

**Submission to The Review of Higher Education  
Financing and Policy in Australia**

**on**

**Developing A Higher Purpose for  
Higher Education in Australia**

**by**

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## Executive Summary

This document highlights the difficulties, problems and inefficiencies that have been engendered into higher education as a result of the changing nature of technological research and development, and the process of learning. In particular, it is suggested, herein, that higher education in Australia has become a confused and complex web of institutions and funding mechanisms that have limited relevance to achieving social or economic objectives in Australia during the 1990s, much less in the 21st Century. It is also suggested that the institutions and funding mechanisms have inherent inefficiencies and weaknesses that can only be addressed through significant restructuring of existing bodies.

In this document, a number of recommendations are put forward for discussion and, although seemingly broad in scope, the objectives of these recommendations are to:

- (i) Ensure that all tertiary institutions (university/TAFE) act in a genuinely unified manner, rather than in the existing pseudo-competitive, multi-tier environment, that has resulted in gross duplication of infrastructure and staffing (at tax-payers' expense), and which has not delivered optimal services to students, society and industry
- (ii) Ensure that universities are genuinely empowered to achieve societal and economic objectives, and are held accountable for achieving those objectives, rather than narrowly-focused outputs
- (iii) Recognise that existing funding mechanisms for research are overly complex and bureaucratic and have resulted from a Federal desire to have policies covering a vast range of university activities, while spreading accountability for expenditure over several different levels of management
- (iv) Ensure that Australia develops a genuine national research council that embraces all aspects of university research, and sets and monitors societal and economic outcomes from universities, rather than the existing duplicated bureaucracies of the ARC and NHMRC (which are little more than administrative bodies selectively dispensing research funding)
- (v) Establish a genuine correlation between expenditure on tertiary education and societal and economic outcomes.

In the past, the only major changes to the tertiary system have come about from amalgamation or reclassification of institutions, neither of which have led to the fundamental attitudinal or structural changes that are required to move Australian tertiary education into the 21st Century. A single, traditional Australian university, with a turnover of \$600,000,000 p.a., constitutes a levy of some \$30 p.a. on each and every Australian. Given that there are over a hundred universities and technical colleges, unless there is significant restructuring of the tertiary education sector, the end result will be an unsustainable financial burden that tax-payers will not be prepared to tolerate.

## **1. Introduction, History and Background**

In order to understand the complexity and extent of the problems facing tertiary education in Australia, and to address these problems, in the light of the need to control burgeoning expenditure on education and research, it is first necessary to understand the history and current environment in which Australian universities function.

As a starting point, it needs to be noted that universities have largely evolved (or have failed to evolve) from their original roots at the University of Salerno, in the 9th Century, or from the 13th Century British universities upon which many of the older Australian universities have modelled themselves. Universities were founded on the principles of academic/scholarly excellence and the creation and impartation of new knowledge. However, given the extremely limited participation rate in universities, a millennium ago, and the extremely limited education standards of the general populace, the standards and measurement criteria for universities were all, historically, defined by those within them. Implicit in this was the assumption that those within the university system were somehow intellectually superior to the general populace - a somewhat naive and mythical notion, given that university participation was originally a function of circumstance and positioning in society. Nevertheless, those within the universities were generally better read than those without and, hence, developed a system of learning and culture that still remains largely intact today. To some extent, the esteem in which many universities have been held, over the centuries, has largely stemmed from the fact that there were few people qualified to criticise their performance and their methods.

In Australia, the current university system is largely founded on the principles of the British university system and there is an increasing scepticism and questioning of the expenditure on higher education, given its enormous cost to tax-payers and the privileges accorded to academic participants. Fundamentally, the questioning of the relevance of universities is related to the phenomenon of mass education. Two thirds of Australians move from secondary to tertiary education and, within the coming decades, it would be reasonable to suggest that more than three quarters of the Australian populace will be tertiary educated. In an environment where the majority of tax-payers have had exposure to tertiary education, and to the staff within them, it is altogether fitting that they now comment on the cost of that education and question the methods that are employed within the existing systems, in a bid to ensure that universities respond to societal needs (rather than those needs perceived to be of significance by those within the university system) and within reasonable expenditure frames.

Australia's tertiary system is largely divided into three perceived tiers, often with largely artificial (government- and university-created) boundaries between them:

- Traditional Universities
- New Universities
- TAFE Colleges.

The public perception (whether valid or not) is overwhelmingly one of first-, second- and third-rate education, and has led to a scramble by students to extract the maximum

benefit from high-school results, rather than to consider genuine career paths (hence the saturation of medical and law courses in traditional universities). The corollary of the artificial tiers has been a scramble by TAFE Colleges to become New Universities; by New Universities to become Traditional Universities and by Traditional Universities to differentiate themselves from the others by marketing an elitist/prestige vision and by further removing themselves from applied research and teaching arenas that are currently at the forefront of societal requirements.

The above scramble for elitism/prestige in tertiary education is not necessarily predicated by any societal/economic needs emanating from within Australia but it has inadvertently exposed the limited relevance of tertiary education in terms of its contribution to Australian society. In particular, the following issues now need to be addressed:

- (i) Can universities justifiably claim to be the creators of new knowledge?
- (ii) What are the relationships between university research and teaching and economic performance?
- (iii) What levels of pure and applied education and research should be deemed appropriate for Australia over the coming decades?
- (iv) What is the role of industry in supporting university education/research?
- (v) What are the inherent risks involved in moving towards a tertiary education structure with a high level of industrial funding?
- (vi) Can universities justifiably claim funding solely based upon the notion of academic excellence in an environment where three-quarters of the population is tertiary-educated?
- (vii) Is there a correlation between the number of universities (and spending on those universities) and the economic performance of society?
- (viii) Is there a future for technical and further education in its present form, given the public perception of the tiered university structure?
- (ix) Given that the answers to questions (i) - (viii) dictate that tertiary education needs to be reformed, is it realistically feasible to staff universities with the sort of personnel that will create a tertiary environment relevant to modern Australia?

This document endeavours to address the above questions.

## **2. The Role of Higher Education in Australia's Society and Economy**

### **2.1 Research**

In examining the complexity of the problems facing Australia's universities, one needs to understand the process of product evolution and the relationship between knowledge creation (research), development and commercialisation.

