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Implications of  
Enterprise Resource  
Planning  
Systems for Universities:  
*An Analysis of Benefits and Risks*

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# Implications of Enterprise Resource Planning Systems for Universities: *An Analysis of Benefits and Risks*

## *Abstract*

*Enterprise Resource Planning (ERP) systems are widely used by large corporations around the world. Recently universities have turned to ERP as a means of replacing existing management and administration computer systems. This report is concerned with how ERP is contributing to the reshaping of universities, and, in turn, with how these systems are being reshaped for universities. First we provide analysis of the rollout of an ERP system and discuss what it means for the university as an 'organisation'. We argue that these systems appear to be reinforcing the establishment of a more 'corporate' form of organisation where both policy formation and policy implementation are far tighter and goals, roles, identities, abstract rules and standard operating procedures are made explicit and formalised. Then we focus on ERP as a 'generic' and 'global' solution and show how this presents universities with particular sets of issues regarding the control and shaping of their systems and ultimately their institutional and organisational autonomy. The report is based on an ongoing programme of academic research on the reshaping of universities and the role of Information & Communication Technologies (ICTs) within that reshaping process. We conducted ethnographic research over a four-year period at a large red-brick university in the UK, and at SAP, the large German ERP supplier, as well as the associated higher education 'user group'.*

## 1 Introduction

**1.1 *The Changing Context of Universities.*** British universities are reacting to rapidly changing national and international environments. These transformations now bear important consequences for the management and organisation of universities. Expansion in the 1990s has increased the number of students studying at universities by some 40% in a decade. While student numbers have increased dramatically, increases in resources have been much more modest leading to a declining per capita resource. At the same time that universities have sought to cope with expansion, and partly in reaction to the stresses that expansion has generated, there has been increasing demand from the state for accountability for public funds. The simple reporting of statistics to the central Higher Education Statistics Agency (HESA) has been augmented by an increasingly invasive set of audits. The Research Assessment Exercise (RAE) and the Quality Assurance Agency (QAA) have sought to systematically evaluate teaching and research respectively leading to the establishment of 'league tables' (whether official or otherwise). These audits directly (RAE) or indirectly (QAA) are determining to a larger and larger extent the real levels of resource in university departments. At the international scale, universities are increasingly seeking to compete for lucrative foreign (non EU) high fee students and an increasingly international labour market. In terms of international research contracts and grants, such as those from the European Commission, universities are in a much more competitive environment. To cope with these transformations there have been calls for academic institutions to operate less according to conventional structures and more as modern, flexible organisations. There is now a direct pressure on institutions to spend more effort on management and administration, for clearer roles and responsibilities, more efficient work practices, and to provide more data and information on 'relative performance'<sup>1</sup>.

**1.2 *Demands for New Management Information Systems.*** It is in this context that universities have sought to harness new information technologies, a context in which new breeds of integrated management information systems have suddenly become so very appealing. In most cases universities are not building these systems themselves, nor are they commissioning them from the many software houses who specialise in the provision of bespoke solutions but, rather, they are turning to, and preferring to modify and customise generic software systems widely used by large corporations, typically ERP systems. These systems, or so it is argued, promise to provide the capacity for universities to respond to and manage the range of pressures and tensions which characterise their current position<sup>2</sup>. Covering the fullest range of organisational activities and processes, they are said to offer the kinds of management information, flexibility, efficiency and organisational updating that is increasingly desired by universities. In this vision, the administration of the university is transformed. At the heart of the change is the provision of comprehensive information systems to support teaching and research networks. More significantly there is a shift from an administrative culture to professionally supported academic self-management. With the aid of ERP it is suggested that the university can

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<sup>1</sup> There are a number of key documents available. For instance, the 1995 document 'An Information Strategy' by the Joint Information Systems Committee. URL: [www.jisc.ac.uk/pub/infstrat/](http://www.jisc.ac.uk/pub/infstrat/). Last accessed 26th July 2000. See also the notes of the JISC workshop on harnessing the power of ICTs in higher education. URL: [www.computing.dundee.ac.uk/projects/dmag/bobby/jisc/161b.html](http://www.computing.dundee.ac.uk/projects/dmag/bobby/jisc/161b.html). Last accessed January 24th 2005.

<sup>2</sup> SAP brochure on higher education, available at URL [www.sap.com](http://www.sap.com). Last accessed 10th January 2005.

simultaneously respond to new global markets, meet the requirement of increasingly onerous national regulation and audit, and satisfy the more local demands for better and more efficient work practices. Yet, if initially seen as part of the solution to the organisational issue within universities, these systems are increasingly seen as part of the problem. Nevertheless, these claims have underpinned an expanding programme of initiatives within universities as they have sought to explore the ERP ideal.

ERP systems are fundamentally based on the notion that organisations contain common elements and through combining the various 'modules' and tailoring the various 'business process templates' an organisation can create for itself its own 'unique solution', yet still have a fully supported computer system in which each individual component is 'best of breed'. As we will see, this is not or at least not for universities, the case. The report discusses the, often difficult, experiences of implementing ERP within universities. It addresses some of the implications these systems have for organisational reshaping and autonomy. It argues that those advocating ERP typically underestimate how universities as organisations work and overestimate just what these technologies can do. First we describe some of the reasons why universities have turned to ERP as well as some of the specific features of these technologies. Second we provide analysis of the rollout of an ERP system and discuss what it means for universities as 'organisations'. We argue that these systems appear to be reinforcing the establishment of a more 'corporate' form of organisation where both policy formation and policy implementation are far tighter and goals, roles, identities, abstract rules and standard operating procedures are made explicit and formalised. In the final part we focus on ERP as 'generic' and 'global' solutions and show how this presents universities with further particular sets of issues regarding the control and shaping of their systems and ultimately their institutional and organisational autonomy.

The findings are based on a number of Economic & Social Research Council (ESRC) funded research projects on the reshaping of universities, the role of information & communication technologies (ICTs) within that reshaping process<sup>3</sup>, and on ongoing research on the development and evolution of integrated software packages<sup>4</sup>. We conducted ethnographic research over a four-year period at a large red-brick university in the UK (an institution for the purposes of this report we shall call 'Big Civic', that adopted a system we shall call 'Enterprise') and, albeit to a lesser extent, at a large ERP supplier, and the higher education 'user group' that is associated with the system.

