Mode 2 knowledge and institutional life: Taking Gibbons on a walk through a South African university*

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Abstract. This paper examines the response of a black university in South Africa to the challenges posed by the mode 2 knowledge thesis of Michael Gibbon. The case material is based on the Faculty of Engineering at the University of Durban Westville, which in the period 1999–2000 grappled with the implications of Gibbon's thesis for knowledge, inquiry and professional identity in a proposed university-industry partnership. The author argues that entrenched institutional rules and behaviours threaten to undermine any attempt to rethink the research and practice of engineering education even when such restructuring appears to work in the best interest of students.

Introduction

Since the end of isolation, South Africa has been besieged by international trends, innovations and ideas clamouring for policy attention in the reconstruction of apartheid society. Nowhere is this phenomenon more evident than in the field of education policy. It was not surprising, therefore, to witness the ready consumption of Michael Gibbon's powerful ideas about new modes of knowledge production among a small but influential group of South African policy scholars.[1] This group of high profile scholars came to exercise a very powerful influence in making higher education policy after apartheid. Unsurprisingly, the documents of the National Commission on Higher Education (NCHE) and the subsequent White Paper on Higher Education (Education White Paper 3) and the White Paper on Science and Technology bear the unmistakeable fingerprints of Gibbons and his colleagues. These critical documents make it clear that a new mode of knowledge production is at play, and that higher education planning, programmes and funding should move in the direction of encouraging such innovative ways of producing knowledge.[2]

In the section on "Research", *Education White Paper 3* (*A Programme for the Transformation of Higher Education*), is explicit:

> …the nature of the research enterprise has undergone radical change through:
> • the development of multiple sites of research and knowledge production which are wholly or partially separated from higher education, including industrial laboratories, corporate research units, parastatals, statutory research councils, and NGOs, or through collaboration among these research organizations;
> • the impact of transdisciplinary and transinstitutional research;

• new forms of communication – the information highway – which have accelerated and widened access to data and research findings (Department of Education 1997, p. 31).[3]

The same document holds that accountability processes in research extend beyond "peer reviews" and incorporate indicators such as industrial innovation and national development needs. The research system, therefore, must

…keep abreast with the emerging global trends, especially, the development of participatory and applications-driven research addressing critical national needs which requires collaboration between knowledge producers, knowledge interpreters and knowledge managers and implementers (Department of Education 1997, pp. 31–32).

I refer to *Education White Paper 3* in some detail, not simply to demonstrate where such powerful policy ideas in higher education come from, but to inquire whether the ready acceptance of the propositions of the European scholar, Michael Gibbons, matches the realities of institutional life in South African universities.[4]

For Gibbons, knowledge carries the following features: it is transdisciplinary, problem-oriented, application-based, team-driven, multi-sited, partnership-based, socially useful, heterogeneous, quality controlled, reflective and responsive, and less hierarchical than disciplinary knowledge of the kind produced in universities (mode 1).[5] This is not to suggest, of course, that such features have only emerged in recent times; universities have engaged in such relations for a long time.[6] On the other hand, there can be little question that the spread and intensity of such relations are much more prominent in this period of globalisation, and especially in Western contexts, than ever before (Carnoy 2001).

How Gibbons describes institutional life

Universities, according to Gibbons, are insular institutions familiar with his 'mode 1' form of knowledge production. That is, universities tend to retain the conventional disciplines and their specialisations in teaching, research and curriculum. This "disciplinary structure of knowledge" translates into a specific organisational form: segmented departments remain the defining administrative units for academic work. There is little co-operation with other knowledge producers and institutions outside the academy. Furthermore, universities define who participates in this discipline-based system and how they are evaluated or accredited, and by whom (the peer-system). In his words,

This structure provides the guidelines for researchers about what the important problems are, how they should be tackled, who should tackle them, and what should be regarded as a contribution to the field. In its social dimensions, it also prescribes the rules for accrediting new researchers,

procedures for selecting new university faculty, and criteria for their advancement within academic life (Gibbons, p. 9).

In other words, a closed-system in which, until recently, universities held the monopoly in providing training, credentialing, and knowledge production.