Firstly, there needs to be an appreciation of the fact that the links between the outputs from universities (i.e., research) and economic advancement (i.e., GDP, exports, etc.) are extremely tenuous to say the least. The process of product evolution is one that incorporates:

- (i) Pure (basic) research (in universities and government research agencies)
- (ii) Applied research (in universities and industrial research facilities)
- (iii) Development (by industry)
- (iv) Commercialisation (by industry).

The rule-of-thumb is that for every dollar expended upon pure and applied research, ten dollars needs to be expended upon development and one hundred dollars needs to be expended upon commercialisation. Australia's university research contributes less than one percent of what is required to create commercial end-products and yet it consumes several billion dollars per annum of tax-payers' funds. In other words, Australia does not have the industrial capacity (i.e., several hundred billion dollars per annum) to commercialise university research, even when it is potentially useful. Far from the academic nonsense that Australian companies do not wish to commercialise Australian ideas is the fact that industry simply does not have the financial capacity to do so, given the current structure of Australian universities and the level of expenditure on research. It is also self-evident, from the rule-of-thumb, that the academic notions of their discoveries being worth millions (or billions, as claimed by some medical researchers) are also a nonsense - if such potential could be realised then there would be a plethora of companies investing in Australia's research institutions or, more likely, creating their own internal research institutions. The reality is that both pure and applied research is generally a non-profitable activity that requires government support even when there is potential for industrial involvement. However, research does form an engine from which industry can draw energy and thereby potentially contribute to society.

The time difference between a discovery in pure research and its commercialisation can only be measured in decades or centuries and so its impact (if any) upon Australian society is difficult (if not impossible) to ascertain. Secondly, the tendency to internationally publish research work further diminishes any possible Australian financial gains derived from pure research work. In broad terms, those countries that have increased expenditure on pure research (Australia, Britain, Canada, United States) have had a diminishing share of gross world product (GWP) since the second world war and so there is no apparent correlation between spending more money on pure research

and realising economic benefits. Further, given the international nature of research it would be reasonable to suggest that if Australia ceased to contribute to pure research in the international arena, then the overall change to new knowledge (globally and, hence, that available to Australian industry) would be less than a fraction of a percent. Given that industry can access international research as readily as local research, one therefore needs to question the directions and expenditure associated with university research. On a purely economic basis, one might be tempted to suggest that pure research has no direct benefits to Australia - however, there are numerous indirect benefits (see 2.2).

Applied research appears to be a more attractive alternative than pure research in terms of economic benefit to a country, such as Australia, because there is a more direct correlation between discovery and commercialisation. However, if inappropriately handled, applied research can lead to the commercialisation of ideas within other countries rather than one's own country (Britain's experience with the hovercraft and jet-engine are two commonly cited examples of off-shore commercialisation).

Overall, the void between university research (whether pure or applied) and commercialisation can be enormous and the impetus for commercialisation extremely low given that the research component of product development and commercialisation is less than one percent of the total cost. Many Australian universities still believe that they can drive the commercialisation process, which is akin to the notion of a "tail wagging a dog". The reality is that unless the impetus for research arises from an industrial partner, the potential for commercialisation in Australia is almost non-existent. Further complicating the process of university research is the difficulty of fitting into corporate research plans. Most companies plan their research and development over a five or ten year time-frame and follow up with development and commercialisation plans. The concept that these plans will suddenly change as a result of a university-based discovery (i.e., a less-than-one percent contribution to an end-product) is extremely naive.

Corporate research (particularly in large organisations) is based upon the notion of dividing the process of discovery, development and commercialisation between a large number of people so that no individual has the ability to hold an organisation to ransom via intellectual property. Universities, on the other hand, are based upon the notion of individuals, generally working in isolation, creating new knowledge. The net worth of a university discovery can therefore seldom be more than the net annual salary of the individual that generated that discovery. The net worth of a research centre or research institute within a university is seldom greater than the sum total of the individuals within it, whereas the net value of a company may be far greater than the sum of the parts. A good example is a large aircraft manufacturer - the sum total of the organisation is far more than a collection of individuals working in a factory - it is a vast collection of networks and interacting teams that work together to produce an end-product. The company cannot be duplicated simply by hiring an identical group of individuals. In universities, a research institute or centre can be duplicated by purchasing an equivalent group of individuals. Universities therefore do not leverage their talent through teamwork to increase the worth of their work.

Developing a team-based research culture within universities is absolutely fundamental to solving realistic problems because most realistic problems are multidisciplinary and are not based upon the academic notion of advancing one particular field of specialisation. A minute improvement in an industrial process, for example, that can be taken from concept to commercialisation, is of infinitely greater value to Australia than the "major international breakthroughs" that will never be commercialised because they have been produced without industrial involvement. However, the team-based approach that leads to tangible outputs flies in the face of seven centuries of "individualism" and individual excellence that have been institutionalised within universities. It also flies in the face of all the existing university funding mechanisms. The end result is that the university research process bears little resemblance to the industrial research, development and commercialisation process.

As an example of the void between research and commercialisation (and the multidisciplinary nature of the "real-world") consider the development of the mobile telephone system. The original mobile/car telephones emerged as a form of technology in the late 1950s in the United States. From an pure-academic perspective, it may have appeared that the research process could have ended there and then. However, the modern derivative of the original mobile phone is the product of thousands of man-years of development in semiconductors, plastics, antenna design, machine-tool technology, surface-mount technology, etc., etc. Although this appears to be an extreme example of the void between principle and practice it is no different to the void between the discovery of a drug and its commercialisation or between the discovery of a new type of engine and its commercialisation.

Many of the major commercialised innovations of the 20th Century (or, indeed, since the industrial revolution) have not directly come about as a result of university research but, rather, because of the ability of individuals (e.g., Edison, Bell, etc.) or companies (e.g., Xerox, IBM, etc.) to develop and commercialise ideas. Ironically, of course, the basis for major innovations did initially arise from universities in the sense that they developed the engineering, mathematical and physical ideas that were ultimately imparted to the innovators through the education system. The problem for Australian universities is that the proportional contribution of "new knowledge" towards innovative Australian end-products has diminished as the complexity of development and commercialisation has increased dramatically. Australian universities have not addressed this issue and, although there has been Government recognition of the difficulty (through the provision of industry research scholarships and collaborative grants), the proportional contribution of this form of research is still small relative to the amount of pure research undertaken by universities.