## 2 The Turn to ERP

In this part of the report we describe some of the reasons why universities are adopting ERP, the key features of these technologies, as well as some of the problems they potentially present.

### 2.1 *There is No Choice But to Adopt?*

**Traditional Computer Systems.** The application of ERP within higher education is a notable departure from traditional computer system strategies. In order to carry out basic administrative functions institutions have typically relied on small systems which were often developed in an ad-hoc manner and maintained by in-house specialists. Sometimes such configurations were supplemented with the 'bolting on' of other packaged software purchased from software houses (but these tended to be relatively small and inconsequential, and usually remained well within the control of the technical team). This began to change in the late 1980s as a result of growing complaints about the 'fragmented' and 'amateurish' nature of in-house computing and the low quality of management information these systems provided. The 'MAC' initiative funded by the, then, University Grants Committee, was an attempt to rectify this by pooling resources so that the sector could commission 'one' high quality higher education specific system. Whilst it was adopted widely, MAC was acknowledged by most to have been an expensive 'failure'. One problem was that the systems were planned and designed just before the period of rapid changes within higher education (some of which are mentioned above) and it was thus described as embodying an 'old model' of the higher education system<sup>5</sup>. These systems are now being replaced by new generations of management information systems and, in particular, ERP solutions.

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<sup>3</sup> This report develops and builds on several years of research on ICTs and universities. Some of the earlier work is reported in Cornford, J & Pollock, N, (2003), *Putting the University Online: Information, Technology & Organisational Change*, Open University Press; see also Pollock, N & Cornford, J, (2002), *The Theory and Practice of the Virtual University: Working through the Work of Making Work Mobile*, *Minerva: A Review of Science, Learning and Policy*, 40, pp359-373.

<sup>4</sup> The findings reported in this document also stem from an ongoing research project. More information can be found at [www.homepages.ed.ac.uk/npollock/biography.htm](http://www.homepages.ed.ac.uk/npollock/biography.htm).

<sup>5</sup> For a review of the MAC system, see Pollock, N, (2000), *The Virtual University as "Accurate and Timely Information*, *Information, Communication and Society*, 4, 3, pp 349-365.

In terms of the take-up of ERP there is, as far as we know, no reliable data on how many solutions have been implemented or how many institutions are considering implementing ERP in the near future. Anecdotal evidence suggests that there has been a significant take-up, especially in the US and Australia, and a growing interest in adoption in the UK and other parts of Europe. Certainly, if software suppliers, industry analysts or the technology focused higher education policy organisations (such as the Joint Information Systems Committee (JISC) in the UK) are to be believed, institutions will have little alternative but to also adopt this form of integrated and industry standard solution.

## 2.2 The Problem

**A High Risk Strategy.** There has been much written in the computing and academic press about how ERP affords organisations new possibilities as well as new difficulties. The discussion of how universities might benefit from ERP has been somewhat more partial. Much has been said about the benefits over existing 'old fashioned' university systems, including the potential economic gains of commodified solutions, the interoperability rewards of adopting standard platforms, the benefits of tried and tested solutions, as well as the advantages of aligning with perceived industry 'best practice'. However, we would argue that ERP also represents a high risk strategy for universities, and we believe that the risks and changes associated with them also deserve greater attention. There are very few niche-specific ERP suppliers oriented to the particular needs of higher education institutions and adopters therefore have little choice but to adopt a 'generic' type of solution<sup>6</sup>. In this respect, there has been little discussion of how appropriate systems designed for and used by large multi-nationals are for universities. Nor has there been much consideration of the specific problems that institutions might find when rolling out ERP<sup>7</sup>.

**An Old Question.** The dominant presumption appears to be that because ERP has worked well in so many other settings then it will also work well within universities. This, on the one hand, appears a reasonable assumption. There are after all many similarities between universities and other organisations. To paraphrase Geoffrey Lockwood, universities as organisations face many problems common to most modern organisations, including, for instance, the problems of co-ordinating resources, controlling costs, of stimulating and facilitating enterprise among staff, and so on<sup>8</sup>. Thus, it might be argued, that since universities have problems common to a wide range of organisations, then the standard tools of contemporary organisational analysis and institutional management – including those computer systems used by large corporations around the world - can be similarly applied in universities. However, on the other hand, it is also tempting to see the university as something different or set apart from other organisations – *as a unique institution in the modern world*. Frederick Balderston, for instance, describes how historically universities grew as a type of institution that was, and still to some extent is, 'distinctive' with an autonomous place in society and the right to choose its members, decide its aims, and operate in its own way<sup>9</sup>.

**The Fallacy of the 'Universal' Solution.** Related to this, it is also increasingly recognised that information systems seldom translate easily across boundaries, whether this is between organisations within the same sector, between industrial sectors, or between public and private sector organisational forms. This is because there is often a gulf between the system and the specific contexts, practices and requirements of particular user organisations. Amongst the many issues generic packages raise, of particular concern to practitioners is the choice between conducting expensive 'customisation' work on standard solutions, or, undergoing unwanted organisational change in adapting the organisation to match the system. Whichever model is chosen it is becoming clear that the implementation of ERP in an academic environment is, to quote from a recent report, a 'daunting prospect'<sup>10</sup>. In the UK there has been a number of protracted implementations and, in one case, a complete failure which left the university without any management information

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<sup>6</sup> We know of only one ERP supplier specialising in higher education (that is the US vendor Sungard SCT). Thank you to Richard Garrett for bringing this example to our attention.

<sup>7</sup> However, see the recent report conducted on US experiences of implementing ERP, Enterprise-Wide System Implementations at Multicampus Institutions, (2005), EDUCAUSE Centre for Applied Research, Research Bulletin, Vol. Issue 15, February 15.

<sup>8</sup> Lockwood, G, (1985), Universities as Organizations, in G. Lockwood, and J. Davies (eds.), *Universities: The Management Challenge*, Windsor: NFER-Nelson Publishing.