But the same universities, argues Gibbons, are under pressure to change. *Massification* has changed the traditional client base of the university with more students demanding education and with more mature students seeking life-long learning through continuing education programmes. *International competition* has added further pressure for change, forcing universities to become more concerned about knowledge production, innovation and relevance of their activities to the external environment. The explosion in technology and information sciences have created a new skills base within the traditional university and forced changes in the curriculum. As a consequence, the arts and sciences have declined, and the 'enterprise professions' have become dominant as reflected in areas such as business, management and accountancy. These changes in the external environment has also altered the internal organisation of universities, what Gibbons (and others) call "a managerial revolution in higher education":

> … the university has moved much closer to an industrial pattern of organisation with senior management teams and strategic plans, line managers and cost centres (Gibbons, p. 24).

These changes, together with the diversification of research funding and the demand for specialist knowledge (and knowledge producers), have not only challenged the traditional university, it has brought more institutions into being in what Gibbons calls "a socially distributed knowledge production system." Suddenly, universities have become only one of many kinds of institutions involved in the knowledge production game. How should the traditional university respond?

The first implication of these challenges for universities, says Gibbons, is that they have to learn to share their resources (physical, intellectual and financial) with other kinds of knowledge producing institutions. This of course is difficult given that universities held the monopoly among knowledge producers and the need for "strategic alliances" is not always recognised in such institutions.

A second challenge for the traditional university is to persistently seek collaborative relationships with other knowledge producers. In Gibbons terms, "creating a presence for themselves in [a] range of problem contexts which facilitate the attainment of their institutional goals" (p. 42). Occasional, sporadic involvement with knowledge partners now becomes a continuing experience as the problem context changes and new needs and expertise arise.

A third challenge, according to Gibbons, is for academics to become accustomed to changes in their work environments. Being locked in the same institutional

laboratory or office no longer works. Travel and movement into and across different institutional contexts become the norm. As the "context of application" changes, so does the environment in which the academic works.

A fourth and related challenge is for institutions to begin changing the system of rewards and the traditional career paths for the mode 1 academic. Success and progression within the parameters of a particular discipline gives way to achievement and recognition in transdisciplinary contexts. Funding patterns would have to shift as well, encouraging innovation in application contexts. And the very standards of evaluation and accreditation would change to accommodate and encourage mode 2 forms of knowledge production.

A fifth implication concerns the nature of the undergraduate curriculum. Teaching the basic sciences is commonplace in universities across the world. But massification and globalisation have changed all of that, leading to new mission formulations that include:

> …discovering new knowledge, applying and testing knowledge, transmitting and diffusing knowledge, dialoguing with knowledge stockbrokers (p. 44).

The undergraduate curriculum is up for grabs, having to respond to new and applied problem contexts that cannot be addressed through single discipline contributions. Social purpose and relevance demands more than intellectual content; they require skills application in real-world contexts.

In restating Gibbon's theses, my goal is not to engage and reflect the views of his critics. Rather, taking his theses seriously, I intend to test these arguments in the single case of a South African university.

Gibbons on a walk through a South African university

I find the Gibbons argument fascinating. But does it provide an intellectual framework to describe what happens inside a South African university? Does it offer a realistic appraisal of unfolding events in and outside South African universities, events that may be too small to see clearly but nevertheless promise to unfold into this grand reorganisation of knowledge production foreseen by Michael Gibbons? In attempting to engage some of these questions, I would like to locate myself in the argument. I was an academic administrator (at the time of writing), responsible for academic matters at the University of Durban Westville (UDW) – a South African university serving disadvantaged students and bearing the indelible marks of an underdeveloped institution created by apartheid. In 1999, I had the privilege of leading the academic restructuring of this institution in response to two powerful changes in the external environment.

First, like all South African universities UDW experienced a dramatic drop in student enrolments, the immediate effect being a decline in the state subsidy to the

institution – by far the major source of revenue to the University. Fewer matriculants were graduating from high school with university-entry qualifications. More private colleges, with international roots and linkages, were offering more stable campuses and more vocationally oriented qualifications. And technikons became more popular destinations for students seeking work-related degrees and diplomas. The threat to enrolments forced a strategic rethink of what we were doing, how well we were doing it, and who were doing it to (sic)!

Second, UDW found itself responding to new legislation and policy for higher education emanating from the new government. Significantly, this legislation required greater responsiveness to community needs, increased inter-disciplinarity within and across institutions, more co-operation with regional institutions (universities and technikons), and curricula aligned with changing technological demands and economic competitiveness – all a consequence of globalisation. As mentioned earlier, this mode 2-type logic found its way into policy and legislation through disciples of Gibbons active in shaping post-apartheid higher education.

What happened?

