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Managing the Unmanageable: the Management of Research in Research-intensive Universities

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All around the world, the importance of research undertaken within universities and other institutions of higher education is widely recognised by governments, industries and diverse stakeholders. Indeed, it is likely that the contribution of higher education in the generation of new ideas and knowledge, and as an economic driver, has never been higher. At the same time, universities face a rapidly changing environment shaped by pressure on funding, an emphasis on quality assurance and the increasing impact of globalisation, marketisation and new technology. Such pressures for change have placed a particular emphasis on the need for effective management of higher education institutions.

This article aims to bring together these two themes, looking at the management of research universities. What are the key management characteristics of some of the world's leading research-intensive universities? Are there particular models of internal organisation, leadership, resource allocation and human resource management that lend themselves to the successful encouragement of research? Further, how do these approaches relate to some of the inherent difficulties in the management of research?

The management of research: a conundrum

Research is an intensely personal activity, strongly dependent on the ideas and imagination of individuals or groups of individuals. Academic staff feel a fierce personal ownership of their research; it shapes and dictates their career development and their status with their peers. Research is ultimately linked with fundamental beliefs about academic freedom and the opportunity to challenge longstanding orthodoxies. Moreover, research, by its very nature, is unpredictable, moving in unforeseen directions with unexpected consequences; further, it is this unpredictability that often gives rise to some of the most important outcomes and is therefore to be applauded, not curbed.

Research, therefore, does not lend itself to control and management. Yet, in the fast-changing competitive world of today's higher education, there are constraints that require the application of some sort of management framework. Funding and quality issues require priorities to be agreed; adequate resources are needed to be expended in the optimum way; and there are legal and ethical controls to be applied. Research may also imply risk; for the modern university, risk-taking is an essential part of institutional vitality, but risk must also be understood and managed. Hogan and Clark describe the conundrum as follows:

> "The arguments for and against centralised research planning are well known, but none the easier to evaluate for that. The purpose of a plan is to set priorities for development and influence the deployment of resources. Institutions in today's highly competitive environment cannot hope to be strong in all areas of research, and not to concentrate and build on strength could seriously disadvantage the research profile of the institution as a whole. The opposing argument is based on the fundamentally correct view that research initiatives are generated by individual academics who champion their project. If the best opportunities are not to be taken as they come along, initiative may be stifled and the research plan is in danger of becoming counter-productive. The usual way through the dilemma is to attempt to do both – set a small number of priority areas and retain development funding for the best new initiatives that arise outside the priority areas – as far as financial constraints will allow" (Hogan and Clark, in Warner and Palfreyman, 1996, p. 128).

It seems, therefore, that research cannot be left un-managed. As Fox observed: "Institutions do not do research: individuals do. But institutional conditions affect productivity" (1992, p. 105). The key issue is how to manage effectively in such a way as to maintain an appropriate working environment within which research can thrive. This paper will explore how this is achieved in six of the world's leading research-led universities.

What is a "Research University"?

This article is primarily concerned with "research universities". Research is undertaken by many academic staff in institutions that vary in type, culture and tradition. Some people would argue that every university should be involved in research and that the interaction of teaching and research is the guiding *raison d'être* for a university. Moreover, in recent years, the "definition" of research has widened, for example to include Boyer's four scholarships (Boyer, 1990) and the emergence of new disciplines based on creative or professional practice (such as art and design or health-related professions). So, what are the distinguishing features of a "research university"?

A starting point is the predominance of research within the institutional mission; hence, the use of terms such as "research-intensive" or "research-led". This does not mean that the institution is not committed to teaching and learning or to the social and community role of universities; rather, it means that the nature and content of these other activities are shaped by their research base. Further characteristics include the existence of pure or "mode one" research alongside applied or "mode two" research and some idea of disciplinary breadth. Thus, the League of European Research Universities asserts that:

> "Basic research ... creates the new knowledge that is the ultimate source of most innovation in the economy, society and culture; and provides a framework for an education through which the scepticism, creativity and high level capability that society needs are embodied in people."
>
> "Research-intensive universities that couple world class research and education provide the most efficient means of providing this combination of basic research and research-based education."
>
> "Research universities uniquely have the disciplinary breadth perennially to re-configure their research efforts to address research needs and opportunities. Basic research should flourish alongside strategic and applied research and professional practice."
>
> (LERU, 2004)

Arguably, the concept of a "research university" is best developed in the United States. Here the *Carnegie Classifications of Institutions of Higher Education* offers two definitions:

> "Doctoral/Research Universities – Extensive: These institutions typically offer a wide range of baccalaureate programmes, and they are committed to graduate education through the doctorate. During the period studied, they awarded fifty or more doctoral degrees per year across at least fifteen disciplines.
>
> Doctoral/Research Universities – Intensive: These institutions typically offer a wide range of baccalaureate programmes, and they are committed to graduate education through the doctorate. During the period studied, they awarded at least ten doctoral degrees per year across three or more disciplines, or at least twenty doctoral degrees per year overall."
>
> (Carnegie Foundation, 2001)

Another characteristic of leading research intensive universities is the concentration of income from industry and commerce. Whilst such income is less influenced by reputation and brand, there is a high correlation between income and other measures of research esteem (Shattock, 2003, pp. 134-135).