In pursuing industrial research, universities will need to re-assess their obsession with the retention of intellectual property. Studies that have been conducted in both the United Kingdom and Australia have invariably found that the cost of protecting intellectual property in universities far outweighs the minuscule potential that universities have for commercialising intellectual property. In light of the 1:10:100 relationship between research, development and commercialisation and, in light of the fact that university-based collaborations with industry are generally concerned with a small portion of a larger product, the financial benefits likely to be accrued by

universities from their knowledge contribution are negligible. Some newer universities, engaging in industrial research, have waived their rights to ownership of intellectual property in the expectation that, in a true collaboration, the real benefits to the university are in exposure to industry; in minimisation of equipment purchases and in higher levels of research training for both staff and students. In genuine collaborative research, therefore, there are potential benefits to universities that will minimise their reliance on government funding.

It is extremely naive for Australia's university researchers to claim for larger amounts of government expenditure on research based upon other OECD per capita expenditures. The reality is that, despite an increase in research expenditure, over the course of the post-war decades, Australia's manufacturing sector has declined from 18% of GDP to 14% of GDP at a time when world-demand for high-technology manufactured products has soared. Clearly, it is not the level of expenditure that needs to be addressed but the mechanisms that are in place for transferring technology/knowledge into economic results.

Overall, Australian universities have decided to pursue narrowly-focused research programs that are divorced from potential industrial partners and devoid of the multidisciplinary approach that is required to derive economic benefits for Australia. There has also been an abject failure to recognise that there is as much (if not more) new knowledge to be derived from the development and commercialisation of a discovery as there is in the discovery itself.

These structural problems have been exacerbated by the current so-called "unified national system" of universities. Far from being unified or systematic, Australia's university system is little more than a collection of institutions squabbling over a single source of government funding and wasting tax-payer funded resources in pursuing identical objectives, rather than working in unison to provide a service to society and industry. The end-result has been an enormous wastage of tax-payer funds on duplicated facilities and programs (e.g., duplicated ARC, CRC, CSIRO, DIST and NHMRC funding schemes and bureaucracies; seven manufacturing research centres in Melbourne; several medical research institutes within Melbourne, etc.) at a time when expenditure on research needs to be optimised. Most of this expenditure is justified by participants on the basis of "specialised" needs. The irony of the situation is that neither industry nor the general public (i.e., those that fund specialised research centres) have any comprehension of the role of specialised centres; the need for duplication or the highly-specialised services that are often offered.

***Recommendation 1:***

*Recognise that Australia's tax-payer-funded expenditure on R&D, relative to its industrial capacity to commercialise is excessive. Develop an environment in which all universities develop alliances with industry to maximise potential economic benefits of research and in which all universities have a spectrum of pure, applied and industrial research.*

## 2.2 Education

Education is one of the most tangible end-products of university research. Universities are, by common understanding, "places of learning" rather than teaching establishments. Hence, the role of universities is to supply the knowledge and the tools that individuals require in order to learn and, subsequently, to assess the levels of learning acquired by individuals. Mass education has, however, changed the role of universities because they are now part of a tertiary education system. All universities have, to some extent, become teaching establishments simply because of the calibre of students entering the system. However, the difference between "learning" and "teaching" was one of the few meaningful demarcations that existed between university and TAFE.

Given that universities still have an important role as "learning" establishments (students are there to learn), universities cease to have any significance to society when they cease to create new knowledge - they merely become a collection of buildings, laboratories and libraries (tools) that students use to learn. The challenge that universities have not faced (to any great extent) is that the form of knowledge has changed dramatically over the course of the century. There is no longer any question of a bright spark emerging from universities and illuminating the remainder of humanity. Meaningful knowledge is not solely embodied in engineering, management, mathematics or science - meaningful knowledge needs to encompass the spectrum of research, development and commercialisation if it is to have any practical significance to society. However, this does not fit into the narrowly-focused disciplines, and unchallenged principles of excellence, that have been established over the course of more than seven centuries of university operation.

The traditional notion of academic excellence, espoused by Australia's traditional universities, is difficult for outsiders (i.e., tax-payers) to monitor in any meaningful way. As a result, artificial mechanisms, of monitoring minutia such as research publications, patents, etc. have been established. However, none of these outputs, in themselves, can be readily correlated with the "betterment" of Australian society. For example, has the Australian economy improved as a result of increased publications or patents? What tangible societal benefits are derived from universities claiming medical breakthroughs? How many breakthroughs filter into society?

Given the difficulty that outsiders have in measuring excellence (i.e., assessing the benefits of expending tax-payer funds), it would therefore be extremely foolish and extravagant to follow the British university model that has divided education into the multi-tiered system that already exists (in perception) in Australia, solely on the premise that we still need to retain academic excellence in the traditional universities, for its own sake. The seven traditional Australian universities currently have an annual turnover in the order of several billion dollars and the notion that this level of tax-payer expenditure should be isolated from economic reality and accountability is a nonsense. All universities therefore need to have a spectrum of activities, embracing the traditional notions of academic excellence, together with applied, developmental and commercialisation knowledge if they are to have significance and accountability. A

spectrum of staff, with pure and applied knowledge leads to a self-regulating structure where academic excellence is accurately monitored by applied practitioners and applied practice is accurately monitored by pure researchers. The role of government is then to monitor larger outcomes and not the minutia of publications and patents.

One might be tempted to examine the role of academics themselves (and the notion of expertise), given the fact that universities now operate in a more complex environment than at any previous time in history. There are several major problems in Australian universities from an educational perspective. Firstly, there are insufficient numbers of "experts" to take on the role of lectureship. Australia-wide, universities employ some seventy thousand staff and use a PhD as a benchmark for lecturing/academic roles. This leaves a very limited pool of potential candidates from which to select "leaders" in lecturing fields. This is a world-wide problem and, with the move towards mass education has led to a continual lowering of standards. The problem is exacerbated in Australia by the unified national system, which encourages "sameness" throughout the university system. Melbourne, for example, has two medical faculties, six engineering faculties, seven computer-science faculties, etc. Universities do not share expertise and rationalise education across a region/state in order to provide an optimum solution. Instead, universities artificially compete with one another to secure a larger portion of government expenditure, normally at the expense of their competitors. On the other hand, if universities genuinely worked in a cooperative environment within each state, then duplication of expertise could be minimised, government expenditure could be reduced and quality improved.

