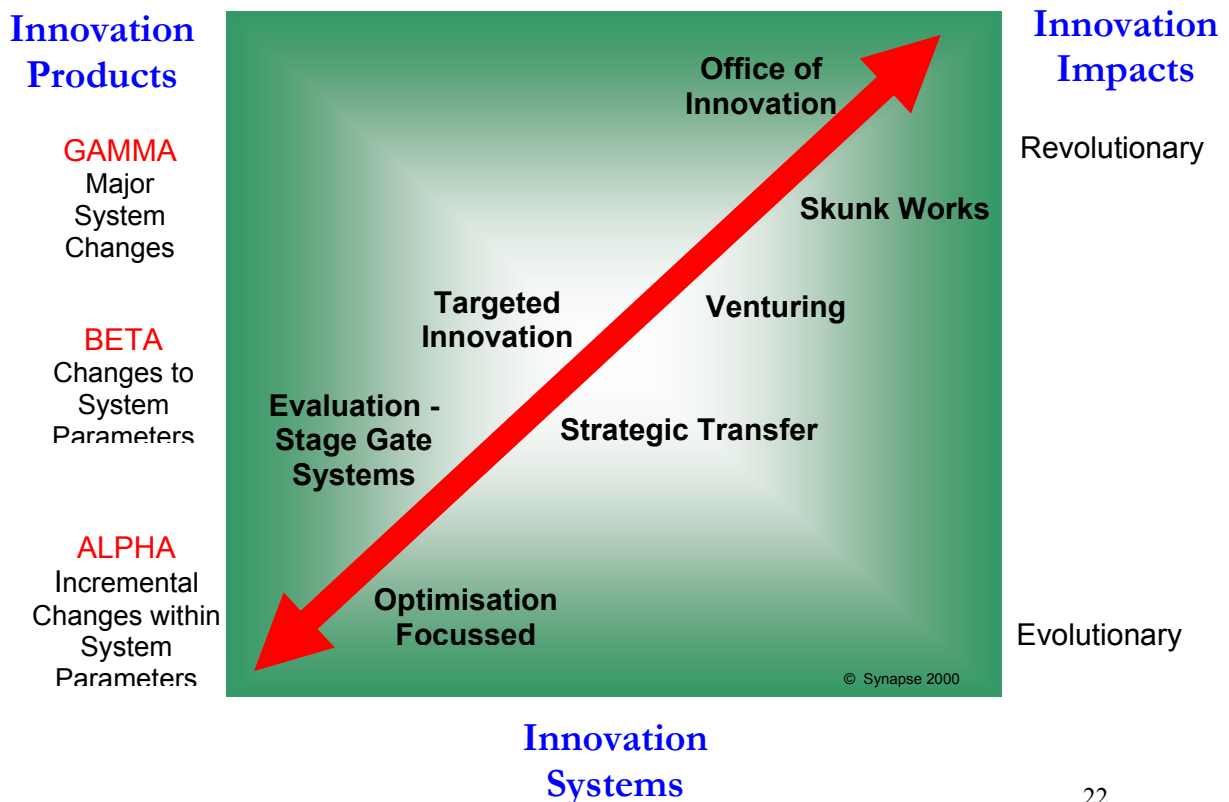
Until recently, support for agricultural innovation was almost solely technological, with little attention to organisational or managerial innovation, despite the increased recent emphasis elsewhere on supply chain management and education and training. This pattern began in the mid - 1850s, with the establishment of experimental farms which employed almost exclusively agricultural and veterinary trained scientists. It has persisted for over 150 years despite (or because of) frequent reviews and restructurings of State Departments of Agriculture.

The OECD acknowledges the problem more widely:

“Governments are often ‘trapped by their own systems of administration which generally reflect the wide variety of sectoral policies and usually present a major obstacle to any coherent comprehensive policy-making. While not claiming that the nature of the institutional structure determines the orientation of the policies it makes, governments are fully aware of the fact that the effectiveness of these policies depends very much on the institutional setting” (OECD 1988).