To summarise, the following are some of the key characteristics of leading research universities:

- Presence of pure **and** applied research.
- Delivery of research-led teaching.
- Breadth of academic disciplines.
- High proportion of postgraduate research programmes.
- High levels of external income.
- An international perspective.

Management of research-intensive universities

To date, no attempt has been made to assess the management of research in research-intensive universities. It is important, however, to refer to some related studies that offer some clues; some of these studies cover types of university that overlap with research universities.

An important starting point is the work of Burton Clark, both on research universities and on entrepreneurial universities. Clark famously identified five management pathways towards the establishment of entrepreneurial universities (Clark, 1998):

- The strengthened steering core.
- The expanded developmental periphery.

- The diversified funding base.
- The stimulated academic heartland.
- The integrated entrepreneurial culture.

Underlying Clark's argument is the promotion of "self-directed" autonomy, variously referred to as the "stand-up" university or the "self-reliant" university. Research universities and entrepreneurial universities are not necessarily one and the same thing, but there may be some common elements in their management.

Similarly, Shattock has analysed the characteristics of "successful" universities. The following are among the main findings:

> "That managing universities is a holistic process; the functions of a university are closely interlocked and mutually dependent so that a weakness in one function can affect others and strengths in key functions can be mutually reinforcing; recognising the integrated nature of university management is a key to success.
>
> That the maintenance of financial stability is an important component in achieving academic success, but this can only be attained in the modern period from a diversified funding base in which the state does not provide the major proportion of the income; to manage this, financial literacy must be widely distributed and a degree of fiscal puritanism should be encouraged.
>
> That collegiality is a more effective management tool for success in the core business of teaching and research, thus managerial direction.
>
> That academic departments represent the essential building blocks of a successful university and that structures which relate departments directly to the centre of the university, without intermediary layers, provide shorter lines of communication and speedier decision making.
>
> That the character and composition of a 'strengthened central steering core' will be one of the determinants of institutional success; leadership is essential but distributed, rather than charismatic and personal, leadership will be the most likely to produce sustainable high institutional performance.
>
> That good governance makes a positive contribution to institutional success when the lay element in governance, the executive and the academic community work closely together; on the other hand progress will be inhibited if one of these elements becomes over dominant."
>
> (Shattock, 2003, p. 176)

Again, "research universities" and "successful universities" are not necessarily one and the same thing; indeed, Shattock himself refers to the

possibility of success being defined on the basis of student-related measures. However, there is likely to be significant overlap and it is important to consider whether these same characteristics appear among research universities.

Looking specifically at the management of research, Bland and Ruffin (1992, p. 385) have identified twelve characteristics of a productive research environment:

- Clear goals that serve a co-ordinating function.
- Research emphasis.
- Distinctive research culture.
- Positive group climate.
- Assertive, participative governance.
- Decentralised organisation.
- Frequent communication.
- Accessible resources (particularly human resources).
- Sufficient size, age and diversity of the research group.
- Appropriate rewards.
- Concentration on recruitment and selection.
- Leadership with research expertise and skill in both initiating appropriate organisational structures and using participatory management practice.

In 2002, Di Sarli (p. 11) identified the following good practice at institution level in the management of research:

- Clear definition of the mission of the university.
- Definition of priorities in research fields.
- Definition of policies to balance fundamental and applied research.
- Definition of policies to support local development.
- Definition of policies of social accountability and operational transparency in the use of public and private funding.

Bushaway defines institutional research management as:

> "The duties and responsibilities commensurate with the successful implementation of the research strategy and its daily operational implications, the control and co-ordination of specific research projects, their quality and related tasks of sponsor management" (Bushaway, 2003, p. 142).

His book sets out many different levels of activity, at institutional level and at the level of departments or schools. However, his work offers a practical guide to research management in general rather than an analysis of the key characteristics of research-intensive universities.

Finally, the OECD has made an important contribution to the understanding of research management in the project, led by Helen Connell, to analyse institutional responses to challenges arising from the implications of the changing education environment in research management. The conclusions (Connell, 2004, pp. 55-57) highlight three key areas of activity:

- Specialisation and professionalisation of research management, including the appointment of both academic and administrative staff to specific research management positions and upgrading the capabilities of staff throughout the institution to manage better research activities.
- Strategic research planning on an institution-wide basis, including the establishment of research priorities and development of an institutional research plan, allocation of resources for research, evaluation of research quality, both internally and externally, creating an ethical framework for institutional research and decisions how far to commercialise institutional research.
- An emphasis on the research career as an institutional responsibility, including graduate career training programmes, support mechanisms for early career development, continuing staff development, developing a research orientation in research-poor institutions and the fostering of interdisciplinary career patterns.

These conclusions are clearly directly relevant to the management of research in research-intensive universities. However, the OECD study, like that of Di Sarli, covers a wide range of types of university, including those without a strong research record, and is not specifically focussed on research universities and their particular characteristics.

Research project

In order to investigate the management of research in research-intensive universities, a series of interviews was undertaken in six prominent research universities: one from Canada (University A), one from the United States (University B), two from the United Kingdom (Universities C and D) and two from Australia (Universities E and F). Selection was on the basis of outstanding performance in published indicators (publications, income), reputation and comparative standing ("league tables") and institutional commitment to research (mission). Interviews were undertaken in 2004 and 2005 and included Vice-Chancellors/Presidents/Rectors, other senior staff (*e.g.* Vice-President, Heads of Research Offices), and academic staff. All six would be immediately recognisable as among the leading research-led universities in the world.