Fundamentally, the educational problem in Australia's universities is related to a total lack of staff and institutional flexibility, with academics tied to departments within individual universities. The existing funding models encourage universities within a single state to compete with one another, rather than to develop networks, complementary activities and share expertise on, say, a state-wide basis. The most obvious example, which costs tax-payers many millions of dollars, occurs in postgraduate management courses where multiple universities establish similar (and extremely costly) teaching facilities in office complexes in capital cities - a few hundred metres apart (Melbourne has four similar university business complexes within a one kilometre radius). Needless to say, the same structural inefficiency is also true in terms of engineering programs, science programs, etc., with some six or seven duplicate programs and facilities in each discipline, in some states.

The infrastructure wastage in universities, in each state, is enormous with many hundreds of millions of dollars invested in laboratories and facilities with limited utilisation. However, if this wasn't of considerable concern, then one has to also consider that courses and facilities are again duplicated with the artificial divisions between university and TAFE. Universities, combining TAFE, often have duplicated multi-million dollar facilities (on the same campus), duplicated support staffing, etc. for no reason other than the artificial boundary between TAFE and Higher Education.

Infrastructure inefficiencies are the most visible signs of an ill-structured university sector. However, as noted earlier, from an educational perspective there are enormous problems from overlapping educational activities. The most significant one is in an

inability of universities to apply sufficient expertise to the educational process - at both undergraduate and postgraduate levels. A sharing of staff between universities would enable a higher level of specialisation and proficiency to be applied to individual subjects and, more importantly, economies of scale would enable universities to engage external staff to act as "pracademics".

Pracademics, or practicing academics, are critical to the development of higher education. Practitioners can provide a learning perspective derived from industry experience and can provide the multidisciplinary approach to learning that is most closely linked to converting learning into practice. A university system, which claims to educate, without the presence of practitioners, is clearly failing society.

***Recommendation 2:***

*Recognise that pure academics are no longer adequate for tertiary education over the coming decades. Recognise that duplication of courses has led to poor levels of teaching at tertiary levels. Develop staff sharing between universities and between universities and industries. Encourage the use of "pracademics" to supplement core academic staff and to enhance teaching quality.*

### **3. Financing Higher Education**

There are two aspects to the problem of financing higher education in Australia. The first is deriving funds, from either tax-payers or education recipients. The second is in distributing the funds to educational providers. The first aspect is considerably less contentious than the second, in all but a political sense. However, the division and distribution of funding to universities, particularly tax-payer-funds, is both complex and fraught with problems.

The current formula-based approach to distribution of funding has sufficed surprisingly well for some time but it has also generated some problems that must be addressed in order to minimise tax-payer funded expenditure on universities and tertiary education. The most significant problem with formula-based funding is not with the funding itself. Rather, it is a question of universities applying formulae, and structuring their universities, to maximise their revenue from tax-payer funds. In simple terms, what has occurred is more a question of empire-building than of responding directly to societal needs.

Funding of universities, through tax-payer funds, has generated the obvious issue of performance. However, performance is difficult to define at a Federal level. The fact that one university draws students away from competitors, in a given year, may appear to be a positive attribute. However, from a tax-payer perspective, the total funds allocated to each university, that runs below an optimum load, still need to cover sub-optimal staffing levels and under-utilised equipment. Worse still, there may be specialists in one university, who remain under-utilised, while a competitor university (that is desperately short of expertise) may substitute poor alternatives to fill a high load.

Staffing flexibility and the reduction of tenured positions appear to be simple solutions to many of the inefficiencies that occur within universities in a given state. However, regardless of the authority vested to university administrators, the reality is that staffing flexibility will always be limited by the high levels of specialisation and experience required by university teaching and research. The solution is to increase the flexibility by increasing the critical mass of the tertiary sector within each state.

From a government/political perspective, it appears that the issues of inefficiency and wastage within universities could be made more palatable if the burden on tax-payers could be reduced by a higher level of user-pays education, and so there have been moves to generate a "voucher-based" education funding arrangement which, in theory, provides consumer-based feedback on the quality of educational outcomes. The problem with this approach is twofold. Firstly, universities, which will become defacto businesses, will focus on programs that maximise returns rather than those that are most urgently required by society at a given point in time. For example, if medical courses provide the greatest return, then universities will make more places available regardless of whether or not Australia is saturated with medical practitioners. Secondly, voucher-based education is eminently suited to the secondary school environment, where the outcomes can be independently controlled and moderated by external agents - for example, industry employers or tertiary-entry requirements. In universities, however, a

voucher-based system could lead to a Dutch-auction in which universities strive to provide the shortest and easiest paths to tertiary qualification. While professional bodies would have a moderating effect on some disciplines, many other disciplines would be unbounded and the result would be a proliferation of meaningless degrees. To some extent, this has already occurred, both locally and internationally, with postgraduate course-work programs, which have diminishing credibility.

In a larger sense, minimising expenditure on higher education, and maximising returns, needs to be considered in terms of a number of dimensions before conclusions are drawn:

- Efficient training of professionals for positions in line with societal demands and standards
- Efficient training of researchers for industrial and societal needs
- Generation of new knowledge that can enhance Australia's reputation as a high-technology country and improve competitiveness of local industry.

Competition between tertiary institutions, in each state, does not necessarily improve efficiency of funds usage and so one needs to be extremely cautious in advocating competition without realising the implications. In particular, it needs to be remembered that there is only one static market for university services (i.e., local students and industry) and one dynamic market (i.e., international students and industry). The dynamic market will become less significant as the number of universities in developing countries increases and the competition from other international universities increases. This leaves universities with the role of competing in a largely static market, often confined within a region, such as a state. In this environment, it is self-evident that funding models need to lead to a cooperative relationship between universities in each state of Australia. Unlike amalgamation, this would allow for autonomy and innovation within universities and, at the same time, a critical mass that would improve potential for international marketing of services against more aggressive international competitors.

To some extent, the problems that exist in Australian universities have been brought about because funding has been formularised from a remote level and the formulae have been locally manipulated by universities for individual gain rather than national objectives or efficiencies. In revising the funding model, it would appear to be sensible to provide somewhat of a reversal of responsibilities and insist that universities, operating within a state, put forward a collective plan that demonstrates that, as a networked group, they can best satisfy state and national objectives through the dissolution of artificial boundaries and empires, and through a cohesive form of operation that minimises duplication. At least then, funding could be formularised based upon competition between state university networks, rather than individual universities.