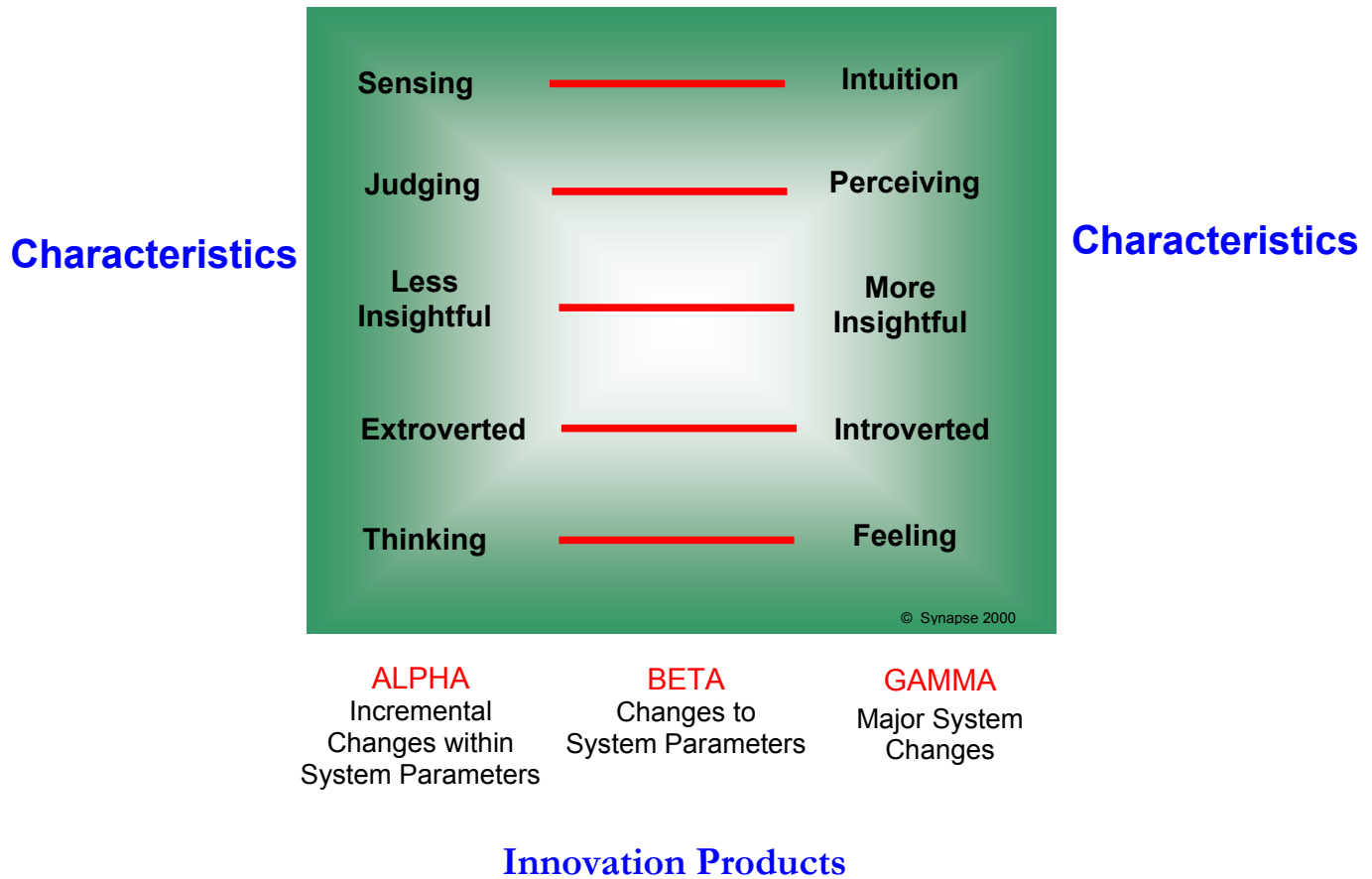
Rates of innovation and of productivity increase hold a particular fascination for policy analysts. However there is scant attention directed towards the determinants of the nature of the products of innovation. The types of innovation products we produce are predetermined by the nature of the innovation systems we create. If the innovation system is highly planned and controlled then we probably will produce innovation products that make incremental changes to existing systems. Such changes are necessary but alone they are unlikely to represent the range of innovation products needed to meet changing requirements in rural Australia.