In the rest of this article, some of the main findings from this research are discussed, leading to the identification of some common characteristics of research management in research-intensive universities.

Management philosophy

The difficulties and contradictions involved in attempting to manage research have already been identified, and were certainly experienced by all six research universities. Several interviewees made a point of emphasising that they did not attempt "to manage" research. In University B, for example, a senior officer asserted that: "We do not and cannot manage research. We appoint the best people and then let them get on with it" (University B).

Universities A, E and F, all expressed similar views. However, in discussion, it rapidly became clear that, in practice, research was managed; the assertion represented in part a confusion between research management and academic freedom and in part a rejection of an over-managerial approach that would be alien in an academic culture. In reality, it was not the case that research was outside the realms of institutional management. Indeed, the reverse was true; research was of such importance to the institution that it permeated all aspects of management. The key point was one of management style: encouraging, supporting and monitoring, but not, except in certain circumstances, directing and controlling.

The two UK universities in the study took a rather different view. Both institutions shared the basic concerns about research management. However, their management style was more openly proactive. This reflected the external environment within which they operated and, in particular, the existence of the Research Assessment Exercise (RAE), which influenced core Government funding for research. The RAE dominated the thinking of both UK universities, not only because of its direct impact on funding, but also because of its wider consequences for institutional and subject area status (with knock-on effects on student recruitment and staff recruitment and retention). A senior officer in University C commented:

> "The management of research should be about more than the RAE. Sadly, we have become obsessed with the RAE. When it started, the RAE forced us to develop our research management – we needed to change. But now the tail is wagging the dog."

The two British universities differed in another respect. Both universities expressed a need to justify their research activity in what was regarded as a hostile external environment; to defend their emphasis on research to Government, to industry and employers, to students and to other stakeholders. This resulted in a more interventionist approach to management.

All six universities recognised the presence of Boyer's four areas of scholarship:

- The scholarship of discovery research.
- The scholarship of integration, including the writing of textbooks.

- The scholarship of service, including the practical application of knowledge.
- The scholarship of teaching.

However, it was equally clear that all six research universities placed a particular emphasis and value on the first of these scholarships: "discovery research." In each case, it was argued that it was this "original" research, "the creation of new knowledge", that was at the heart of the institution and provided the vital lifeblood that sustained all other activities and forms of scholarship. This, in turn, influenced approaches to resource allocation, performance management and human resource management, and was seen as a distinguishing feature of a "true" research university.

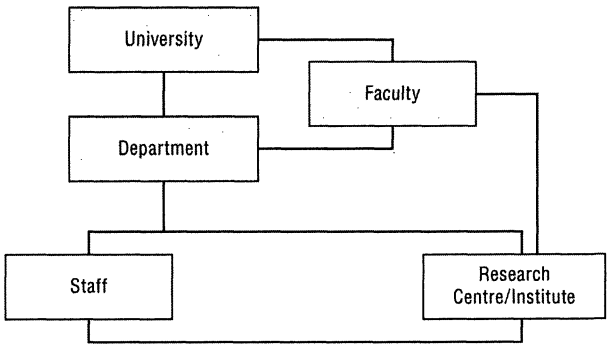
Another characteristic was a commitment to institutional growth, including expansion in the range of activities and the size of the institution. With growth, came additional resources and influence, including the capacity to recruit more active researchers. Possible adverse effects of growth on the quality of activity were recognised, but were seen as an issue to be managed, not as a reason not to expand further.

Taking the six universities as a group, the importance of management of research was clear. There was, in reality, no question of "*laissez faire*". The key difference was one of approach, passive management or active management, which in turn was largely the result of differences in the external working environment. Both forms of management provide for support and encouragement of research and for scrutiny of performance. Passive management tends to rely on external, market forces for the emergence, retention and eventual decline of research activities and research groups; new groups appear when they identify and exploit new gaps in the research market. They are heavily dependent on external funding and therefore rise and fall by their own efforts. The University can help and support, and will do everything possible to create an effective working environment, but, in the end, researchers must survive through their own efforts, reflecting the quality and relevance of their research. By contrast, active management involves both support and encouragement with the direct identification of research to be developed and the allocation of resources to sustain these decisions. How these decisions are reached, whether it should be at institutional level or within academic units, may vary, but it represents an attempt to anticipate and moderate the effects of the research market and to develop a balanced research portfolio across the institution. Both models aspire to encourage the initiative and drive of individual researchers and both models aim to release the drive and imagination of talented, ambitious members of staff; the difference relates to the working framework and to levels of management interaction within the institution.