Each region/state within Australia is similar in size to a European country and has peculiar attributes that need to be supported by education and research. For example, Victoria has a large manufacturing base, Western Australia focuses on primary industry and so on. It is only reasonable, therefore, to expect that a network of universities, operating within a state should have a central theme which supports that state's

economic base as well as satisfying national objectives and offering diversity to local students.

***Recommendation 3:***

*Develop a network of universities/colleges in each Australian state, with a central theme of excellence peculiar to that state's economic/social requirements. Insist that universities work as a network to deliver a complementary set of programs that minimises the enormous wastage in duplication of facilities and maximises staffing flexibility and quality of training for students.*

Ultimately, the financing of university education must either be sourced directly from recipients (through fees or vouchers); indirectly from recipients (through taxes); or indirectly from all Australians (through taxes). Given that, within the coming decade, most Australian tax-payers will also have been tertiary education recipients, all forms of financing ultimately revert to user-pays (or effectively, a tax) and, so, the distinction between one form of financing and the other is somewhat arbitrary. The key issue is therefore not how financing occurs (although the format has advantages and disadvantages for each individual university) but, rather, how efficiently funds are expended for national benefit. Each state in Australia currently has multiple universities and technical colleges and the potential for gross duplication and inefficiency within the region. Future funding models must therefore place the onus on university executives (vice-chancellors) to demonstrate that, within a given region, universities can operate as a cohesive network that minimises tax-payer expenditure on staffing, maximises flexibility of staffing between universities, and minimises infrastructure while offering maximum potential for diversity, international commercialisation and support for regional needs.

The networking of universities, within regions, is absolutely essential in minimising costs. However, the issue of Technical and Further Education (TAFE) also needs to be addressed if duplication is to be minimised. The TAFE sector forms another artificial tier in the tertiary education sector which should be removed so that there can be genuine integration of tertiary education and maximisation of outcomes. Ultimately, many TAFE courses are remarkably similar to university courses and many university courses are remarkably similar to TAFE courses, despite protestations from both sectors that they are different. For example, science students at a traditional university ultimately study the same computer programming courses as those in TAFE colleges; electrical engineering students at universities undertake similar laboratory experiments to certificate students in TAFE and so on. Furthermore, the natural progression, from college to institute to university, that has occurred in Australia over the past decades will not diminish until there is some recognition that all tertiary education needs to be unified. The three tier structure that currently exists in tertiary education would be laughable if it was to be applied in, say, primary or secondary education. The fact that it still exists in the tertiary sector is an indictment on the indecisiveness associated with the governance of tertiary education.

***Recommendation 4:***

*Recognise that TAFE has now become an indistinguishable part of the university system, with current boundaries largely established on artificial and unnecessary divisions. Incorporate TAFE into the university system and establish common entry for TAFE and university programs. Minimise duplication of staffing and capital facilities where possible. Increase the level of articulation from certificate programs through to higher degree programs.*

Overall, the problem with minimising expenditure on tertiary education therefore stems from the fact that what currently exists is a product of uncontrolled evolution and empire building at both institutional and government level. Like many other aspects of government, processes are not necessarily demand-driven. Instead of ascertaining societal needs and then structuring tertiary education to suit, tertiary institutions have been permitted to drive the overall process and the net result, not surprisingly, has been an expansion of empires on all fronts (at tax-payer expense). The justification has been the pursuit of excellence which, from a tax-payer perspective is difficult to measure or verify. The issue of university financing, from a revenue collection perspective, is of secondary importance and should therefore be deferred until the structural inefficiencies of the existing institutions have been addressed.

#### **4. Funding University Research**

Given the lack of unity in the "unified national system" of universities, it is not surprising that funding mechanisms for research are as disjointed as the overall system. University research funding is ultimately derived from four sources:

- (i) DEETYA (student load funding)
- (ii) ARC/NHMRC (competitive grant/centre/institute funding)
- (iii) DIST (competitive grant funding)
- (iv) Industry funding.

The number of funding permutations within these groups is enormous and it is altogether appropriate that they should be reviewed in the light of a need to restructure universities for greater relevance.

Taking each point in turn, the least contentious funding arrangement for research is DEETYA student-load based, where there is a clear correlation between the number of research students and the funds required to support them with infrastructure, supervision, etc. Given that DIST funding is not being considered in this review, the two contentious items that need to be discussed are ARC/NHMRC funding and Industry-based funding for research.

The most obvious problem with ARC/NHMRC competitive grant funding (which appears to have gone unnoticed thus far at a Federal level), is that universities employ academic staff on a combined education/research basis. Hence, the question that needs to be asked, given the absence of research funds (i.e., the ability to undertake research by paying research stipends, acquiring laboratory assistance, acquiring equipment, etc.) is what academics are expected to do during the periods allocated to them for research. The only answer appears to be to "read" and "write" papers. In other words, tax-payers are expected to fund the salaries of staff who are largely idle because of a lack of grant funds. Worse still, tax-payers are expected to fund the cost of salaries for academics to do no more than fill out competitive grant applications. To give an example of the enormous wastage involved in the competitive process, consider that each ARC Large or Collaborative Research grant application takes two to three staff several weeks to complete. Each grant application therefore costs tax-payers \$10,000 in salary. Only a small percentage of grant applications are approved and, hence, millions of tax-payer dollars are wasted in filling out grant applications. In fact, for every dollar of grant funding awarded by the ARC, an additional tax-payer's dollar is expended in the competitive process - an extraordinary wastage of funds and resources with no clear end-objective (other than the oft-cited academic excellence).

The current ARC granting process has the following mode of operation. Universities A, B, C, D and E each apply for an average grant of \$50,000. The total cost to tax-payers, for the application/administrative salaries (at \$10,000 per application), is \$50,000. In addition to this, the ARC, expends some 15% of grant monies in the

evaluation/administration process, thereby adding another \$7,500 to the cost of the process. Typically, university A is awarded grant funds at the expense of universities B, C, D and E, so staff at universities B, C, D and E remain partially idle because they have no funds to undertake research. In a typical large grant application, three principal researchers might have devoted 3 days each, per month, on a project so, as a result of a lack of funding, tax-payers have to pay 3 researchers x 3 days/month x 11 months x 4 universities to remain partially idle (approximately \$120,000 pa of under-utilised salary cost). The cost to tax-payers, of the \$50,000 ARC grant is \$107,500 of real expense and it leaves \$120,000 of under-utilised research capacity which is also paid for by tax-payers. This gross inefficiency largely exists because of "bucketing" of funds. The ARC claims efficiency because it does not consider funds expended at university level and the universities claim efficiency because they don't consider idle time costs. In the final analysis Australian tax-payers bear all the costs. One assumes that the NHMRC provides an analogously inefficient expenditure of funds.