<sup>9</sup> Balderston, F, (1995), *Managing Today's University: Strategies for Viability, Change and Excellence*, San Francisco: Jossey-Bass Publishers; see also Pollock, N & Cornford, J, (2004), *ERP Systems and the University as an 'Unique' Organisation*, *Information Technology & People*, Vol. 17, No 1, pp31-52.

<sup>10</sup> ERP Systems in Universities: Panacea or Can of Worms, (2003), Joint Information Systems Council (JISC) Report. URL: [www.jiscinfonet.ac.uk/pub/](http://www.jiscinfonet.ac.uk/pub/). Last accessed 3<sup>rd</sup> February 2005. See also the notes on a recent JISC workshop which asks why universities have found it so difficult to implement ERP, URL [www.jisc.ac.uk/index.cfm?name=events\\_infor-strat](http://www.jisc.ac.uk/index.cfm?name=events_infor-strat). Last accessed 3<sup>rd</sup> February 2005.

systems for several weeks and, more importantly, simply unable to pay suppliers or staff<sup>11</sup>. Moreover, from our own research, it is clear that there is a growing awareness among universities of ending up with the 'wrong' solution.

**Technical Fixes.** As relatively recent adopters of ERP and other packaged solutions, universities are in truth rather 'poor customers'. While management and IT staff might understand the workings of their own institutions, they are not always familiar with the 'dynamics' and complexities that surround large integrated packaged solutions. As a result they often struggle to reconcile this understanding with the demands that an ERP implementation places upon them. This is because institutions are often presented with a bewildering range of competing software products, many of which are promoted as 'technical fixes' to complex (and unique) organisational problems. As a result there appears to be much uncertainty within institutions concerning ERP, its appropriateness for higher education, the difficulties of implementation, and its wider implications for organisational reshaping.

### 2.3. What are ERP Systems?

The acquisition of well-established, generic and corporate computer systems is increasingly common among firms and businesses. Today, after more than 30 years of computer systems development in an ever-growing variety of institutional and organisational settings, few systems are developed from scratch. Rather, most large-scale institutional computer systems are constructed by adapting existing elements to new organisational contexts. Firms and business no longer commission and build bespoke systems and packages but instead adapt general software packaged solutions to their local contexts. In this respect, ERP systems have an interesting history. They were initially conceived for and used by manufacturing firms before being applied within non-manufacturing settings and, more recently, non-commercial contexts (which today includes higher education). Large commodified software packages (such as ERP and other types of integrated financial and administrative information systems) represent a substantial part of organisational IT expenditure. It is said that over 60% of organisations rely upon this form of software packages, and that they are increasingly seen as the 'de facto standard' for the replacement of legacy systems in large multinational companies and beyond<sup>12</sup>.

**Integration Across an Organisation.** The most radical aspect of ERP, perhaps, is its attempt to capture and integrate the full range of activities and transactions *across* an organisation. Traditional university systems were typically 'discrete technologies' applied to specific or closely related functions. In contrast, ERP is applied to all aspects of an organisation in an attempt to bring together unrelated functions under the umbrella of one system. One notable aspect of previous university systems (like MAC) is that they were kept within the domain of the centralised administration and had little influence on the primary functions of universities and their chalk-face workforce. Departmental and academic staff rarely came into direct contact with these systems and most were unaware of their existence. Moreover, it was common for academic departments to maintain their own smaller information systems (which did not interface with the centralised system in any useful way). ERP is often deployed with the aim of ridding organisations, to use the jargon, of these 'functionally-based silos' and replacing them with enterprise-wide processes. For this reason, the systems have become synonymous with radical change and the large scale re-engineering of organisational practices. In order to bring about the level of integration desired, there is a need to replace the often ad-hoc and inconsistent procedures found in departments with more formal, standardised processes and roles across departments. The benefits of this are that it allows organisations to have consistent processes throughout the organisation as well as a single source of data. While the re-engineering stage is widely recognised to be difficult, it is regularly presented as an opportunity for organisations to update procedures and achieve new kinds of organisational flexibility and performance.

**Tough Medicine.** Indeed, at the university where we conducted our research, the management team decided on SAP, rather than any of the others vendors (some of whom had significant higher education experience), because the Supplier had presented the solution not in a narrow, technical way but as an opportunity to restructure the University's entire business processes. This met with approval as the managers were in the early stages of putting together such a plan to restructure and devolve much of the management and administration issues to departments and the system appeared to offer a useful template in structuring such changes. The rationale for embarking upon the project, as given by the Pro-

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<sup>11</sup> Finkelstein, A, CAPSA and its implementation: Report to the Audit Committee and the Board of Scrutiny, Cambridge: University of Cambridge, 2001.

<sup>12</sup> Parr, A. and Shanks, G, A Model of ERP Project Implementation', *Journal of Information Technology*, 15, pp289-303, 2000

Vice Chancellor in charge, was to support a fundamental restructuring of the institution's information management. To paraphrase his words, the idea was to follow what multi-nationals were doing through having highly-decentralised structures where line managers were given greater autonomy and responsibility within a framework of an overall corporate entity. In other words, the goal was to build a devolved structure where senior management had oversight of the University but Schools and Departments were given greater autonomy. The generic ERP solution for this university, then, was seen as 'tough medicine'.

**Self-Service.** As we have said, ERP demands a large scale re-engineering of institutional practices. These systems also assume the existence of certain kinds of users with specific roles and responsibilities towards the support of the newly reconfigured institution. The notion of 'self-service' is often deployed as an integral part of any system roll-out. This is where employees, suppliers, customers (and potentially 'students') can view, input and modify their own administrative and financial information. In this respect, the application of self-service and ERP technologies is widely seen as offering the possibility of new divisions of labour between different categories of individuals within the university. Work can be shifted from staff to students – i.e., students can take on responsibility for checking and maintaining some parts of their student records, relieving administrative and academic staff of this task.