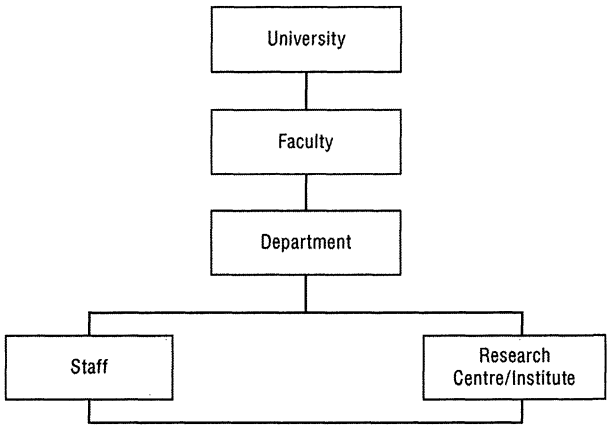
Organisational structures

The management and encouragement of research is a prime determinant of organisational structures in all six research universities. There is no single model. Traditionally, the academic department has been seen as the main organisational unit for the delivery of research, providing an organisational administrative, cultural and intellectual home for both individual members of the academic staff or for research groups. For Universities B and F, the department remains the primary organisational unit, based on separate academic disciplines (*e.g.* Department of Politics or Department of Civil Engineering). However, the managerial function varies.

University "B"



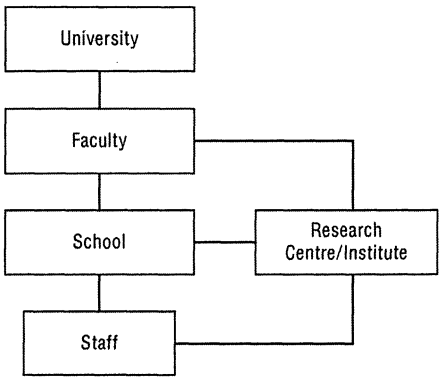
University "F"



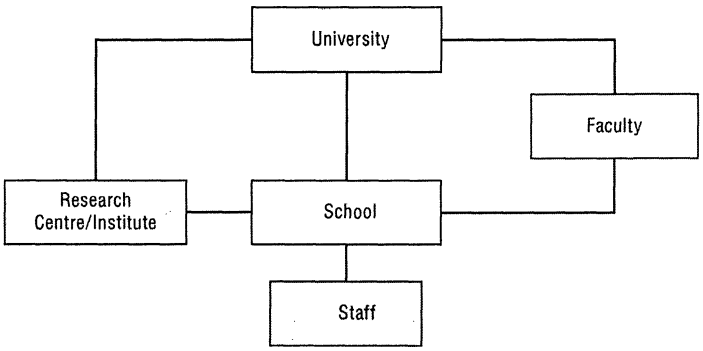
In University B, the Department has a dominant role in research strategy, funding, management and quality assurance; the main reporting line is to central university management. In University F, the faculty has a more direct involvement in research management, with an active role in strategy resource allocation and human resource management.

Universities A, C, D and E have very different structures based on "schools" rather than departments. A school represents a larger organisational unit, often bringing together a group of related disciplines (*e.g.* School of Humanities or School of Engineering). Again, there may or may not be an intermediate level of management at Faculty level. Within schools, staff may be clustered by research groups. Existing alongside or within the schools may be research centres or research institutes.

Universities "A" and "C"



Universities "D" and "E"



The constitutional position of research centres or institutes, the focus of research activity, had exercised all six universities, especially in terms of their relationship with schools or departments. Did they have some separate identity? How were they funded? How were issues of line management resolved? Again, the answers varied. In some cases, research centres had an independent, quasi-departmental status (University D); in other cases, the Centres existed within departments. The key point from all the universities was that any managerial tensions had been identified and resolved; ongoing uncertainty led to research inefficiency.

The six universities therefore show four different models of organisation. In each case, the university argues that the structure reflects the needs of effective research management. There is clearly not a right or wrong model! Organisation must reflect local circumstances, especially institutional culture and history, and the range of disciplines. However, the interviewees present a common set of requirements from which they reached their different answers:

- **Speed of response** – the ability to reach decisions quickly in order to react rapidly to external opportunities. All the institutions stressed the need to be "quick on your feet". This required short lines of decision-making and a minimisation of formal committee structures.
- **Flexibility** – the potential to reconfigure and restructure resources (including academic staff) without disproportionate disruption. This included the creation and dissolution of new research centres as needed, reflecting external demand and changes within academic disciplines (emergence of new subject areas and the decline of others).
- **Critical mass** – the size of an organisational unit. Senior officers in all six universities regularly referred to the importance of size, both in terms of operational efficiency (spreading the cost of research management and reducing duplication of support services) and in terms of academic vitality (stimulating interaction between the maximum number of colleagues and enhancing the research experience for staff and research students). Across all six universities, there was a unanimous view that the small academic department was no longer sustainable as a primary organisational unit for research in a research intensive university. There was also a common view that research now required group organisation. Whilst the individual researcher could survive in certain subject areas, they should still be integrated within wider subject based groups or clusters.
- **Interdisciplinary research** – The six universities shared a common view that much of the most important research now occurred at the interface between traditional academic disciplines. The need to encourage and facilitate interdisciplinary research was therefore a prime determinant of

organisational structure. In University D, for example, a key part of the rationale for moving from a departmental structure to larger schools was the desire to encourage interdisciplinary research.

