Universities as Learning Organisations -or not!

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Abstract: Increasingly in recent times universities funded by national or state legislatures have implemented management strategies that involve tensions between dollarship and scholarship. While fiscal pressures have created difficulties for universities it will be argued that emerging problems are attributable substantially to internal decision making. In developing corporate identities institutions have introduced management practices adapted from business and industry, but the presence of delayed feedback means that outcomes have been problematic. This typical systems outcome undermines the intentions of administrators who have tended to assume rapid and direct outcomes from initiatives. Pressures to achieve results, and competitive aspects introduced at all levels, have implications for relationships, both structural and personal, that are fundamental to the operation of a 'learning organisation' culture. The paper discusses a range of system properties and behaviours in relation to the disciplines of organisational learning, inferring that such institutions are presently some distance from this culture.

1.Introduction

Clearly the title is a play on words, since in one sense of course universities are organisations devoted to the promotion of learning. However for present purposes we are concerned with the extent to which universities as institutions display (through the culture of their management, and the structure of their goal setting, policies, and administration), characteristics that have become associated with the term 'Learning Organisation'. Furthermore, in examining this theme it becomes clear that there is no single generic definition of 'University' that encompasses the wide range of institutions that share this name, and the national contexts in which they are located. So it is proposed here to delimit the discussion by defining the context to be that associated with publicly funded institutions that over the last decade or so have faced a changed operating environment, including funding curbs and increased demands for accountability, leading to the development and application of a range of performance indicators, and devolution of managerial responsibility such that academic aspirations have come into increasing conflict with fiscal goals.

This situation is represented, for example, in the UK and Australia but is by no means restricted to those environs. Daniel (1991) is referring to Europe when he observes that governmental efforts have been characterised by "great expectations" but "mixed performance" as noted earlier by Cerych and Sabatier (1986). Problematic elements have been identified by Neave (1991) who pointed out that while the market ideology has levered change into higher education that would in former times have been unthinkable, the outcomes are uncertain. This observation remains valid, and stresses and uncertainties continue as reminders of the substantial time-scales involved in managing institutional behaviour. The ongoing nature of the managerial challenge has been highlighted (Mahony, 1994; Trow, 1994) who draw attention to a

discourse that has increasingly come to include terms that indicate an increasing tension between dollarship and scholarship. Thus there has been downsizing and sometimes closure of academic units, voluntary or forced redundancies, the replacement of tenured positions by short-term appointments, debt management strategies, and the acceptance of national priorities in directing and rewarding research effort. Last year an interstate colleague reported that his campus was being required to effect a thirty- percent reduction.

There is no question that funding cuts have imposed extreme stresses on institutions and that institutional managers act in good faith to develop and implement policies for difficult times. The purpose here is to examine some of the characteristics of institutional management; bearing in mind the insights gained from many system dynamic studies indicating that organisational responses to external pressures have themselves contributed to problems faced in the future.

We have been apprised well of problematic aspects of organisational decision making through the writings of Forrester and others over many years, and it is appropriate here to recall the summary (Senge and Sterman, 1994) of the management difficulties experienced by executive administrators challenged to respond to simulated operating conditions representative of their organisational contexts. Thus business managers generated costly supply-demand cycles even when consumer demand was constant; experienced executives in a simulation of a failed airline destroyed their company just as their counterparts had done in real life; executives from a publishing industry bankrupted their magazine just as circulation reached an all-time high; fire department managers burned down their headquarters despite their best efforts to put out the blaze; and doctors ordered increased tests while their patients sickened and died. The point is that understanding and managing the dynamics of a complex system is not a natural by-product of field experience and disciplinary expertise, whether the enterprise is manufacturing, service, or education.

2. University Decision Contexts

In order to embed the ensuing development within a systems view we refer to a planning feature common to all universities of the type under discussion-The Strategic Plan.

A Strategic Plan for a university typically identifies target areas such as the following:

- The reputation of the University;
- Quality in teaching and learning;
- Excellence in research and postgraduate training;
- Strong relationships with the community;
- Effective management of resources.