Recognising the limitations of a single-case study, and with due recognition that the assessment focuses largely on the first 18-months of university reforms, I nevertheless wish to start by taking Gibbons to the Faculty of Engineering at UDW, a segment of the university that was a particularly strong candidate for restructuring – if not closure. On the one hand, student numbers were low, student failure rates were high (something penalised in the state subsidy formula), and staffing costs were inordinately high – in part because of salary subventions offered to professional engineers teaching in universities. The deficits were not only high (several million rands per annum), but were sustained over multiple academic years. A crisis loomed even as the university was burdened by the fact that closure would mean the end of the only historically black university offering engineering education. In searching for solutions, various university leaders stumbled on the Warwick Manufacturing Group that offered a model of engineering education showing promise within the South African context. Studied, refined and adapted to the South African context, the Morgan University Alliance took the lead in developing the so-called "Warwick Model" at UDW. The following represent critical features of this new model of engineering education:

1. The model represented a partnership between business and industry, a South African university (UDW), the Morgan University Alliance (a South African group acting as facilitator of faculty exchange programmes and university-business partnerships), the MUCIA Global Group (a partnership of several top North American Universities offering modularbased engineering and business training on demand), and the Warwick Manufacturing Group (offering technical assistance, consultancy support and accreditation). This model was recommended and supported by government, through the Offices of the Minister of Arts, Culture, Science

and Technology – providing initial consultancy support and contact with Warwick;

2. The model brought together the UDW Graduate School of Business (GSB), the Faculty of Engineering, and the Faculty of Science. The GSB's involvement came as a result of the recognition of the fact that increasingly, an engineering graduate required business skills, including financial management and marketing, to be able to function effectively in the private sector. The Faculty of Science was involved because of its interest in and gradual movement towards an applied science programme within the mainly discipline-based physics and chemistry qualifications, for example;

3. The model required that engineering education be offered strictly on the basis of a business venture between UDW and the facilitating partner, the Morgan University Alliance. This means that modules in engineering would be offered on a strict cost-recovery basis with specified profit levels. If less than the specified numbers of students were attracted, then the modules would not be offered. That is, no deficits would be accumulated; profits remained the bottom-line;

4. The model is based on complementary functions and specialisations offered by different partners in what is called "the partnership programme." The university (UDW) provides the professors who teach the modules. The Warwick alliance facilitates the travel of international consultants (Professors at USA and UK universities) to teach those modules for which local expertise is not readily available. The industrial partners provide the "live laboratory" within which engineering students (employees of the firm) "learn while they work" and "work while they learn." The university (UDW) creates a "centre of excellence" on the main campus in which cutting-edge research tailored to the emerging needs and priorities of contracted industries is conducted and fed-back into that industry. Post-graduate students thereby find a home within a university to conduct advanced and relevant research before returning to their workplaces. One such example is the already established Centre of Excellence in Rural Telecommunications, funded by ESKOM – the Electricity Supply Commission;

5. The model means that the UDW professor who could previously assume tenure for life, now has a career shaped by the availability and relevance of his or her expertise to modules influenced and shaped by the demands emerging from industry. The professor is hired on a contract basis to fulfil specific tasks on pre-designed modules; But the professor also has the option of raising funds to establish a research "centre of excellence" and to attract post-graduate students into that centre for degree purposes;

6. The model assumes (as should be evident from earlier descriptions) that the engineering students are working employees of a particular industry. These industrial partners therefore do not lose their staff to five to seven years of theory-biased training on a distant campus. Rather, the students are trained in the workplace in application contexts immediately relevant to their daily operation;

7. The model is based on intensive and ongoing negotiations between the different partners. This is expensive and inevitable. Industry has to "deliver" the students to this innovative training programme and pay the costs of such development. The university has to agree to operate an engineering programme from a distance, and the staff have to be persuaded that constant travel to and location within industry would displace the office- and campus-based tradition with which they are familiar and comfortable. Crucially, staff would have to be persuaded that short-term contracts would replace life-long tenure. Under what conditions might this happen?

I believe that "the partnership degree" as outlined above describes a strong version of mode 2 knowledge production. But did it work? To some extent it is too early to tell, since the model was to be introduced in academic year 2000, and implementation is currently underway. In the next section I wish to evaluate, albeit tentatively, the model even as it is being implemented as a way of testing the Gibbons thesis against the routines and behaviours of institutional (university) life in South Africa.