- **Devolved responsibilities –** All six universities argued that a high level of devolution in management encouraged both initiative and innovation and quicker and more informed decision making. This did not negate the overall institutional responsibilities for broad strategy and achievement, but was essential if researchers were to have the freedom to work with the minimul of bureaucratic interference and distraction.
- **Strong Leadership** – The research universities were characterised by a combination of powerful, visionary leadership, with a firm, unwavering commitment to the research-led mission, and devolved operational responsibility. Strong leadership was taken to include consistency of purpose, strategic vision and an ability to take difficult decisions. Such leadership should exist both at the head of the university as a whole, but was also necessary within academic departments and schools.
- **Effective management** – Throughout the interviews with senior officers and with academic staff, there was an emphasis on good communications and effective sharing of information. Opportunities to participate in management and decision-making were important. This sense of involvement and inclusiveness was common across all six universities. At the same time, however, there was an equally strong view that "managers should be allowed to manage" and that researchers should not get involved with the minutiae of university or school/department management. Underlying these comments was a view shared across all six universities, that collegial models of management were no longer the most appropriate for the modern research university. Provided that opportunities were retained to provide for a sense of involvement and, most important, for academic interaction, managers (both academic and non-academic) should be free to manage, subject to accountability. Thus, in the research university, academic staff were increasingly (and voluntarily) being spared some of the administrative load previously associated with an academic position (*e.g.* committee work, admissions, financial management).
- **Co-ordination** – Each of the research universities studied had a senior officer with overall responsibility for research, normally a Vice-President (Research) or Pro-Vice-Chancellor (Research). In practice, their role varied widely. At University F, the position was mainly concerned with overall co-ordination and policy; "a champion for research within the University", but with little direct role in strategy or resource allocation. By contrast, in University E, the post-holder had direct control over significant resources, which was used to encourage new research initiatives; in this case, the

incumbent was also very proactive in initiating the review and scrutiny of research at departmental level. The importance of an institutional leader is clear, both as a figurehead, but also to provide overall direction.

Research support offices

The research universities placed a strong emphasis on creating a helpful working environment within which research is conducted. To this end, all six institutions had research support offices. The precise activities varied between institutions, but normally included:

- Co-ordination of overall university strategy in research. Interestingly, the extent to which the staff in these offices were actually involved in forming the strategy varied; commonly, this was left to other senior officers and those involved in academic planning.
- Information and advice – provision of information about funding opportunities. All six institutions emphasised that this was a proactive function, actively seeking out funding opportunities and giving specific targeted guidance on research priorities and application procedures. There were frequent references to the need to be "in the know" or "on the inside track", to be aware of new research initiatives before they were known to others.
- Assistance and direction of costing and pricing procedures. These offices undertook the detailed costing of research proposals; in particular, they had a specific role in the recovery of indirect costs. Increasingly, in a market-based, competitive world, they were also involved in pricing, as distinct from costing, of research.
- Co-ordination of major research initiatives.
- Advice regarding legal and ethical aspects of research, and about intellectual property, including implementation of university regulations. This could involve an active role in the negotiation of research grants and contracts. Each of the universities also possessed specialists in the exploitation of research and "technology transfer", including legal specialists working on patents, licences and development of university companies.
- Development of a code of practice on the conduct of good research (record keeping, data preservation); avoidance of plagiarism.

Much of the work undertaken by these units was advisory in nature. However, in universities A, C and E, academic staff wishing to apply for funding were required to submit proposals through the research support office. Such compulsion sometimes caused resentment, but was seen as essential in order to avoid or control financial loss on grants and contracts, to ensure appropriate quality assurance and to provide consistency and co-

ordination (reference was made, for example, to avoiding different approaches being made to the same funding body).

A further important aspect of the work of the offices in Universities A, E and F, was the use of "professional application writers" who would work with academic staff in the development of new proposals.

All six universities stressed the professionalisation of their research support services, able to ease the administrative burden for academic staff, but also able to investigate new research developments. The importance of networking was regularly mentioned, especially in competition for research funding. Equally important was the need to be helpful, constructive advice; to be a friend and a *de facto* member of the research team, not merely a regulator and enforcer of the rulebook. To this end, all six universities employed staff with personal experience of research in their research support offices.

Resource allocation procedures

The detailed resource allocation procedures adopted varied between the universities, reflecting differences in national arrangements for the funding of research. Most were income-based with devolved financial responsibility. In particular, the need for departments or schools to have the freedom to manage resources to enhance their research was regularly emphasised. However, the interviews revealed a number of common principles that may be applied to research universities:

- **Incentives** – All six universities recognised the importance of providing financial incentives to departments and schools, and to individual members of staff, in the pursuit of their research. Such incentives often related to the proportion of indirect costs retained by grant holders or their departments. Alternatives included the use of premium weightings for postgraduate research students and the relaxation of central costs once certain levels of external income were attained. University E operated a more centralised system where funds were retained at university level and then reallocated to reward success in publications and/or grant income.
- **Diversity of Funding** – The research universities share a number of financial characteristics, but a key factor is diversity of funding sources. Five of the six universities studied are "public institutions"; the sixth is a "private, not-for-profit" institution. However, all six show a mix of funding from Government and private sources, from industry; from charities, from home and from overseas. All six demonstrate a range of other income generating activities, from endowments and gifts to university run businesses and the exploitation of university buildings and estates. All six are highly adept in their financial management. Diversity of funding provides additional resources for investment in research and helps to offer

continuity in research support; it helps the institution to plan its own future without undue dependence on single and often erratic funding sources. Much research income is "in and out", to be spent on a particular grant or contract, but diversity offers the availability of "free" money to be used by the institution as it wishes. Such freedom is often essential in developing new research activities without an established record of income generation. The same argument underpins the retention of core Government funding for research, a point emphasised in particular by the UK and Australian universities studied.