One might be tempted to accept such gross inefficiency in funds distribution if it had some tangible benefits to society. However, as with most other structures that have evolved in the university system, there are no clear benefits other than the often-cited "academic excellence" criterion which cannot be measured. Even then, one has to wonder how a competitive granting process is able to discern that research into "bananas" is more excellent than research into "apples", "pears", "peaches" and "apricots". However, this is the end result of the ARC granting processes, when physicists apply for grants in competition with engineers, mathematicians, accountants and historians.

***Recommendation 5:***

*Recognise that competitive granting processes are costly, inefficient, potentially inequitable and subject to committee biases. Replace competitive granting processes with a formula-based distribution to universities and use Federal research bodies to set national research agendas for universities and to monitor universities in terms of their performance in realising those agendas.*

As if the research funding distribution inefficiencies weren't bad enough in their own right, one also has to consider that duplicate bureaucracies exist in the ARC and NHMRC for no reason other than that Australian governments have traditionally cowered from the medical profession ("*our research is a matter of life and death...*") and have been goaded into elevating medical research above any other form of research ("*Australia is a world-leader in medical research...*"). Few questions have been asked about Australia's capacity to commercialise medical research. Perhaps, also, the unwarranted preferential treatment given to university medical research has been a matter of political expediency because it makes governments appear more benevolent ("*our government is curing cancer...*"). Regardless of the reasons, it would now appear that saving Australian lives by, say, chemical engineering research into the elimination of carcinogens in the environment (i.e., causative agents in cancer) is of far less significance to government than medical research into cancer as a disease, even though the former may save more lives than the latter.

The distinction between the ARC and NHMRC is nothing more than empire building and bureaucratic nonsense which has no basis for remaining intact when the utilisation of tax-payer expenditure needs to be maximised. It is scandalous that millions of dollars of tax-payer funds are expended in duplicate bodies that both have no more purpose than to selectively distribute funds to university departments through a complex and convoluted series of grants. The question also needs to be asked why, if the government persists with the retention of the NHMRC (because of pressure from medical lobby groups), they do not introduce an additional bureaucracy for every other form of research - agriculture, engineering, history, physics, mathematics, etc.

***Recommendation 6:***

*The duplicated and artificially created ARC and NHMRC bodies should be replaced with one Federal research body, a national research council (NRC), whose role it is to set research directions for Australia and to monitor the performance of universities in achieving those directions.*

The existing approach to research funding is as paternalistic as one could imagine any funding mechanism to be. Government selectively distributes funds and endeavours to monitor minutia (e.g., publications) in order to somehow justify the expenditure of the funds and the contribution of the research to society. There is little then to relate the many "small-picture" outputs to larger societal benefits. For example, publications, even in international refereed journals, may contribute little to local and international society. A study conducted in the United States, in the early 1990s, determined that the majority of citations were by researchers citing their own research in previous publications - in other words, there was a belief that the "publish or perish" mentality had achieved little more than the generation of unread papers. Ultimately, therefore, the only feedback that government tends to acquire is that tax-payer funds contributed to "academic excellence" in research.

The problem with research funding is altogether identical to that with funding of undergraduate and postgraduate training - government has no clear picture of what it wants universities to achieve (in terms of society and the economy as a whole) and universities (or, their vice-chancellors), in turn, have no greater vision than to enlarge existing activities in the same fashion that has existed for over seven centuries. Little wonder then that there are few discernible relationships between spending on universities and research, and direct economic benefits to society.

While governments relish the collection of vast amounts of minutia to justify expenditure, they do not have the capacity to determine its significance to society - ultimately, the decisions made on the performance of universities must be subjective. In the case of research, the distribution of funds is also a major source of inefficiency and, since government should be about outcomes, the concept of research fund distribution should be removed from the ARC and NHMRC and replaced with a formula-based approach. While no formula-based approach is liable to be entirely satisfactory, at least such a change would cause the ARC and NHMRC to switch their focus to a more substantial cause - setting research directions, based upon societal requirements, and

monitoring university performance, based upon the fulfilment of societal requirements, rather than on simplistic factors such as publications.

It would be unreasonable to be overly critical of the ARC/NHMRC in themselves because, despite constant problems over dubious granting procedures, both organisations have made genuine efforts to put forward meaningful programs. The concepts of collaborative industry research and industry postgraduate programs, in particular, have provided a pivotal change in attitudes in universities and there is no reason why universities could not expand such programs if funding was devolved to them by formula. The difficulty with centralised funding is endeavouring to suit the nuances of each research area and each research collaboration.

A good case in point is the collaborative research centre (CRC) program which, despite the best of intentions, appears to be achieving mediocre results. On the surface, and from a centralised (government) perspective, the CRC program appears to be a large extension to the ARC Collaborative grants and postgraduate scholarship (APAI) scheme. In practice, however, the scheme is far more complex and has wider ramifications and problems. The success of the ARC Collaborative grants and APAI schemes was due to the simplicity of the project-based approach which provided universities with a small amount of funding to undertake research that supported industry. Outcomes and expenditures were clearly identifiable and neither the universities nor industry partners could directly financially benefit from tax-payers' funds. Benefits for partners had to be derived from genuine collaboration. The schemes were self-monitoring because industry monitored the universities and universities monitored industry partners.

It might have appeared obvious to expand such a scheme to the CRCs but the net result was an enormous pool of money available to a group of industry and university partners for non-project based research, with ill-defined objectives; bureaucratic management structures; complex multi-way intellectual property agreements; ad-hoc amalgamations of disparate partners with differing objectives and outcomes which were difficult to define. All too often, the end result was a collection of disparate partners expediently combined to gain access to a new funding mechanism. Worse still, as entities separate from universities, CRCs were again encouraged to duplicate existing university/industry facilities/staffing. In some cases, on the other hand, there were no physical centres even in place, with all partners carrying out research in their own premises, and the issues of genuine collaboration had to be assessed. Even using the simplistic criterion of research publication outputs, the centres performed poorly. A recent government review into the CRCs failed to quantitatively determine whether their only influence was to allow companies to divert previously allocated research funds to other profit-making activities, while using tax-payer funds to carry out normal research. The notion that Australian universities and industries could undertake such large-scale collaborations, although well-intentioned, was altogether innocent and many years of smaller-scale, project-based collaborations still need to be undertaken before such costly centres should be reconsidered.