There can be little question that increasingly, South African universities are beginning to accommodate mode 2 knowledge forms within their institutional programmes. This accommodation, however, is small and uneven. At the University of Pretoria, for example, mode 2 knowledge forms thrive and expand and may well become, over the next decade, the predominant form of knowledge production. At most other universities, especially the historically black universities (HBUs) – like the rural University of the Transkei – there are at best small pockets of mode 2 knowledge forms, if at all. At UDW there are one to three mode 2 recognisable knowledge forms, but little else. A correction that must be made to the Gibbons thesis, therefore, is the highly uneven dissemination of mode 2 ideas even within the same national context. The "developing country" footnote in his main works cannot assume homogeneity given the deeply entrenched historical traditions and inequalities facing countries like South Africa. But leaving the extremes of the University of Pretoria (see Vil-Nkomo 2001) and the University of the Transkei (see Habib 2001), what does the UDW case suggest about the Gibbons thesis within institutional life?

The UDW experience suggests that the outcome of initial mode 2-type interventions is by no means clear. The underlying teleology in the Gibbons thesis is indefensible. For a simple reason: it underestimates the complex organisational and cultural arrangements that define institutional life. At UDW over the course of about 12 months the struggle to replace the mode- 1 dominant curriculum and research orientation was fiercely resisted by the majority, if not all, professors in the university. This resistance appeared to fade in the context of the business-driven logic of the Warwick model that in fact promised to erase deficits within fixed timelines and ensure the long-term viability of the Faculty of Engineering. The real threat of closure did bring the senior professors of Engineering into countless numbers of meetings to discuss and design the partnership model. Indeed, some

senior staff together with representatives from the Morgan Alliance met over many days to finetune the partnership model. But the wheels came off for the several reasons, the most important being the response of engineering academics at UDW, which could be summarised as follows:

1. The engineering academics were not prepared to abandon the four traditional disciplines (chemical, electrical, mechanical and civil engineering). They were trained and socialised within their disciplines, and any venture into transdisciplinary opportunities would be made tentatively, and in limited ways, from the security of the discipline. It became clear that many (though not all) academics simply could not comprehend, let alone buy-into, the new intellectual demands of the partnership model given their disciplinary rootedness;

2. The engineering academics claimed the sanctity and authority of the Engineering Council of South Africa (ECSA), as the agency likely to scuttle any attempts to move into the innovative engineering education model associated with the Warwick model. Now one could argue, with some legitimacy, that ECSA was simply "used" to protect disciplinary turf. But it remains clear, in fact, that ECSA's acceptance of this model was likely to constitute a major battle given the conservative tradition this institution seeks to protect. In any event, external accreditation could be achieved from international affiliates, so that in a worst-case scenario, it was unlikely that ECSA could prevent the model from being implemented;

3. The engineering academics realised that implementing this model made staff retrenchments inevitable. Operating the partnership model on strict business lines with clear profit margins meant that staff would be lost. This fact constituted the major basis for resistance of the model, even though it was seldom expressed in such explicit terms. The existing model offered protection, even though there were clear demands from within the traditional model for more cost-efficient ways of delivering engineering education;

4. The engineering academics understood that the new model required a more active role in recruiting students and funding for research centres of excellence. Their employment depended on the assumption of new roles and identities. Salaried, permanent or even long-term contract employment was now dependent on success as teacher, researcher and entrepreneur. And these centres of excellence typically required a broader integration of cross-disciplinary involvement than the "big four" fields. The new model, in short, entailed unacceptable risk in the conditions of work.

But apart from the views of engineering academics, there were other limitations imposed on this model. A point raised often within the Strategic Planning Task Team (SPTT) of the University, the body driving academic policy innovation, was the following: can the same conditions hold for UDW/South Africa as for Warwick/UK with respect to industry involvement? In other words, was the Warwick model relevant and appropriate for African conditions where national investments in science and technology are very low? Are South African industries

innovative enough to respond to such a partnership model? Are there enough industries willing to make students available in what was essentially an experimental programme? Would industry be willing to commit the scale of resources required to make this model viable on the ground? Such questions remain to be answered. At the launch of the Partnership Programme at the ESKOM Centre in Midrand, Johannesburg in 1999, there were no hard commitments made by the many "captains of industry" present even though all appeared impressed by the innovation. Now this may change, but at the time of writing (February 2000), there does not appear to be a groundswell of practical support for the idea. Our assumptions about South African industry, its needs, priorities, requirements and openness to innovation may, in fact, be misguided.