- **Risk acceptance** – Linked with the availability of "free" funds is an acceptance of the need to take risks. This might include the decision to invest in new areas of research, new facilities or new staff, or the decision to retain an area of activity that is underperforming against a clear development strategy. Risk must be managed and considered carefully, but senior officers in several universities (Universities A, D, E and F in particular) all stressed the previous investments in "risky" or speculative research developments that had paid off handsomely in terms of subsequent research achievement. Formal risk management procedures were in place in five of the six universities studied.
- **Investment funds** – All six universities operated devolved financial systems, but they also maintained some central development funds, either by "top slicing" or by internal taxation. Such funds were used especially to develop new areas of research. Commonly, they were also used for "opportunistic" expenditure (*e.g.* to assist with additional recruitment of leading researchers). The universities concerned all assessed such expenditure very carefully, alongside formal business plans. The key point is clear: the ability to invest in new activities, thereby maintaining the essential vitality of research in the institution, in the long term.
- **Awareness of cost**: A feature of the financial management of all six research universities was a deep awareness of cost among all those involved in management and delivery of research. In particular, the need to cover indirect costs was regularly emphasised; if full costs could not be covered, this had to be undertaken knowingly and in full knowledge of the consequent shortfall. In most cases, this current awareness, which clearly formed a high management priority, represented the outcome of previous or continuing under-funding of research by external funding bodies, a trend with which the universities had themselves been complicit. Across all six universities there was recognition that such under-funding could not be sustained in the long-term. Both UK universities, for example, pointed to the outcome of the recent Transparency Review as highly significant in shaping the present financial management of research. This Review, which highlighted serious under-funding of research, supported by cross-subsidisation from teaching and

from other areas of activity, has led to a new appreciation of the full costs of research by UK universities and funding bodies. Awareness of cost is therefore a feature of research management in the research universities. Each institution emphasised the need to create such awareness and to avoid the temptation to undertake work "on the cheap", despite pressures, often from academic staff themselves, to the contrary.

All six research universities in this study would be regarded as "wealthy" institutions. This can cause resentment among aspiring research universities and there is ample evidence from these institutions that resources are deployed to strengthen their position still further. These universities can invest in new facilities and can attract the "best" staff, often by recruitment from other institutions, thereby maintaining their research pre-eminence at the expense of others. However, all six universities also exercised good stewardship and prudence in their management of resources in support of research; their ongoing research success shows what can be achieved through effective management. This is a lively debate, especially in the United Kingdom and Australia, where there are continuing moves to concentrate research in a smaller number of institutions. The counter view is that research would be advanced by a more equal distribution of funding and of the opportunities for research that are thereby created. For the purposes of this paper, it is sufficient to note that among the characteristics of the research universities are the presence of significant resources *per se*, but also financial stability and skilled, professional management.

Research plans

The OECD study of research management places a strong emphasis on formal planning procedures leading to the preparation of an institutional research strategy (including reference to research priorities and resource allocation). However, the approach of the six research universities was much less convincing. Universities B and E had no formal, institutional research plan; universities C, D and F had plans but were openly sceptical about their value as either strategic or operational documents. The prevailing view was best summarised by University A where a senior officer commented as follows:

> "A general research plan is no use. To produce a plan with more specific targets is inappropriate because the situation is changing all the time. Research changes so much and so rapidly that a detailed plan would be too restrictive; we would have to change it day to day. Sometimes we have to produce a plan to meet the requirements of external funding bodies; we just prepare something meet their needs... In research management, you must be able to respond to new opportunities and new ideas; formal planning is no use."

University C had a research strategy, but this had not been updated for a number of years. Academic schools were expected to plan their research and this was monitored within the University. University D had an institutional research strategy, but this was regarded as a "very bland" document, of some value as an external statement of the University's research commitment and strength, but of limited value as a management tool.

Institutional research plans therefore play little role in the management of research in these universities. Here, there is a key difference from other institutions or aspiring research universities where difficult decisions have to be made about the weight to be applied to research relative to other activities and about particular areas to be developed. In the research universities, research underpins all areas of activity; every academic unit is expected to be active in research. There is no need, other than for presentational reasons, to maintain an institutional strategy; the emphasis of planning lies in the academic units, as the main points of delivery.

Linked with this scepticism about the value of plans is an even stronger concern about the value of "research committees". All six universities reported that such committees, whilst there was a superficial attraction given the commitment to research of the institution, often struggled to find a clear role or to exert any real influence.

Performance management

Whilst the research universities preferred not to engage in active institutional planning of research, this most definitely did not mean that the research performance of academic units was overlooked. In all six research universities, a high performance culture pervaded all the levels of management involved with research. Senior managers, including the Vice-Chancellor/President and Deputies responsible for research, middle managers, including Deans, and Heads of Department/School and Heads of research groups, were all intimately aware of both institutional performance relative to peer group competitors and over time, and the performance of individual departments and schools; indeed, the performance culture extended to the level of individual members of staff.