**The Customisation Dilemma.** There has been much discussion also concerning the 'generic' nature of ERP systems and how they are often described as 'embodying a management model that could be brought to bear on any organisation'<sup>13</sup>. In more recent years, however, there has been a greater awareness of the various incommensurabilities adopters often find between the systems and specific practices and requirements. There is a further important feature of ERP, often described as the means by which the generic is brought towards the specific, and that is the process of 'customisation'. Customisation of ERP is possible because the systems are designed around a basic organisational functionality, what is sometimes described as the 'generic kernel', and painted onto this kernel are 'business process templates' that form the outer layer of the package. In some ERP systems a user organisation is able to choose from over 800 ready-made business processes, and is then able to customise each through selecting from a variety of parameters (a process known as 'parameterisation').

While parameterisation allows for a 'weak' form of customisation, in most cases a more extensive reworking of the system is required. Yet, reading the ERP literature, there is little consensus as to just whether heavier customisation can, or should, be carried out. Light argues that some organisations cannot completely adopt the standard modules or templates and therefore have no choice but to customise extensively<sup>14</sup>. In this respect, Davenport discusses the case of a small software company with unusual methods for accounting for its revenues and inventory, and how these idiosyncrasies could only be accommodated through substantial extra programming<sup>15</sup>. However, other research points to how 'strong' customisation can mean that a system is taken away from the supplier's standard, and this may mean that it will be difficult to make use of later upgrades or new system functionality. There is also growing evidence to suggest that even whilst adopters might want to rework an ERP system, because of the sheer number of organisational and technological discrepancies that arise during the attempts to do so, they simply end-up accepting those 'default' features embodied within systems. In other words, adopters will have a dilemma when considering customisation strategies. This is the choice as to whether to fit the system to the organisation or the supplier standard, a problem that has been described as the 'package paradox'<sup>16</sup>.

### 3 The University as an Organisation

In this part of the report we develop more of an organisational focus through discussing our case study and the specific implications ERP has for the practices and policies of universities. Before doing so, however, it is necessary to describe how we think the university is currently organised.

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<sup>13</sup> Kallinkos, J (2004), Deconstructing Information Packages: Organisational and Behavioural Implications of ERP Systems, *Information Technology & People*, Vol. 17, No 1, pp8-30.

<sup>14</sup> Light, B, (2001), The Maintenance Implications of the Customisation of ERP Software, *Journal of Software Maintenance and Evolution*, 13, pp415-429, 2000.

<sup>15</sup> Davenport, T, Putting the Enterprise into the Enterprise System, *Harvard Business Review*, 76(4), pp121-132, 1998; see also Davenport, T, *Mission Critical: Realising the Promise of Enterprise Systems*, Boston: Harvard Business School Press, 2000.

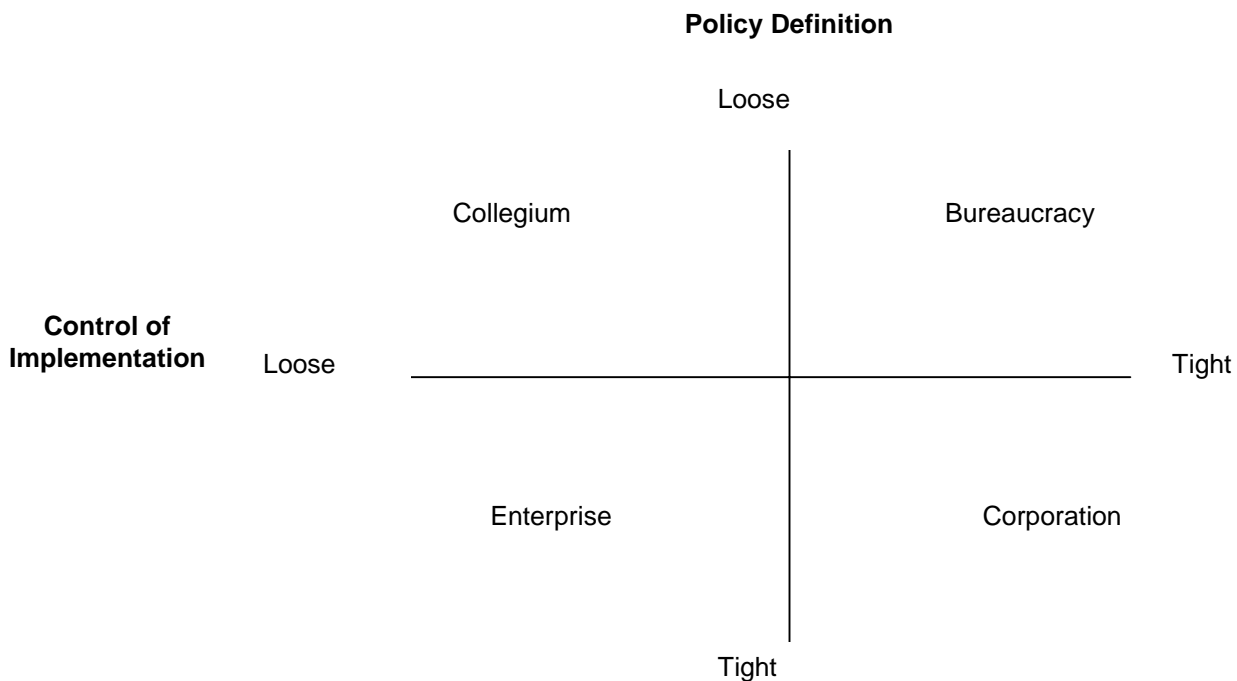
<sup>16</sup> Tierney, M & Williams, R, Issues in the Black-boxing of Technologies, Edinburgh PICT Working Paper No. 22, Edinburgh: University of Edinburgh, 1991.

### 3.1 From the Collegium... to the Enterprise?

The 'organisation' of the university is notoriously difficult to define. The traditional university is conventionally, if mythically, thought of as a band of scholars coming together in pursuit and dissemination of knowledge, governed by a more or less collegiate model of organisation, based around a complex structure of committees and with a high degree of individual and departmental autonomy. In this sense 'the university' as an institution tends to lack a clear identity, primarily existing in the heads of people who constitute it and a myriad of locally negotiated practices and interactions. In institutional terms, it has thus been described as an exemplar of a 'loosely coupled system'<sup>17</sup>, as until relatively recently 'devoid' of large-scale organisational characteristics<sup>18</sup>, and characterised by a lack of clearly articulated policy and weak control over the implementation of policy<sup>19</sup>. But, as we have said, universities are clearly changing.