But there is another feature of institutional life that explains the weak response from academic engineers. The partnership programme was developed without any changes in the incentive and reward structures of the University of Durban Westville. While the threat of closure brought people to meetings, the traditional system of progression remained in place. The staff appointments and promotion system worked within the assumption of a fulltime, campus-based lecturer moving gradually from lecturer to professor over many years. There is no incentive for inter- or transdisciplinary research or teaching. There are no rewards for co-operative ventures or partnerships. No salary adjustments have been made to attract or reward staff who establish centres of excellence in transdisciplinary research. In other words, the entire system still favoured the traditional academic pursuing the mainstream career path established in the 1960s. In fact, to move outside of this established system is to expose yourself to risk and failure: what if your expertise as one trained in conventional disciplines was simply ignored in a market amply supplied with international academic engineers 'on-call' for module delivery at short notice by the Morgan University Alliance? Similar problems have been observed in transnational studies of university-community partnerships:

> Such efforts required to achieve institutional change are unlikely to be maintained *. . .* unless the operating norms and reward systems are altered to accommodate such activities (Marullo and Edwards 2000, p. 905).

A further concern that inhibited smooth implementation of the partnership model was the fact that it assumed the disappearance of the first-year engineering student fresh from high school. The partnership model, as initially described, was quite explicit about the fact that the engineers to be trained are full-time employees of firms to be trained within the infrastructure and resources of industry. This created a dilemma for the University since its mission is to build and expand capacity among young people denied opportunities for training and employment in the past. Moreover, the fact that young engineering students would not form part of the day-to-day life of campus was not very attractive to some key players in the university community. After all, the University had over time established a very expansive and costly infrastructure of laboratories, computer networks, office

space and equipment that would become obsolete (except for post-graduate study) with the partnership model.

Given these tensions between the traditional model and the partnership model, what happened at UDW by the end of 1999? First, the University Senate was presented with a dual model for offering engineering education. A campus-based model offered by traditional academics would co-exist with an industry-based model led by academic entrepreneurs. This dual model created considerable confusion within the University Senate, the body responsible for academic policy. The insistence by the Vice Chancellor and the University's Strategic Planning Task Team that the two budgets be consolidated within a coherent programme with two component parts was simply not possible. The more we tried to force cohesion and conversation between the two models, the
more we realised that their base assumptions about engineering education, the identity of the engineering academic, and their assumptions about students were so radically different, that the models could only exist in isolation from each other (Gibbon et al. 2001).

Consider for example the issue of student identity. Ideally, the modularised engineering curriculum could be used to teach students in both the traditional and the partnership model. This means, for example, that consultant academics from the USA or UK partners would conduct the teaching of a particular module to both groups of students at the same time. The problem is that the campus-based students would be first-time university learners without any work-experience and a mediocre high school education. Such students would need intensive academic development support and foundation modules in science and mathematics before they could productively engage high-level engineering modules. On the other hand, mature students already working and with considerable practical experience of an engineering environment would need a much more challenging curriculum building on their prior experiences. This would mean a different curriculum for two different groups of students based on very different education and employment backgrounds. In short, in the realities of South African university life, mode 2-oriented models of teaching and curriculum face serious threat from the power of existing institutional arrangements.

This raises another question about Gibbon's assumptions relating to knowledge production in mode-2 style. I am not sure that the UDW partnership model would in fact have led to the production of new knowledge which was "heterogenous" and "transdisciplinary" in Gibbonian terms. The simple fact of a partnership does not automatically translate into mode 2-style knowledge production. It might facilitate such a trend, but it may not. It seems to me that a crucial element in the mode 2 debate is the readiness and orientation of the partners to engage in new forms of knowledge production. In other words, one could in fact have a vibrant partnership in which the qualities of knowledge and knowledge production are multi-disciplinary with a simple technology-based application devoid of theoretical and non-empirical elements. Indeed, there was little evidence in the terms of the alliance between

UDW and other partners that the qualities of knowledge production was itself an issue of concern. The primary rationale for the partnership degree programme was organisational rather than epistemological:

- that the conventional education delivery platform is not meeting the technical skills requirements for industry;
- that industry is concerned about the lengthy incubation period required for graduates;
- that degree programmes are perceived as being too narrowly technical and too technically narrow – there is too much rigidity;
- that there is a large untapped human resource potential in the form of people who have worked for many years in industry;
- that a corporate university would be created with competitive advantage.[7]

The only reference to *knowledge* was the somewhat marginal observation that "knowledge changes quickly (shortening of knowledge shelf life), and that a globally competitive operation requires continuous learning" (see note #5 for reference).