**Recommendation 7:**

*Avoid expenditure of tax-payer funds on ambitious, overly bureaucratic and nebulous industry collaborative research programs (e.g., CRCs) which can become pseudo-granting bodies for universities and industry partners. Encourage simple, project-based collaborations where outcomes and failures can be clearly identified. Allow industry and universities to establish centres through natural growth in collaboration and without specialised and excessive funding.*

Government/university funding of industrial research is a complex issue and it is becoming more complex as universities endeavour to work more closely with industry. Firstly, one has to accept that industrial research is a normal business expense in the same fashion as stationery, vehicles, machinery, etc. In the long-term, if industry is unable to fund its own research from a re-investment of profits then the industry may be non-viable. The questions to be addressed are then:

- Should the government use tax-payer funds to pay for normal business expenses (research)?
- If industrial research is non-viable on a commercial basis, should government interfere with normal competitive practices by funding activities that lead to non-sustainable businesses?

In the case of simple funding mechanisms, such as APAI/SPIRT scholarships, the answer is that government has an important role. Tax-payer funds are not expended to assist companies but, rather, to enable universities to link to industries and to train postgraduate researchers in industrial research. A postgraduate researcher gains by simultaneously acquiring a postgraduate degree and industrial experience. The university gains by saving money on equipment funded by industry. Academics gain by acquiring exposure to industrial problems. Ultimately, whether or not the industrial partners gain becomes irrelevant because the scheme is justified solely on benefits to society and the university. In most cases, however, industry does gain and the result is a genuine win-win collaborative situation. A similar arrangement applies to ARC Collaborative grants. The same does not necessarily occur with CRCs because the primary emphasis there is not in providing support and links but, rather, in providing cash, that both university and industry partners can utilise, often without genuine collaboration.

From a government/societal funding perspective the objectives of collaborative research should therefore be:

- (i) To minimise tax-payer funded expenditure on university research which can never be commercialised by universities in isolation
- (ii) To expose university staff and students to the industrial research, development and commercialisation process and thereby create more dynamic researchers that contribute positively to Australia's economic prosperity

(iii) To minimise university project-based expenditure on equipment, facilities and staff that already exist in-house in industry

(iv) To assist industry to undertake research and development without risking tax-payer funds on cash subsidies that are difficult to monitor and subject to misuse.

Industry funded research is the ultimate extension of the ARC Collaborative and APAI programs but it is not particularly common in Australia, even less so in the case of benefactorial research. In most cases, collaborations can lead to tangible benefits for both the industry-partner and the university participants and, in most cases, there are no ethical problems because the research contribution is an invisible part of a company's end-product. There are, however, moral problems that emerge in some areas. In medicine, for example, it is not uncommon for pharmaceutical companies to fund research that seeks to find a correlation between some measurable biological quantity (e.g., blood-pressure, sugar levels, etc.) and the long-term use of a pharmaceutical product (e.g., hypertension or diabetes drugs). Given the vagueness of medicine as a science, one can always find some correlation between the non-use of some drug and the occurrence of medical conditions. However, one cannot help but be concerned that such sponsorship could have a deleterious effect on Australian society - for example, leading to unnecessary long term use of drugs, based upon industry-funded research that may unconsciously have become skewed as a result of funding. In such an instance, universities can inadvertently become marketing arms for industry partners, thereby diminishing their independence

Medical research is one of the more obvious areas where universities, undertaking industrial research, can have ethical problems. However, the same problem applies to any instance where industry-funded research leads to outcomes that are beneficial to a collaborating partner from a marketing perspective. Given that there can be no blanket solutions to such problems and that each needs to be treated on a case-by-case basis, universities moving towards industry collaboration need to consider the establishment of ethics committees to deal with such problems in the same way that similar committees have been established for, say, human or animal experimentation.

The problems associated with collaborative university/industrial research are numerous but the potential benefits are many, and there needs to be some acceptance that universities can no longer be funded solely as islands of knowledge without direct interaction with industry. The most deep-rooted problem that occurs with industrial collaboration is that the success rate decreases significantly from that reported to occur in the rarefied university atmosphere. Whereas academics have been conditioned to report back to government that a research program went exceedingly well because it was discovered that none of the proposed theories actually worked, there now needs to be an acceptance, by both government and academics, that collaborative research programs will often be considered unsuccessful (by industry collaborators) even if, in an academic sense, they have been carried out as a sound piece of systematic research that, perhaps, positively leads to postgraduate qualifications. As universities make a transition towards a higher level of industrial research and industries, unaccustomed to collaboration, move towards research in partnership with universities, there will inevitably be major problems in the early years. These include arguments over

intellectual property, academic freedom, ability to publish work, etc. It may take more than a decade before Australian universities and Australian industry ultimately develop the synergy required to increase the success rate of collaborative research.

In terms of funding, the ultimate argument for the dissolution of competitive grants is that they are not conducive to modern business practices. Companies approaching universities for collaboration generally want an immediate commencement of research. Existing grants require up to nine months from initial concept to potential funding, with only a one in four chance of a collaboration proceeding. This causes irreparable damage to university reputations, in terms of delivering results through collaboration, when universities cannot guarantee partners that collaborations will proceed, even after nine months of discussions. Devolution of research funding to a localised level would enable universities to pursue collaborations on a systematic basis, in line with particular industry requirements, and to vary the pure/applied research mix in line with a framework established by a national research body together with local opportunities for research.

The pursuit of industrial/applied research within Australian universities, although vitally important, should not preclude the retention and funding of many areas which contribute to societal advancement, such as history, the arts, etc. Many such areas are not well-suited to applied research and still have an important place within the university framework. The devolution of research funding to university level should not necessarily lead to a decline in such areas, provided that appropriate governance of national agenda can be accomplished and monitored by a national research body that is not encumbered by the bureaucratic distribution of funding through competitive grants.