Associated objectives, with suggested strategies for achievement, are separately and severally important. Usually related to performance indicators they are expressed implicitly or explicitly in terms of a goal and a time scale which effectively defines the intended rate of achievement of the goal from current conditions. For example a goal to increase the output of published research papers may be expressed as a desired number of papers to be published in 3 years time, (or in terms of a percentage increase over the current state), and the rate of increase in terms of papers/year needed to achieve the goal thereby implied. Such a plan can be expressed as a simple negative feedback loop. However a university decision making and resource allocation structure contains many such loops that impact on each other, and that together with a range of other loops, drive and curtail growth processes. In a university an example of

a positive loop is the process by which an *increase* in enrolments provides additional funds which supports an increase in academic staff which provides for the enrolment of more students which produces additional funds and so on. An example of a negative loop is the process by which an *increase* in staff increases the salary bill, which reduces the funds available to employ staff that reduces the rate at which new staff can be appointed, which leads to a *reduction* in staff etc. In both of these loops, delays of the order of years are involved before the loops are closed. System parameters include initial values (such as student enrolment and staff numbers), parameters that characterise operating properties (such as average length of tenure, average research productivity per staff member), and parameters that characterise management policies (such as weights assigned to various research products, and averaging times to smooth enrolment or research data). Impediments to organisational learning arise through practices, theories, and beliefs that are enacted and exist in ignorance of principles of system dynamics. Several have been elaborated in detail elsewhere (Galbraith, 1999), and for present purposes brief summaries are provided. The intention is then to reflect on them in relation to learning organisation concepts.

2.1 Artificial Internal Structures

Most if not all institutions have developed structures based around collections of cognate units variously described as faculties, groups or divisions, themselves comprised of smaller cells called departments, schools, or centres. Depending upon circumstances these internal structures may be in 'debt' or 'surplus' relative to one another but the debts and surpluses are contrived since they are artefacts of the institution's own creation and can be altered at will. Typically a faculty or school in debt will have an 'appointment freeze' imposed, or face a staff loss in order to reduce or eliminate its 'debt'. Planning policies based on debt and surplus elimination strategies lead endemically to cyclical movements in fiscal balances and personnel, through the action of negative feedback processes containing delays. Pressure to hold or reduce staff levels while eliminating a debt in the face of increasing enrolment creates a natural desire to rebuild quickly when circumstances improve. The net result is to induce oscillatory motion through overshooting targets and then reducing strongly in turn.

2.2 False Dichotomies

These are arguments based on the splitting of cause-effect chains that effectively deny the existence of system feedback. For example planning on the basis of salary savings achieved through the non-replacement of a leaving staff member without considering the associated costs of staff attrition. A productive staff member generates research output which produces income and the permanent loss of this output represents a future 'loss of income' which should be set against the saving. When an active researcher is not replaced, or prospective doctoral candidates are turned away because “we no longer have expertise in that area” the loss of future revenue is as real as any salary saving.

2.3 Funding Formulae

Intra-institutional competition is enshrined through allocations made on the basis of some kind of funding formula, in which student load is always a major component, and in major research universities substantial allocations are made on the basis of both student load and research effort. A popular method (because it appears superficially to be fair) involves proportional allocation on the basis of student load weighted differentially for different disciplines.

While an increase in a faculty enrolment increases student load and hence tends to increase dollars earned (positive loop), it also increases the total load for the university, and so reducing the dollar value received per student when the total funding is limited (negative loop). The positive impact of higher enrolment is negated by the lower return received for each student. Consequently a faculty can grow in student numbers and yet suffer a reduction in funding if there is greater relative growth elsewhere, so that under conditions where the total university funds are frozen or reducing, the worst possible circumstance is to be the slowest growing unit in a growing institution. A consequence of such funding formulae is that unless conditions are identical across the university winners and losers must emerge.