Ian McNay has provided a useful map to describe these changes (Figure 1). Drawing on the management theorist Charles Handy, he lays out what he calls 'the four cultures of the university', defined in terms of the degree of closure (tightness or looseness) in their definition of policy and their control over implementation<sup>20</sup>. McNay labels the four resulting archetypes as the collegium (loose definition of policy and loose control of implementation), the bureaucracy (loose policy definition but tight control over implementation), the corporation (tight policy definition and tight control over implementation) and the Enterprise (tight policy definition and loose control over implementation).

**Figure 1 McNay's Model of universities as organisations**



While, as he notes, 'all four co-exist in most universities', McNay himself sees a clear progression over the past decades in terms of the dominant culture, specifically from collegium to bureaucracy, to corporation to enterprise, culminating in a 'fragmented' or 'atomised' institution characterised by small, task-focused work units, each having economic and managerial control over its own destiny, interconnected through 'benign computer and communication links' and bonding into larger organisations through 'strong cultural bonds'<sup>21</sup>. Our own research suggests that this image is too simple. In spite of more than a decade of managerialist reform, the collegium or the 'traditional university' remains an important self image for university institutions, albeit one that is understood to be rapidly disappearing and which may never really have

<sup>17</sup> Weick, K, Educational Organisations as Loosely-coupled Systems, *Administrative Science Quarterly*, 21, pp1-19, 1976.

<sup>18</sup> R. Barnett, *Realizing the University in an Age of Supercomplexity*, Milton Keynes: Open University Press, 2000.

<sup>19</sup> McNay, I, From the Collegial Academy to Corporate Enterprise: The Changing Cultures of Universities', pp105-115 in T. Schuller (Ed.), *The Changing University?* Buckingham: Open University Press, 1995

<sup>20</sup> Ibid.

<sup>21</sup> Ibid, p114.

existed. Many of university administrators and senior academics in managerial positions that we have spoken to describe their own institutions in terms that uncannily echo McNay's description of 'the classic collegial academy':

*A relative lack of co-ordination; a relative absence of regulations; little linkage between the concerns of senior staff as managers and those involved in the key processes of teaching and learning; a lack of congruence between structure and activity; differences in methods, aims and even missions among different departments; little lateral interdependence among departments; infrequent inspection; and the 'invisibility' of much that happens<sup>22</sup>.*

Given this self understanding, where is the university as an institution? There are, of course, elements of bureaucracy (rules, formal roles, etc.), the corporation (co-ordinated means-ends planning) and the enterprise (individual and collective entrepreneurship) present in all institutions. Nevertheless, the traditions of collegial self-management and the heritage of rule by committee mean that these tendencies are always to some extent held in check. Under such conditions, then, it is clear that 'the university' must be seen as a highly heterogeneous institutional ensemble, which exists primarily in the heads of the people who constituted it, and in a myriad of locally negotiated practices and interactions. This traditional university, *as an institution*, often appears to exist only 'virtually'. What we want to show below is how the application of ICTs, aligned with the pressures on funding and the imposition of increasingly short-term and instrumental policy goals by the principal funders of higher education, do not seem to be favouring the desired enterprise model. Rather, they appear to be reinforcing the establishment of a more 'corporate' form of organisation where both policy formation and policy implementation are far tighter and goals, roles, identities, abstract rules and standard operating procedures are made explicit and formalised<sup>23</sup>.

### 3.2 *Re-Institutionalisation of the University*

**Knowledge About Themselves.** One common problem during the implementation of ERP at Big Civic was that the university, like many other large organisations, did not know itself well enough. When we conducted the early parts of our research, Big Civic was in the process of implementing the financial, human resource and project management modules of the ERP system, prior to adopting the student management module. The actual work of adapting and expanding the existing software to the new context of the university involved both non-technical and technical staff from the university, programmers from the supplier of the system, and third party consultancies (let us call them 'The Team'). In this adaptation work, information about existing management and administration processes would be collected and passed back down the chain to the programmers, who would pass back code based on their understanding of the information they had received. In practice, however, this often proved to be a considerable hurdle. The problem was that, in some senses, there was *no university there to fit to the system*. What we mean is that in contrast to the highly defined processes, hierarchies and roles embodied in the system, the university is made up of locally negotiated practices and interactions many of which are difficult to accurately capture or articulate in the language of ERP (see McNay's description of the traditional collegial campus above).

The point is exemplified by The Team's attempts to uncover the recent history of university practices regarding the handling of Student Fees. In one conversation, for instance, they were trying to work out the processes for setting and administering 'fee categories'; these were categories that had been established on the existing MAC system some years before but now it was not obvious just why they were there, who had made the decisions about which categories went where, or even where the data for populating the categories had come from. As one document records it: "Every degree program is currently assigned to a fee category within MAC. However, the process by which new programmes are allocated to categories is unclear and haphazard. The fee category is an important parameter in the proposed system". Further investigations provided no clues and, thus, the team came to the conclusion that the staff responsible for inputting the data were simply 'making it up'. To resolve these kinds of problems it was common for members of The Team to meet with the 'faculty support team' (members of central departments, such as finance, attached to the faculty) and representatives of academic departments where they were going to pilot the new system, but here again they were often presented with other problems.

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<sup>22</sup> *Ibid*, p105.

<sup>23</sup> This move to a more 'corporate' form of university is the result of not simply ERP but other ICTs (such as email, WebCT etc) and wider external pressures. For more detail on this see, Cornford, J, *The Virtual University is the University Made Concrete*, *Information, Communication and Society*, 3(4), pp508-525, 2000.

### 3.3 *That's a Matter for Policy...*

The consultants had a set of 'workflow process diagrams', which describe the proposed sequences of events by which numerous tasks, such as setting up a research account, raising a purchase order or issuing an invoice, would take place within the new system. Each step of the process was described in detailed flow diagrams, indicating which parts of the process take place 'on the system' and which take place 'off the system', as well as constraints on who can undertake which tasks. Each of the workflow process diagrams was discussed with the departmental representatives and faculty team. The aim of the session was to clarify the workflow processes, iron out any problems which arise, and identify who does what. As the meeting moves through the workflow diagrams a number of basic rules of the system were made clear (for example, two separate logins are required to complete each and every external transaction – the same 'login' cannot order and receive goods). At some points the workflow diagrams were amended to better reflect the current practice (although this amendment tends to happen more with 'off system' events). At a number of points in the process it becomes clear that there were more than one way, in current practice, in which a particular step in the process was being handled. If the issue could not be resolved one way or another, the consultant leading the meeting would identify the issue as 'a matter for policy', a matter on which a definitive ruling must be given by the university centrally.