## 5. Agents of Change in Universities

Any reformation of the Australian university system must be considered with cognisance of existing management structures within universities. Regardless of government intention, little will ever be changed in real-terms at the university level unless there is some willingness, on the part of various chancelleries, to genuinely seek change and innovation in the university system. It must always be remembered that, despite seven hundred years of evolution; an industrial revolution; two world wars; the development of former third-world countries into economic power-houses; the rise and fall of communism, and many other societal changes (mass education, continuing education, etc.), universities in many Western countries have remained unperturbed in their mannerisms and levels of innovation. Given the increasing complexity in the role of universities; the need to reduce burgeoning expenditure; the need to interact with industry and to satisfy mass education requirements, one therefore needs to recognise that the demands upon the university executive are enormous. One also needs to accept that the formula that has traditionally been applied for the recruitment of university executives may no longer be appropriate. The fundamental issue that government needs to address, in any reformation of the university system, is whether or not existing executives are capable of responding in meaningful measure to any major reform agenda.

Most of Australia's existing university executives (vice-chancellors, etc.) have acquired their positions through a combination of academic and administrative abilities that have been founded on a system which has, in broad-terms, been in place for centuries. Those entrusted with leadership of traditional universities in Australia have inherited systems and staff that evolved prior to the emergence of new universities and mass education, at a time when government funds were more plentiful and competition for them considerably less. Those entrusted with the leadership of newer universities have often inherited systems derived from former colleges and institutes that were heavily focused on teaching, rather than research.

The current administration of higher education in Australia is predicated on a paternalistic system that assumes that university executives need assistance in executing government policy and, hence, research funding and performance monitoring (in terms of minutia such as publications, etc.) have traditionally been carried out at a Federal level. The overall result has been a failure, on the part of government, to treat university executives as genuine "executives" and to hold them accountable for societal/economic outcomes rather than administrative details such as publications. One could argue that social/economic outcomes are subjective but, then, so too is the entire academic process.

It may be that the devolution of such responsibilities to university executives is currently unwarranted, given the means by which university executives have traditionally been appointed, but the current problem is that Federal departments have assumed the overall responsibility for executive decision making in universities across Australia. It is not surprising, therefore, given the diversity and intricacy of the universities and regions in which they operate, that higher education in Australia

appears to be a melange of overly-complex policies that endeavour to be all things to all people.

A large Australian university is an organisation with more than \$600,000,000 pa turnover, and the bulk of this is derived from tax-payers' funds. Most universities rank amongst Australia's largest organisations, with thousands of staff and tens of thousands of customers. It would not be unreasonable, therefore, for government to expect the executive of such an organisation to be given considerable autonomy to direct such expenditure, while at the same time, being held accountable for societal/economic benefits to Australia, rather than the small-scale outcomes that have little significance to those funding the organisation. The current higher education structure, restricts the flexibility of universities and fails to hold them accountable for the higher sense of purpose, for which universities were established.

***Recommendation 8:***

*In reforming the university system, consider that existing university executives have not been selected based upon the need for innovation, change and accountability for large-scale expenditure based upon societal/economic requirements. Consider the devolution of responsibility for delivering broad outcomes, outlined by government policy, to university executives and for making such executives more accountable for tangible deliverables in terms of societal/economic requirements.*

## 6. Conclusions

Australia's tertiary education system is the product of more than seven hundred years of historical precedent. The general stagnancy in the system, and its desire to suppress meaningful change in response to changing societal and economic requirements, is indicative of highly entrenched processes and bureaucracies that will be difficult to shift.

In the final analysis, there are two conclusions that can be drawn from the diminishing relevance of tertiary education to societal and economic objectives:

(i) That a failure of universities to change in response to changing circumstances has led to the diminution of universities as a meaningful agent for the forecasting and implementation of change in society

(ii) That universities have never (at any time) been appropriately structured as agents of change, and the historical self-accordance of "academic excellence" has only been exposed as weak and ill-founded because society has become better educated and is now able to assess the performance or non-performance of universities.

Traditionalists would argue that, in pursuing industrially-relevant education and research programs and, perhaps, in reducing the emphasis on classical studies, universities would lose their higher sense of purpose. However, one can only question what higher sense of purpose an educational system has when it ceases to be relevant and responsive to the needs of modern society.

The issue facing the Australian government is whether to continue along the current low-resistance path, of minor variation to funding formulae and mechanisms, or whether to implement meaningful change that will bring universities into the 20th Century prior to the arrival of the 21st Century.

## 7. Summary of Recommendations

### **Recommendation 1:**

*Recognise that Australia's tax-payer-funded expenditure on R&D, relative to its industrial capacity to commercialise is excessive. Develop an environment in which all universities develop alliances with industry to maximise potential economic benefits of research and in which all universities have a spectrum of pure, applied and industrial research.*

### **Recommendation 2:**

*Recognise that pure academics are no longer adequate for tertiary education over the coming decades. Recognise that duplication of courses has led to poor levels of teaching at tertiary levels. Develop staff sharing between universities and between universities and industries. Encourage the use of "pracademics" to supplement core academic staff and to enhance teaching quality.*

### **Recommendation 3:**

*Develop a network of universities/colleges in each Australian state, with a central theme of excellence peculiar to that state's economic/social requirements. Insist that universities work as a network to deliver a complementary set of programs that minimises the enormous wastage in duplication of facilities and maximises staffing flexibility and quality of training for students.*

### **Recommendation 4:**

*Recognise that TAFE has now become an indistinguishable part of the university system, with current boundaries largely established on artificial and unnecessary divisions. Incorporate TAFE into the university system and establish common entry for TAFE and university programs. Minimise duplication of staffing and capital facilities where possible. Increase the level of articulation from certificate programs through to higher degree programs.*

**Recommendation 5:**

*Recognise that competitive granting processes are costly, inefficient, potentially inequitable and subject to committee biases. Replace competitive granting processes with a formula-based distribution to universities and use Federal research bodies to set national research agendas for universities and to monitor universities in terms of their performance in realising those agendas.*

**Recommendation 6:**

*The duplicated and artificially created ARC and NHMRC bodies should be replaced with one Federal research body, a national research council (NRC), whose role it is to set research directions for Australia and to monitor the performance of universities in achieving those directions.*

**Recommendation 7:**

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**Recommendation 8:**

*In reforming the university system, consider that existing university executives have not been selected based upon the need for innovation, change and accountability for large-scale expenditure based upon societal/economic requirements. Consider the devolution of responsibility for delivering broad outcomes, outlined by government policy, to university executives and for making such executives more accountable for tangible deliverables in terms of societal/economic requirements.*