2.4 Tragedy of the Commons

Proportional policies have other implications for long-term management when used to distribute funds in situations where no constraints (natural or imposed) act to curb competition for scarce resources-such as funding based on research productivity. Major research universities, keen to encourage and reward the research excellence of their academic members provide incentives through the allocation of a proportion of operating grants to faculties on the basis of their relative performance, say, in grant winning, publications and graduation of thesis students. As with enrolments, when total funds remain relatively steady greater productivity results in a lower return per product. Every additional grant won, every additional paper published, and every new thesis student graduated ensures that less income is received for that particular product than the previous one. More and more effort is required just to maintain a relative position as a "tragedy" scenario unfolds. A faculty or school working at maximum efficiency has nowhere to go but down. While principles for managing a commons act fortuitously to limit excesses in relation to enrolment pressures through the waxing and waning of student demand, and the application of quotas, there are no such natural restraints within the research sector. Here perceived monetary rewards to institutions and faculties, and promotional rewards to individuals drive the process so that units and individuals work harder and harder for less and less return per effort. This structure can be identified at all levels, nationally between institutions, between faculties within institutions, and between schools within faculties.

2.5 Weights and Parameters

In university systems parameters appear in four contexts-as starting values of system variables; as 'system' givens such as staff salary levels or government funding indices; as institutionally determined time constants such as enrolment averaging times and delays, and as weights that reflect differential emphases in decision making such as funding loadings for research versus undergraduate students, or disciplinary weights. Weights assigned to various entities do have a role to play - they signal the relative importance placed on various kinds of institutional activity, and changing parameter values signals a shift in institutional priorities that can have substantial local effects. However such changes do not usually alter the *form* of the trajectories of system variables that are determined structurally by allocation mechanisms and debt management strategies. For example if initial values of internal debts are set to zero (say), transient dynamics will ensue as the system adjusts from these new imposed starting values to the behaviour determined by its structural formulae. In fact debt and surplus cycles must resume as an inevitable consequence of proportional allocation principles unless all sections of the university experience identical change conditions. Systems thinking and analysis is needed to identify the transient nature of the effects

of such instantaneous interventions, versus the endemic and enduring character of the cyclical variations generated by the structural formulae.

2.6 Interaction Effects

Dual emphases on the need to balance budgets and to maintain or increase research efforts present a tough challenge to faculties or schools that are losing staff. Unrestrained application of funding formulae together with enforced management decisions involving staff reductions to reduce debt ignores the significance of an explicit feedback process linking the strategies, a circumstance ensuring that the long-term impact of one policy cannot be properly evaluated without estimating the influence of the other. Additional workloads imposed on a reducing staff will eventually impair the total research effort, so creating a further loss of funds and pressure for further staff reductions. The increasing move towards short-term appointments, as a means of increasing the flexibility with which staff may come and go, will impact on this process.

2.7 Research Traditions

The tendency to ignore the impending impact of management decisions is probably aided by entrenched views encouraged by traditional research training involving the use of linear statistical models, and predictions by such means as regression analyses. We know that in dealing with system dynamics it is not acceptable to omit a process of significance from consideration on the grounds that 'hard data' are absent. A case in point involves the impact of increasing student load on research effort such as occurs when a reduced staff has to cope with a stable or increasing student load, or when research energy is diverted to service initiatives such as off-shore teaching programs. Particularly in an 'emergent mode' such as many institutions are experiencing presently, there may be no historical data available to measure such impacts. However, the effect of increasing staff loads on research activity can be estimated functionally and a range of graphical relationships developed. It is not that any one such relationship is 'correct' but that the effect on research production is qualitatively similar across a range of postulated impacts that is important for forecasting.

Put another way, when dealing with systems, processes must be included because of their existence in the real world, not on the basis of the availability of data, although such should be used when available. The problem is not so much one of unavailability of data as inability to use effectively such information as is known. A process deemed important must be included, for to 'omit' such a process on the grounds of insufficient data is not to omit it at all - but to include it with an assigned weight of zero! This is a far more serious structural error than getting the shape of an effect correct but its detail approximate.