Universities spoke openly about their use of performance indicators. University E used a detailed set of statistics covering seven other Australian universities, broken down by academic subject area, and was now developing international benchmarking. University D also used a set of national indicators and had developed a set of internal management tools based on output targets agreed with individual Heads of School. In this example, Heads of School had been asked to specify the measures necessary for international status in their particular subject area (*e.g.* number of papers in specific named

journals or level of peer reviewed grant income); in this way, the University had successfully reflected difficulty in research practice between disciplines.

In each of the universities, detailed information on performance was openly available and circulated within the institution, thereby encouraging a further level of peer pressure; under-performance in one subject area would be known to colleagues elsewhere in the institution. University A referred to this as "managed internal peer pressure". Moreover, all six universities openly used information about the performance of individual members of staff.

Among the key performance indicators used in the research universities were the following:

Input measures:
- Research income (by source)
- Numbers of research students
- Numbers of research staff
- Numbers and percentage of research-active staff (especially in the United Kingdom)
- Applications for research funding (by whom, to what sources)
- Success rates in applications

Output measures:
- Numbers of publications (by outlet *e.g.* peer reviewed journals)
- Citations*
- Completed research student theses
- Applications of research (patents, licences)
- Academic distinctions (editorships, special awards)

There is no doubt that the open, regular use of performance indicators and targets was deeply embedded in the research universities. It was striking from the interviews how well informed were managers at all levels about research performance of academic units and individual members of staff. This approach was important in fostering an intensely competitive ethos, both internally and externally. Performance indicators were also used to highlight under-performance. Responsibility for resolving under-performance of academic staff normally rested naturally with Heads of Department or Schools. Many managers interviewed were clear that life could be "very uncomfortable" for such staff; initial responses included increased teaching and/or administration, but more often than not there would be questions raised about the individual's position in the university.

Another form of performance management used in most of the universities studied was external peer review. For example, University C had a particular department that was thought to be under-performing over a long

* The use of citations was recognised as controversial in all six universities. At the same time, all six actively used such analysis, arguing that this was valid for particular subject areas and if used alongside other forms of analysis.

period. External advice was sought, including a visit and detailed discussions with all staff, regarding whether the department should be retained or closed; the former course of action was agreed and the external advisers then became consultants in the restructuring that was executed. More generally, all six universities regularly used external reviewers to comment on research achievements. There are a number of key elements, therefore, that distinguish the research universities:

- Constant, regular and rigorous self-assessment.
- Systematic benchmarking against competitor institutions, both at home and international.
- Open, systematic use of performance indicators.
- Use of external peer review, both for information gathering and as change agents.
- Explicit, deliberate promotion of a competitive culture.
- An acceptance that under-performance, once identified, must be resolved, either by remedial or corrective action or, if necessary, by the termination of activity.
- This is not to say that such characteristics are unique to the research universities; far from it. However, they are clearly important factors in the enduring success of these six universities over many years.

Human resource management

The quality of individual researchers is of paramount importance for the research universities. All six universities placed a strong emphasis on human resource development. This took various forms:

- **Staff appointments –** Recruitment policies in the research universities were highly selective, with a strong emphasis on research achievement and potential. University B stressed the need to establish an international reputation in research before full appointments could be confirmed. This was regarded as a very tough process; academic staff unable to meet the required standards frequently moved on before a final decision was made. Other universities also placed an increasing emphasis on the importance of rigorous probationary procedures. In the process of initial appointment, the research universities all openly targeted key individuals, often waiting some length of time in order to secure the right appointment. Similarly, for senior appointments, the use of advertising was seen as a formal requirement rather than an effective process; most appointments were by formal or informal "headhunting", intended to ensure that the universities secured outstanding individuals who would "fit" the research profile required. Commonly, this also meant the recruitment of whole research

teams, not just a single appointment. The research universities were also very willing to devise attractive packages of remuneration and other benefits to secure the right appointments, often including major infrastructure investments in addition to salary. A final characteristic mentioned by all the universities was the fact that they were seeking to make the best appointments in an international market; to this end, universities in North America, the United Kingdom and Australia were searching the world for the best researchers.

- **Staff development –** The research universities all had well established programmes of staff development linked to research, including guidance in the preparation of research proposals, project management, postgraduate supervision and writing papers for publication. Most of the universities also used mentoring schemes, linking younger staff with experienced researchers; in one university, some concern was expressed about the implied patronage, which could disadvantage some staff. Research performance was regularly assessed in staff appraisals and all the universities made use of agreed targets for annual research outputs. Reward mechanisms were also geared strongly to reflect research performance, including salary reviews and promotion; the use of accelerated promotion schemes was commonplace in order to ensure that universities retained outstanding researchers. Academic staff were also supported by funding for travel and conference attendance and by regular periods of study leave for intensive periods of research or writing.
- **Conditions of employment.** None of the six universities used contracts of employment that specified hours of work or time to be committed to research. Staff were expected to work the hours necessary to achieve the desired outcomes. All the institutions recognised that staff worked long, often excessive, hours on their research.