Similarly, the argument that community outreach and development in itself constitutes a mode 2 form of *knowledge production*, is highly problematic. Organisational formatting or modes of delivery should not therefore be equated with or even considered pre-requisite for, mode 2-type knowledge production.

But are these constraints associated with partnership models uniquely South African or peculiar to developing countries? It is striking that recent assessments of university-industry partnerships are far more cautious, even sceptical, in parts of Europe and North America. Such caution has direct implications for the mode 2 vision as articulated by Gibbons and others. One major review of university-industry (UI) partnerships claims that

> … the status of the debate about UI relationships is one in which the university and governmental science policy advisors are uncertain as to the potential impact of such relationships for academia (Hellstrom and Jacobs 1999; see also Matlay and Hyland 1999; Burnham 1997).

Posing the question – "Are Universities Ready for Partnerships?" – Robinson and Daigle (1999) argue that partnerships tend to underestimate "institutional readiness" with respect to differences in vision, commitment, culture, risk, power and adaptability among partners. As in the UDW experience, "the greatest challenge is how to get everyone in on the act and still get some action, a serious hurdle to partnership formation" (Robinson and Daigle 1999, p. 6).

It might be worthwhile in future studies to examine more systematically the progress of such partnerships in relation to mode 2 experiences in developed nations.

Conclusion

There can be little question that mode 2-type innovations are emerging at the periphery of institutional life in South African universities. Medical schools increasingly require problem-based curricula from the moment young doctors are trained i.e., "learning in the context of application." Some Schools of Education require their preservice graduates to enter classrooms for extended periods of time in the first-year of study, rather than final (fourth) year as is the case at UDW. But such innovations are dwarfed by the *status quo*, the power and status of disciplinary science within most South African universities.

I have tried to make the argument that unless there is a radical shift in the complex of institutional arrangements that govern and underpin mode 1 knowledge production, then there is little chance that advocates of 'mode 2' will witness the kinds of changes anticipated by Gibbons and his colleagues. In this respect, it is important to distinguish Gibbons the prophet (what *might* happen in the university of the 21st century) from Gibbons the documentalist (what *is* happening in universities throughout the world, displacing mode 1 forms of knowledge production). Viewed from inside institutional life at the turn of the century, there is little evidence of a substantial shift in the ways South African universities and their counterparts produce knowledge – even though the Gibbons thesis might yet "come to pass." It remains to be seen.

Notes
1. I count among such eminent scholars persons such as Ahmed Bawa, Nico Cloete, Joe Muller, Mala Singh, Andre Kraak, George Subotsky, and others.
2. Recent policy reviews by some of the same group of Gibbonians continue to mark progress in higher education against his main theses. See Nico Cloete and Ian Bunting (2000), *Is Higher Education in South Africa Moving Towards National Transformation Goals?* Pretoria, Centre for Higher Education Transformation (January); also, Kraak (2000).
3. The full citation is Department of Education (1997), Education White Paper 3, A Programme for the Transformation of Higher Education. Pretoria, *Government Gazette*, vol. 386, no. 18207, Notice 1196 of 1997, July.
4. All references to Gibbons in this paper is taken from his Higher Education Relevance in the 21st Century, Association of Commonwealth Universities, 1998 (Final Draft). Many of the original ideas appeared earlier in Gibbons et al. (1994).
5. Transdisciplinary: drawing on multiple disciplines; crossing discipline boundaries; Problem-oriented – solves problems; generating in problem-solving contexts; Application-based – applied and generated in real-life contexts; Team-driven – draws on groups of knowledge producers; Multi-sited – team members located in different types of institutions; Partnership-based – forges joint ventures/partnerships between groups/institutions; Socially useful – has social or commercial value; heterogeneous – empirical and theoretical; cognitive/non-

cognitive elements; quality-controlled – dispersed across sites and expertise (beyond simple peer review); reflective – responsive to economic and social needs; less hierarchical – flatter structure of accountability, with transient organisations.

6. I am grateful to one of the anonymous reviewers of this paper for making this point.

7. From presentation notes on the UDW Partnership Degree Programme (A Joint Venture with Morgan University Alliance in Association with the Warwick Manufacturing Group, University ofWarwick). Provided by Dr Roy Marcus, Morgan University Alliance, 1999– 2000.

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