Figure 7.1 Relationship between Innovation Systems, Innovation Products, and Innovation Impacts.



Innovation systems can also be described by the attributes of the innovation processes as illustrated in Figure 7.2.

Figure 7.2 Relationship between Innovation Products and Characteristics of Innovation Systems



(Adapted by Synapse from Rabson & De Marco 1999 and Chisholm & Elden 1993)

We need new institutions to re-represent rural Australia. We need more flexible and integrated institutional arrangements. Tinkering at the edges of a failed policy framework merely prolongs the suffering without meeting the realistic aspiration that Australians generally have for rural Australia.

We fail to build institutional capacities for environmental management that are community based, that are adaptable and that reflect the complex interactions of all the forces that influence values, beliefs and attitudes. And we fail to provide sufficient resources and powers for those local, community-based and responsive institutions that respond directly to environmental issues.

But through the '80s and 90's we tried. We developed concepts and strategies for ecological sustainable development. We initiated Landcare, the Murray Darling Basin Commission, the Great Barrier Reef Marine Park Authority, and the ill-fated Resource Assessment Commission. Many policies were initiated that are less environmental destructive than their predecessors. And there has been a sea change in attitudes, particularly in rural Australia, and in farming practices.

But we have bred sprinters for long distance races and we now have many tired and frustrated jockeys and tired mounts. We really do not have the institutional structures and processes to support those people who are trying to improve resource management whether they be in the public or private sectors.

We have fragmented efforts between community, industry, and government.

We have fragmented efforts within government. Inter-departmental rivalries are legendary and officials without regulatory responsibilities describe themselves as the "good guys," as compared with their colleagues with regulatory responsibilities.

We talk of "smart regulation" as though regulation is a policy instrument that can be used in isolation from other policy instruments such as education, leadership, and research.

We have programs that are principally about not much more than seeking and distributing grants.

And we have many -too many-overworked and under-resourced committees.

Future institutional arrangements in rural Australia might be characterised by:

- Being more explicitly based on the broad sets of material and non-material values held by both rural and urban Australians, rather than on narrow sectoral based values and vested economic interests;
- Being less accepting of the presumed supremacy of the market institutions and more receptive of the need for social institutions;
- Being more integrated across the three tiers of government and the regional community, broadly represented; and
- Being less agricultural centric and having the charter to place agriculture and farming within a cultural and social context.

Conclusions

There is growing institutional recognition of the need to address the deteriorating ecological and social fabrics of rural Australia. This recognition may reflect that Australians identify with and value their rural landscapes. However it is more probable that it has its genesis in the agri-centric cultures of most of the institutions that support innovation in rural Australia as is illustrated starkly by the following quote:

“Australia is a country defined by its agricultural sector. Agricultural products were among the first goods traded by this country and remain a critical element of our current and future international trade. Our quality of life is enhanced by the wealth generated by the agricultural sector and the clean, green quality of our food and agricultural products” (ABARE 2000).

Institutional support for innovation in rural Australia is circumscribed conceptually by an overwhelming emphasis on commodification and the consequential movement towards rights of exclusion, including for instance in pricing policies to improve natural resource management. Furthermore institutional support for innovation in rural Australia is narrowly focused on the agricultural sector, a situation fortified by misunderstandings about the economic performance and significance of the agricultural sector. These misunderstandings are significant in that they provide positive feed back into the commodified conceptual framework.

This reinforcing loop of commodification and of agricultural fundamentalism, through its constraining influences on the creative field and domain, limits our recognition of the need for insightful solutions. Furthermore the loop limits our capacity for insightful thinking for it makes more difficult the essential problem finding process of multiple representations.

Against this backdrop the way forward is remove the obstacles to institutional renewal in large part by recognising the important relationship between the nature of the products of innovation and the characteristics of innovation systems. This paper does not seek to discount existing agricultural innovation support systems but to suggest that we require greater diversity in their mode of operation and their foci.

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