Human resource management in the research universities reflected both the crucial importance of the individual member of staff in the generation of original research and the fiercely competitive world in which the institutions were operating. Strategies were developed to recruit the best researchers and to retain the best researchers; each university was acutely aware that they could lose "star" researchers to other institutions at any time. Outstanding researchers were commonly targeted at a very early age and "groomed" before making full appointments. Salaries and benefits were obviously important, but all the universities were also conscious of non-material benefits. University A, for example, argued strongly that attractive, well designed buildings, in fine, landscaped grounds and excellent staff social facilities were vital in creating a working environment that would help to retain key staff.

Teaching and research

A final, and possibly surprising, area that characterised the research universities was the emphasis placed in management upon teaching as well as research. All six institutions emphasised their role in teaching students, undergraduates as well as postgraduates, alongside research; none of the interviewees favoured "research-only" approaches. In University C, new course programmes were required to demonstrate the integration of research within teaching. In University D, a senior officer contrasted the vitality of university research with the narrow view of either Government research units or industrial research and development groups; he was an engineer, and had worked in all three, and he was totally convinced that the need to teach compelled academic staff to take an overview of their subject areas, to retain a "freshness" of approach and to respond to unexpected questions, all of which directly benefited their research. Similar views were expressed in all six universities. In University A, academic staff referred to the "inspiration" provided for younger students by working alongside active researchers; research also provided "state of the art" facilities, especially in science and engineering, which would otherwise be unavailable for undergraduate students to experience. Underlying these comments in all six universities was a strong philosophical commitment to the integration of teaching and research in the institution to the mutual benefit of both activities.

The link between teaching and research was part of the core management philosophy of the research universities. However, the interviews also revealed some uncertainty about how this approach should be turned into practice. Large areas of management were concerned with either teaching or research (*e.g.* the positions of Vice-President Research and Vice-President Teaching and Learning, the allocation of separate funding steams for teaching and research, the separate monitoring of teaching and research). The response was to allow individual members of staff the freedom to pursue their teaching and research, drawing the two strands together in different ways, at different stages as appropriate for the work in question. This approach required a level of self-confidence and self-belief within the institution that was a feature of management style within the research universities.

Conclusions

This study has revealed much about the management of research-intensive universities. It must be stressed that there is no "right" way to manage these institutions; good management must reflect institutional culture, local and national circumstances and many other contextual factors. It is also important to recognise that this paper has considered six well established research universities; different models with different approaches

may be required in less research intensive or aspiring research universities. In particular, the need for planning and highly selective resource allocation may be more important in the developing research university. The universities in this study apply such principles, at the margin, in making new investments, but there is an underlying assumption that all academic staff and all academic units are undertaking high level research; competitive prioritisation within the institution is less of an issue and the main competitive focus is external.

There are, however, some common characteristics that seem to link the research universities.

Beliefs and values

- Commitment to academic freedom (ability of academic staff to pursue interests, subject to the law and ethical constraints).
- The need to innovate as institutions, including new subject areas and new structures (the flexible organisation).
- Ambition (the desire to be "the best"; constant improvement).
- The need to encourage individual initiative (a supportive environment).
- A willingness to change and to appreciate external circumstances, but not necessarily be driven by them (the reactive organisation).
- The pursuit of excellence in research and in the support of research.
- The importance of competition, within the institution and with other institutions.
- A shared commitment within the institution (the corporate organisation).
- The need for risk-taking, informed and managed (the enterprising organisation).
- The importance of performance assessment (over time and comparative) as an instrument for institutional and individual development.
- The importance of incentives and rewards (financial and non-financial) for academic units and for individuals (the rewarding organisation).
- Celebration of success (the appreciative organisation).
- Stability of mission and purpose; consistency of objectives.
- Belief in the value of strong leadership at all levels within the organisation; and conversely; recognition of the problems associated with poor or weak leadership.
- Institutional self-confidence; a desire to shape its own future, free from dependence on Government and other bodies, commonly based on a degree of financial independence.

- Trust and respect for management, allowing managers to manage and researchers to research in an atmosphere of mutual support, consultation and constructive interaction rather than suspicion and interference.
- Minimal bureaucratic constraints, to encourage responsibility, speed of reaction and reduced overheads on staff.
- An environment of openness and accountability.
- Recognition that research underpins a breadth of activity.

Practice

- Support structures to manage overall strategies and to provide practical assistance.
- Emphasis on research in resource allocation (staffing and non-staff resources).
- Regular use of performance indicators and targets.
- Use of devolved decision making and responsibilities to provide for speed and response and informed resource allocation, but subject to accountability.
- Large organisational units, to spread management overheads and to encourage inter-disciplinary collaboration.
- Pro-active human resource management and staff development.
- Selectivity in resource allocation.
- Financial prudence; awareness of the full costs of research (including opportunity costs).
- Income based funding arrangements (to encourage self-reliance among academic units and to provide incentives), but also the retention of central university-level investment funds.
- Minimal committee structures; short decision-making chains.
- Scale of organisation; a commitment to growth and expansion (which brings with it resource, status, influence and opportunities).
- Research that directly influences teaching (and vice versa), and that contributes to wider social and community interaction.
- A strong international perspective (as well as, not instead of, a firm local and regional base), including international students, staff appointments and partnerships.
- Co-existence of pure and applied research.
- Active support for the wide dissemination of research and for the application of the results of research to the benefit of society.

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