2.8 Significance of Time Scales

Delays in feedback processes determine timescales governing periods of cyclical variation, rates of adjustment to targets and so on. Within university contexts examples include cyclical patterns of debt and surplus, cyclical patterns of staff numbers, and rates of adjustment to changing enrolment conditions. To avoid sudden disruptions input variables may be smoothed. For example enrolments may be averaged over a three-year period to provide input to funding formulae, increasing the total loop delay, but with the positive effect of damping the magnitude of the fluctuations that occur when full adjustment is attempted on an annual basis. Circles of causality contain pipeline effects generated by changes in undergraduate enrolment levels, consequent changes in staff levels, contingent changes in thesis enrolments and

graduations, compounded by a variety of smoothing times. The cumulative delay in such loops is of the order of a decade, and it is not therefore surprising that cyclic patterns of debt and surplus prove resistant to attempts to reduce or eliminate them over short time periods

A significant and related aspect of time-scales involves the planning horizons of policy makers and system managers including politicians, Vice-Chancellors, Deans, and Heads of Schools. Understandably, such managers have operational expectations for achievement of policy goals over time periods far less than the cumulative delays in the feedback loops of the systems they are called upon to manage, in fact most probably related to the much shorter duration of their own management responsibilities or appointments. Requiring competing units to maintain balanced budgets in the face of changing conditions with embedded time scales indicates either that systemic knowledge is inadequate, or that sub-optimal academic performance is acceptable. Understanding of interacting time-related processes is involved, one aspect being that with income in a given year being determined by system processes including substantial delays, there is limited scope for managers to adjust balances through the manipulation of expenditure. The alternative is to raise external funds that are not subject to internal allocation procedures. So earning income from external and other initiatives assumes the status of an essential management strategy, rather than a planned extension within a total mission. This is usually easier within some disciplines than others. The real danger to institutions is long-term, for management policies directed towards medium and long-term health are not those that will appeal to those looking for or needing instant relief, especially when the circumstances are substantially a result of policies presently in place.

3. Organisational Learning

Having considered some system properties that are occurring within universities it is now the intention to transfer attention to concepts and behaviours associated with *Learning Organisations.* The approach here may appear rather cynical for "black" versions of the five disciplines have been created in order to engage more closely with the attendant issues. The approach has been developed from a synthesis of behaviours, espoused beliefs, goals, proclaimed mechanisms, and expectations; expressed in strategic plans, in committee, in discussion forums, in conversations, in the media, and in other public or institutional forums extending across university and state boundaries. The rhetoric is widely shared as individuals from different institutions can testify.

It is relevant also here to draw attention to historical circumstances that make the university context different to a degree from the business community that has provided most examples of learning organisation culture. Many examples discussed in the System Dynamics literature have been drawn from companies able to reflect on their current performance, against a backdrop of fluctuating fortunes over a time-scale long enough to evaluate the outcomes of their existing and past policies. The university environment we are considering is relatively young-of the order of a decade or so, and there has not been time for the implications of many current policies to be experienced in full. However the structure associated with management practices is well defined, and this, together with corresponding emergent behaviours, forms the basis of policy analysis as illustrated earlier in this paper. A consequence is that opportunities to identify and use current contexts in engaging the learning disciplines are limited by the incompleteness of the experiential data-that is by the necessity to

address policy issues before the full impact of their implementation is felt over the relevant time periods.

Secondly university administrators come from a much more homogeneous background with respect to management than their counterparts in business and industry. We have been reminded, by Forrester and others, through the agency of many examples how different divisions of a company may pursue goals and policies each designed with the best of intentions, yet creating problematic total outcomes for the company. The problem symptoms typically emerge far in distance and time from the initial policy enactments, and are to non-systemic eyes unrelated to them. Individual section managers are likely to accept the expertise and field experience of their counterparts with different industrial backgrounds in those respective parts of the organisation for which they are responsible. In universities a compounding problem arises in that those who are responsible for planning and resource allocation across an institution have a common academic heritage, albeit in different discipline areas. Furthermore they have been successful scholars and administrators in their fields, and there is a natural tendency to equate this with consequential ability to successfully design and implement policies for what is in fact a complex system-a university in its operating environment. This increases further the propensity for competition and compromise rather than complementarity, as individual administrators pursue their respective goals.

From this perspective we now consider ways in which the organisational learning disciplines are compromised in university settings.