What appears to be happening here, as the computer system is rolled-out through the university is more than a mere standardisation of working practices and clarification of roles. Rather, as the ERP system makes visible the variety of local practices and where these cannot be reconciled with the system (and thus with each other), this goes on to generate a constant flow of 'demands for policy'. In other words, instead of simply taking existing practices and including them in the system, the management team had to formulate new policies and implement this across the entire institution. Indeed throughout the implementation there were hundreds of such requests for a central policy decision and these were logged by the team in a database and passed onto the senior management to resolve. In principle, then, the process not only sees the 'tightening up' of roles and procedures, but it also demands a tightening up of policy which will apply not locally, but across the whole university, in effect calling the university into being as a far more 'corporate' institution. We might say that these implementation and customisation procedures involve both the building of a university specific system and the re-building of the university: the roll out of the ERP system is requiring the simultaneous roll-out of a new (and more standardised) institution to host it<sup>24</sup>.

### 3.4 *Reconstituting the Policy Making Process*

This 'co-production' of system and university is a complex process, however. As we found out in a later phase of our research, there were so many of these demands for policy that lots of them simply remained on the database without senior management ever having the time to deal with them. As we have said, universities are governed by a complex structure of committees, each with a high degree of individual and departmental autonomy. The Committee overseeing the system roll-out (made up of a number of Pro-Vice Chancellors, the Registrar, Bursar, various Deans, and senior administrators) did meet once a week intending to resolve these demands but, in the words of a project administrator, "the Committee were getting 20 issues a week to resolve and therefore they usually did not get past the first or second one on the agenda". As a result most of the issues had to be resolved within the project team on more technical grounds (this meant that The Team had to deploy their own criteria whilst configuring the system).

Our conclusion is that because of the amount and complexity of the issues ERP systems generate they place a strain on institutional structures and this means that decision-making is shifted from the established mechanisms to the more informal, loosely based coalitions surrounding the implementation. Moreover, because the committee cannot decide on the details of the system, responsibility for resolving the decision is deferred and then pushed down to the project team who, in turn, are unable to do anything other than shift the decision onto the system itself. In many cases, this meant just accepting the default business process templates embodied in the system. In other words, the University underwent one of the largest re-organisations in its recent history and many of its new policies and procedures were not formulated as they would have liked but, rather, through a default alignment with the ERP system. In effect, it could be said that Big Civic changed its processes to match the system rather than the other way around.

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<sup>24</sup> Cornford, J, *The Virtual University is the University Made Concrete*, *Information, Communication and Society*, 3(4), pp508-525, 2000.

### 3.5 *Living with an ERP System*

The period immediately following the implementation revealed the extent to which the new ERP system implied changes in established ways of doing things. More specifically, this period provided insights about how Big Civic assimilated the 'tightening up of roles and procedures' required by the system's default settings. Initially, there was much enthusiasm for the introduction of the new system, particularly concerning those more paper-based and time-consuming functions. There was a wide-spread recognition that processes were badly in need of updating. As it turned out, however, university staff found such assimilation quite 'uncomfortable'. We can say that the system has stretched out across the University - its terminals, for instance, sit on the desks of several hundred support staffs and managers across the institution. Yet, its actual integration into people's everyday practices has been more equivocal. For instance, many of those based in the centralised administration departments reported that they 'like' Enterprise and that the system (and its defaults) had become part of their daily work routines. Nevertheless, for others, especially those in outlying academic departments, the system has not had the immediate take-up that was initially anticipated, and remained 'outside' of everyday practices for quite some time. This was because some of the new processes put in place have been described as 'laborious', 'inflexible', 'inadequate' and the 'source of much frustration'. One important outcome, and despite the original goals of decentralisation and greater academic self-management, is that many outside the centre found that they were increasingly constrained by the system.

***Loss of Flexibility.*** There were particular complaints about 'loss of flexibility'. One example is the setting and implementation of rules regarding postgraduate 'course fees'. As described above, during the implementation it was discovered that there was no standardised way to set course fees (there was too many ad-hoc agreements and inconsistencies across departments). A 'fees working party' was set up to formulate university wide policies and practices amenable to the new system. Each course was allocated preset information (a unique fee, category and code, etc); a 'change approval process' was put in place to consider proposals for modifications; and the centralised Academic Office was allocated responsibility for administering and controlling the process. These changes underpinned the reshaping of conventional relationships through the re-engineering of business processes. However, there was also evidence of resistance, particularly from academic staff who saw the system impinging upon the freedom and flexibility of departments to raise or lower course fees according to market demands or the particular needs of students. While many of these rigid procedures were pushed through we also found instances where the most inflexible processes were often ignored or 'worked-around'. We demonstrate this by discussing the 'procurement processes'.

***The Burden of Making Standardised Processes Work.*** The procurement of goods or services throughout the University officially commenced with the raising of a 'purchase requisition' and this is then authorised by pre-identified individuals. However, this process was often flexibly adapted within various departments; non-authorised staff often made orders over the telephone, and the appropriate paperwork was raised much later in the process. Therefore, this informal practice was proscribed, as this was not the procurement procedure operating within the system. Moreover, as a method of enforcing this proscription, Big Civic's major suppliers had received written instructions informing of changes to procurement policy, and that they were to supply goods and services only for orders detailed on the appropriate paperwork and bearing a Unique Order Number, both of which were generated by the new ERP system. However, we observed how staff often developed 'strategies' to live with the new procedures. In one research centre, for instance, procurement procedures were often flexibly adapted to deal with urgent problems, such as the need for a travel ticket. Once the system was implemented, this flexibility was no longer possible and this created problems. If the centre administrator was unavailable, the other staff did not have an appropriate 'login' or 'user profile', and thus could not generate the paperwork when it was required. To circumvent this, a copy of the ERP order form was designed on a word-processor (available to print out at any time by the remaining support staff) and this was adorned not with the ERP Order Number but with what the staff called a 'pseudo number' or 'Secretarial Requisition Number'. Tickets could thus be ordered and the correct paperwork dealt with at a later date.