3.1 Mental Muddles

" Human beings cannot navigate through the complex environments of our world without cognitive 'mental maps', and all of these mental maps, by definition, are flawed in some way". (Senge et al, 1994: page 235). This classification reflects the "confounded" models that have developed from the amalgamation of beliefs, intuitions, expectations and suspicions that co-exist in university environments. Because mental models are the most powerful drivers of all in management decision-making (Senge et al, 1994), this section is given the primary focus. It is fair to say that writing on the subject of mental models has been broadly based, and to a degree eclectic, as indicated in the critique by Doyle and Ford (1998). In fact some 'models' associated with perceptions of motives, and closely associated with beliefs and 'the left hand column', may be better described as *mental images.* It remains important to acknowledge the importance of such mental structures in two interacting domains:

(1) *mental images* concerning the nature of the organisation, and the motives and values of individuals and groups within it;
(2) *mental models* concerning the expected impact of policies and their anticipated outcomes within the institutional context.

The interaction occurs because the design and implementation of policies are influenced by beliefs and assumptions in regard to institutional mission, performance, and accountability, about contributions of key players and agencies; and assumptions about the expected outcomes of the policies put in place.

There are two levels at which *mental images* are articulated; (a) deliberately in mission statements, strategic plans, and public utterances that elaborate the university's goals at levels of institution, faculty, and school; (b) inadvertently as individuals display their 'left hand columns', (Senge et al, 1994: 246-252), in statement and discussion. The first is well illustrated in official documentation. With respect to the second two examples are given below-they were expressed to the author

in the context of a study into the effectiveness of newly implemented resource allocation procedures.

> "I fight for my section to the best of my ability - totally irrationally, with no respect at all for what's good for the university, because with that hat on, that's my job."
>
> "I would argue with some of the parameters and I've tried and it's no use. And the reason it's no use is because the other departments can see that if they accept my arguments then they can take less out of my department, and the less they take out the less there is for them."

These comments merely articulated in 'honest' terms the opinions of other persons holding similar positions - they were typical not exceptional, and there appears little evidence to suggest that such sentiments are absent from current administrative thinking across a range of institutional contexts.

In regard to *mental models*, we have illustrated in the preceding sections how an application of systems thinking and analysis leads us to question outcomes that are the assumed future results of specific policies. To summarise the examples considered we note:

- the creation of arbitrary internal structures that act as cost centres and give an illusion of permanence that can act to reduce the management options across institutions as a whole;

- non-systemic thinking that separates system processes that are essentially linked - such as the inclusion of salary savings without an estimation of corresponding costs of staff attrition;

- the rigorous application of funding formulae that contain feedback processes with extended time-scales and which incorporate internally opposing principles with respect to resource allocation;

- the creation of unrecognised management dilemmas (such as 'tragedy of the commons' scenarios) when activity such as research production is rewarded strictly in proportion to the numerical weight of approved products;

- incomplete appreciation of the respective roles of parameter values versus system structure in determining system behaviour with, for example, the generation of false expectations through arguments (naive at best and specious at worst) that ground lost in re-distributions by weighting changes can be recouped readily by effort;

- the expectation of rapid turnaround of debt and surplus situations when time-scales of up to a decade or more are built into some of the processes by which the debt and surplus cycles are generated and controlled;

- the systematic tendency to exclude from explicit planning the implications of factors introduced as consequences of new management policies, such as the impact of increased staff demands on future research productivity and hence on future funding.

To enable a higher degree of recognition, elaboration, and thence transformation of muddied models two general approaches need more conscious application. Firstly in relation to *mental images* there needs to be more exposure of the "left hand column" thinking that presently underlies the worldview of competitive players but is not made public. Secondly in relation to *mental models*, and assuming that greater exchange of mental images will enable a wider consideration of options, systems modelling is necessary to make explicit the consequences of interacting policies whose outcomes are at present assumed on the basis of linear non-systemic predictions. In this respect it is worth noting the extent to which managerial concerns appear to be triggered by the amplitudes of variations (eg size of debt, magnitude of enrolment shortfall etc) while the policies enacted relate to time-scales determining rates of change. It is the time-scales, that like stiffness of springs, determine the periods of oscillation that are induced by changes in weights or input values, and the power to control is invested firmly in the time-constants of the system that determine rates of change of variables, rather than responses to the magnitudes of the variables themselves, that tend to result in drastic actions too late. Put another way, pre-occupation with magnitudes rather than addressing rates of change is rather like addressing the problem of a broken shock absorber by driving slowly over potholes.

3.2 Personal Mystery

It is possible for a current reality to depress individual vision to such an extent that the potential of creative tension to lift performance is diminished by the sheer magnitude of the perceived task. In universities as currently structured there have been commendably frank statements by administrators as to the meaning and significance of current or emerging conditions for individuals and groups. What has been less clear is the range of options available to administrators such as heads and deans to meet emerging challenges in a tight monetary environment-for example a school in debt with a growth market but imposed course quotas that prevent full access to it. The sensitivity of funding formula allocations to annual shifts in enrolment patterns is a continuing de-stabilising agent for managers in charge of academic cost centres. Inflexible application of formulae mean that a school or faculty can take appropriate and vigorous action, increase both enrolment and research production, and yet find itself further behind as a result of shifts elsewhere in the institution over which it has no control, so creating feelings of "it being done to us" and "here we go again-what's the use". Far from developing confidence and feelings of mastery, mystery (or perhaps misery) emerges as responsible leaders begin to doubt their efforts. Experience elsewhere as described in (Senge et al, 1994) indicates the need for the nurturing of intra-personal mastery to develop shared interdependence and trust with significant others, in which all resources and responsibilities are viewed as shared, and driving questions become " Who will our actions impact upon?" and " How can we involve them in our planning?" Currently we appear to be some distance from this position.

3.3 Shared Fission

An articulated vision for a university is enshrined in its strategic plan, continually updated. As listed early in this paper, the ideals to which universities aspire are worthy ones, to which the university community as a whole would subscribe. In a typical institution hierarchical management structures then require faculties to construct plans consistent with the overall purpose, and schools in turn do the same for their faculties. And here the process can come unstuck when systems thinking is absent from the planning process, for the production of separate plans for

faculties, departments and schools means that pursuit of individual targets can in fact undermine the attainment of general institutional goals. If every school or faculty succeeds with an ideal of achieving growth in a situation where total funding is limited then some units must lose viz all whose growth is below the faculty or institutional average. The same situation applies when a total university load is set with penalties for over-enrolment, in which case trade-offs in the interests of achieving total load ensure even more surely that losers must emerge, for when budgets are tightly balanced any consequent reduction in dollars per enrolled student will send some units into debt even though they are performing according to targets in their strategic plan. As system dynamicists will be quick to recognise this is precisely a consequence of the university's own funding policy and is at odds with an institutional goal of achieving growth and excellence in all areas. If systems thinking is going to be able to help with this problem more flexible ways of allocating resources need to be visioned and implemented. One such policy that has been explored in a simulation model involves withholding a small fraction of operating funds from the proportional allocation process, and distributing it on the basis of defined need, (Galbraith, 1998). This approach will highlight tensions inherent is the system by addressing squarely the question of competition versus co-operation between institutional units. The policy, leading to win-win outcomes in the long-term, involves the inclusion of an adjustment component in the funding formula reflecting that if currently A is in surplus and B is in debt, then A can subsidise B to a small extent on the reciprocal agreement that the reverse will apply as necessary. It is also given that B will address its problem urgently with an added sense of responsibility to peers as well as to line managers. This policy, applied to only 10% of resources produced substantial benefits; ensuring staff levels and research performance were maintained across all units at higher average levels and with less variation than under full proportional allocation. This concept is challenging, possibly because it is counterintuitive to the conventional 'wisdom' which argues that maximum individual benefit must be extracted from what is currently on offer. So long as the bottom line remains individual survival, and "the devil take the hindmost", 'fission' rather than 'vision' will characterise the interchanges between individuals and groups, and the benefits of productive sharing will remain tantalisingly beyond reach.