What does this tell us about what is going on? Such 'work-arounds' indicate the nature of the ERP system's relationship to the University. True, the system has been 'fully' implemented but many procedures have carried on as before. Though, importantly, support staff have the added work of maintaining a system that does not reflect the department's working practices and they are therefore obliged to translate between, we might even say 'perform', their specific part of the University to the system, and, simultaneously, translate the system back to departments. These users, in other words, bear the burden of reconciling the tension between universities as unique organisations and as generic

organisations – what we might describe as a process of *pretending to live with defaults*. This leads us to ask the question- could it have all been otherwise? Might not the university have procured software more suitable to its particular setting? This question takes us onto the building of the 'Campus Management' module.

## 4 Re-Shaping ERP for Universities

In this final part we focus on how the Supplier is reshaping ERP for the higher education sector. What we see here is a tension emerging where universities are not simply pressurised to think about their similarities to firms and businesses but to other higher education institutions also.

### 4.1. *The Dynamics of Generic Software Packages*

As we have said, generic software packages seldom translate easily across boundaries. As concerns rise as to the incommensurability of system and context, there are demands for solutions which are already partially adapted to particular business settings (i.e., 'semi-generic' packages) and for greater user-involvement in the shaping of these packages. In this respect, universities appear to have been relatively successful in 'lobbying' suppliers concerning their need for university specific functionality. One element not available within ERP systems, for instance, was software for one of the core functions of universities - *the management and administration of students*.

While most ERP suppliers have had little, if any, experience of working in higher education settings, several had publicly demonstrated an intention to commit resources to re-developing software for this new market. Some have developed higher education specific versions of their generic systems as well as new university specific modules which can be integrated into the wider ERP solution. One of the larger vendors has acquired a student management system that was already in use (Oracle acquired 'Callista' which was developed by Australia's Deakin University) and others have developed 'new' modules. Big Civic, along with a number of other universities from around the world, for instance, successfully lobbied SAP to build the 'Campus Management' module.

**Recycling Software.** SAP, who were keen to enter this potentially lucrative and under exploited market, promised to commit considerable resources to building a module for the management of students. However, and much to the surprise of the 'pilot' universities involved in the development, they did not build new software but attempted to *re-cycle* existing ERP modules: the Training and Events Management (TEM) module, which was used to run internal training programmes within firms; and the Real Estate (RE) module, which allowed firms to manage their buildings and estate. While there was criticism of this from among adopting universities, this strategy was not altogether surprising. It is well known that software package suppliers operate by taking existing systems and modifying them to work in what they regard as similar classes of organisation or settings. This can be within the same or related industrial sector or, as is now increasingly common, across different and unrelated sectors or organisational forms. In this sense, ERP systems form part of an established practice in the supply of generic information systems whereby suppliers recycle the same system within different organisations. In more practical terms, however, the recycling posed a number of problems for adopters in that the module did not 'fit' very well with the university environment. We show one aspect of this problem through discussing how the Supplier dealt with the notion of 'the student'.

**Students are 'Special Types of Employees'.** ERP is structured around commercial categories (notions such as 'supplier', 'customer' and 'employee') and while there are similarities between these and the categories found in universities, they do not always map straightforwardly. Within the TEM and RE modules, for instance, there was no notion of 'the student'. Thus programmers conceived of students as a *special type of employee*, one who was undertaking a long-term training course and thus permanently renting a room! In this way they could develop a student module and re-use much of the existing software. Unsurprisingly this raised numerous tensions among university staff, particularly those with specific responsibilities towards student administration. They found that the module could not account for many of the circumstances and characteristics they routinely had to deal with when administering students. There were simply inappropriate fields and assumptions in the software. Some of the end-users openly described the system as 'simplistic' and 'overly commercial'. What this clearly shows is that the Supplier had underestimated the complexity of the university environment and, just as important, had overestimated the transferability of its existing systems. Indeed, the Supplier admitted to Big Civic and the other pilot universities involved in the project that simply re-

cycling software was not appropriate in the case of higher education. Nor would it be possible to simply move the universities towards the organisational assumptions embodied in the software.

### ***3.2. The Global Shaping of Campus Management***

The Supplier set about the task of rebuilding the module. However, once again, users were unsatisfied with how their needs were represented. It was said to be based around far too general or 'ideal types' of organisational processes. This is because suppliers see their business as building software not for one user, or even one group of users, but as many users as possible. Unlike conventional software development, packages are not designed for a specific customer but a large and anticipated market. In order to cover the costs of expensive software development work suppliers have incentives to build systems that can be applied in the widest range of settings. The supplier strategy, in other words, was to build a generic product that could be marketed around the world, and therefore this meant that they treated the various pilots as part of one homogenous sector.

***Are Universities the Same?*** In order to build the package, the supplier regularly brought participating universities together in an arranged venue, where they would sit in a large classroom and work through test versions of the system. The aim of these sessions were to ascertain particular needs and, where possible, to translate these into a set of 'common needs' or functionality that was relevant to all sites. What this meant was that the suppliers were translating diverse requirements into functionality that might be used by all of the sites present; and, because these sites were surrogates for a wider potential market, to then translate the community functionality into a more generic functionality. Yet, of course, institutions around the world are highly diverse. And, in attempting to meet the demands of all the pilots, the Supplier was flooded by requests where each university was asking for different things. The Supplier often complained about the lack of a standard university model (they could not often decide which of the requests were 'important' and which were not). They therefore employed a number of strategies to establish 'equivalencies' and 'similarities' between sites. Another method was to 'reject' certain requests for functionality. This was particularly evident in the latter stages of the build where requests were sifted on the grounds that it was functionality desired by one university only and therefore could not be included in the common system.