3.4 Team Lurching

Teamwork in the new university era is mixed and appears to occur at two levels. Some is very productive as individuals and groups find new ways to work together, for example toward the achievement of better teaching and assessment practices; and both cross-disciplinary and cross-institutional sharing is occurring in ways that before were unlikely, if not unknown. At another level however the culture changes when the context becomes competition for resources, when the same individuals who acted together in another forum now behave in quite different ways. One difficulty is that university structures tend to create committees rather than teams, in which members are representatives of their administrative units and thence custodians of sectional interests. Another enemy of course is time-meetings are widely regarded as necessary evils rather than as opportunities to grow teams, and this latter aspect may mark a distinction between universities and commercial enterprises. Individuals in the latter may well depend for survival on developing coherent and interdependent relationships within the company. In universities, the substantial rewards accruing on the basis of individual academic effort, means private time is guarded jealously, and the additional commitment required for genuine team learning

may be resented. As a consequence teamwork remains uneven, with some excellent achievements, but in other areas lurching from issue to issue remains a more accurate description than learning.

3.5 Systems Tinkering

Examples of this activity have been illustrated throughout the paper. There has been no obvious influence over the past decade that would direct attention to the central complementary role that systems thinking should play in constructing and testing policies in university management. Rather on the contrary, purposes and goals for higher education have been set by government authorities with all the cultural inheritance associated with linear, non-systemic thinking. Incentives to achieve particular goals for research, enrolment levels, community service, and fiscal responsibility have been presented as if simple cause-effect relationships exist and can achieve ends given the will and diligence on the part of those concerned. Without re-visiting the detail of the earlier examples it is reasonable to suggest that surface "tinkering" has predominated over incisive systems thinking. This is not surprising given the history of other enterprises in which it has been demonstrated that feedback loop thinking is not a natural product of conventional corporate or administrative experience. So altering weights, changing averaging times, and locking in to short-term, segmented, budgetary and staffing goals, while linked to responsible purposes are not capable in themselves of achieving best overall outcomes in a structure driven system. Institutions cannot become learning organisations until *mental images* involving trust and concern for the whole replace localised self-interest, and concomitantly, the *mental models* that link policies with intended outcomes are evaluated through analysis and systemic probing. Only then will the capacity for real organisational learning be released.

As noted by Senge et al (1994) at its essence every organisation is a product of how its members think and act. Barriers to progress are created by the wishes, expectations, beliefs and habits of members, and remain because in the absence of challenge they become invisible, endemic, and taken for granted. Universities of the type we have discussed are young institutions in their management structures and responsibilities, although venerable in their values, aspirations, and purposes. Hence there is still fluidity, and opportunity to experiment with structural changes and policy initiatives. The extent to which they can become learning organisations is a function of the extent that they can adapt the architecture identified in other organisations as central to this purpose; guiding ideas; theory, methods and tools; and innovations in infrastructure (Senge et al, 1994).

As presently constituted the guiding idea that seems to present the greatest challenge is the 'primacy of the whole'-a value that is espoused but unevenly applied within institutions. It seems to be held firmly by most senior administrators, but in a typical top-down hierarchical structure becomes lost among competitive survival instincts among faculties, schools, and services. Of the necessary theories, methods, and tools, systems thinking appears the most central to provoke new conceptions of possibilities and outcomes, and so support the co-operative development of win-win mentalities where win-lose scenarios currently prevail. With respect to innovations in infrastructure the Fieldbook indicates that those organisations successful in learning have improved their infrastructure mechanism 'so that people have resources they need: time, management support, money; information, collegial support…' One senses that a list such as this will provoke hollow laughs, and this is because the necessary changes are profound, and not easily envisaged as

incrementally achieved from current conditions. It is interesting to observe, for example, that the setting up of competing cost centres can actually increase inefficiencies, as funds in an area of surplus are not put to maximum use. Such a circumstance means that the dollars are not working as they should, and as they can if flexible funding policies enable them to be moved forwards and backwards between areas of need. But the most important innovations will be those that enable people at all levels to apply capabilities like systems thinking and collaborative enquiry within the contexts of their normal jobs.

Perhaps the biggest single challenge to the application of learning organisation principles is in the identification and use of leverage points. If the reaction is to shoot the messengers bringing unwelcome news, then as with other organisations universities will miss the opportunity to push the boundaries of their potential. The window of opportunity still exists, but it will close quickly if forces of re-ification continue to promote and congeal a culture already at risk from conservative heritages underlying university traditions.

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