What is interesting here, and reason as to why we go into some detail, is that in the design of this new module we saw how more attention was paid to the search for 'generalisable concepts' than specific needs, and there was more interest in building a system for the wider higher education sector than for individual institutions. Of course, this provided a strain on the relationships between the Supplier and some of the adopters as many had agreed to act as 'pilot sites' predicated on the belief that they could influence the shaping of the package in some way. However once the Supplier attempted to make the product more generic, the universities experienced a loss of control as their specific features were 'designed out' of the system.

***Some Needs are More Important Than Others.*** In the final stages of the development there was often 'competition' between universities about whose needs would be represented. When presented with requests from several users, the Supplier would conduct a selection and ranking process concerning which functionality would (and importantly would not) go into the system. While Big Civic had been particularly influential in early stages (it was both promising an early implementation and it represented the large and important UK market), it now found that it was no longer able to exert the influence it once had. The Supplier was now prioritising the requirements of a US university who was also promising to attempt an early implementation but, more importantly, this university appeared to be more open to incorporating some of the more advanced features that were already available in the commercial version of Enterprise. They were pushing the Supplier to include functionality to cope with differing forms of student enrolment and registration: they argued that the inclusion of features and software such as 'self-service' and Customer Relationship Management (CRM) would suit their more 'market oriented' admission process. This left Big Civic concerned that Campus Management was now heavily favouring the US model of student administration rather than their own. It was thought that this would have implications for its own methods for managing students as CRM and self-service were at odds with Big Civic's more 'handicraft' and 'paper based' approach. More importantly, as both sets of needs could not be reconciled within Campus Management, the supplier was forced to prioritise one set of requirements over another (and chose to build the system according to the needs of the larger US market).

To summarise this section, in order to exert pressure on suppliers to build specific modules, institutions have little choice but to procure software as a 'community' or 'sector'. In so doing, adopters will have to negotiate and struggle both with the supplier *and* with other higher education institutions. This can take many forms and have different implications. In our example, rather than have their needs rejected as 'too specific', the pilots began to actively search for commonalities between themselves and other institutions. They were formulating their requirements with one eye on their own institution and the other on universities in other countries<sup>25</sup>. Moreover, we saw the Campus Management module converge on a particular design not because the supplier had found the one 'best model' or set of 'best practices' (as it is often described in the promotional literature) but because this is the nature of standardised software and the production of a 'global product.' The convergence described above has important implications for the future shaping of institutional structures and processes. These pressures are described as sometimes leading to what organisational sociologists call 'institutional isomorphism'.

### 4.3. Accommodating Unwanted Functionality

ERP may have important implications for the autonomy of universities and their ability to decide to operate in their own way. As ERP evolves, universities may be increasingly forced to consider institutional change in order to maintain alignment with the system. In the case of CRM and 'self-service' functionality, for instance, their inclusion in the Campus Management module meant that pilot universities were forced to also consider adopting this functionality. While in some cases, this simply meant that universities debated CRM and Self-Service earlier than they otherwise might have, in others, there was more direct pressure placed on institutions. At Big Civic, for instance, their ability to influence the direction of the module was directly linked to their acceptance of these new features. And as a result, back at their university, the Big Civic Team would present self-service, and allowing students access to their own records, as an inevitable and integral part of the Campus Management module. They also openly warned colleagues that rejection would lead to a 'waning' influence. However, after a long and hotly contested struggle, self-service was eventually rejected by the Committee overseeing the project on the grounds that it was too early for the university to move in this direction.

Moreover, universities often found that there were other (often more mundane) features that were impossible to reject. As Big Civic found it was having a waning influence, the part of the module used to record applications by prospective postgraduate students, for instance, was built simply according to procedures common within American universities. There, applicants are required to submit a small fee when submitting an application. As a result Campus Management automatically generates an 'accounting record' for each new prospective student so that the appropriate financial information can be logged. However, there is no similar fee requirement in Britain and this therefore leaves Big Civic (and all the other adopting universities) with the problem of deciding what to do with all the unwanted accounting records (some 30,000 being generated each academic year).

There were many examples of this type of unwanted functionality. If we accept the customisation argument, then, the solution appears straightforward (simply remove this functionality). However, there were also compelling reasons why Big Civic should accommodate inappropriate aspects in some form rather than rewrite the code each time. If the module was to be localised *too much* there was the risk that the University would be unable to make use of later upgrades and new functionality released to the world-wide ERP community. In the case of the accounting records, therefore, these were simply stored on the system as they were generated; a fix that ultimately reduces the efficiency of the system (and goals of reducing data redundancy). Indeed, on hearing of the problem, one member of the Committee overseeing the project suggested 'well, why don't we also charge a fee for every application we receive?' It was some moments before the others seated around the table realised that he was in fact joking and they accordingly burst out laughing. For a split second, then, it was an item on the table worthy of serious consideration!

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<sup>25</sup> For more detail on the 'dynamics' of generic software packages, see Pollock, N, Williams, R & Procter, R, *Fitting Standard Software Packages to Non-Standard Organisations: The 'Biography' of an Enterprise-Wide System*, *Technology Analysis & Strategic Management*, Vol. 15, No. 3, pp317-332, 2003.

## 5 Conclusions

While universities choose ERP solutions because of their economic and dependability benefits they are also potentially a costly and high-risk strategy. Generic ERP solutions seldom translate easily across boundaries and there is often a gulf between the system and the specific contexts, practices and requirements of the higher education setting. Amongst the many issues generic ERP packages raise, of particular concern to adopters is the choice between conducting expensive 'customisation' work on standard solutions or undergoing unwanted organisational change in adapting their practices to models of work and organisational process embedded in the software. The picture emerging at the university we studied is that the ERP solution has radically reshaped existing processes and practices. While this was in some respects in accordance with the goals of the senior management team, who through their respective restructuring programmes were attempting to make their university less organisationally idiosyncratic and a much more modern organisation or 'enterprise', the implementation also had a number of unintended consequences:

- The pace of organisational change required to implement ERP appeared to be substantially greater than any of the management or implementation team could have anticipated. The system threw up so many 'demands for policy' that it placed a strain on existing institutional structures, such that the committee overseeing the project could never discuss all the issues arising from the implementation.
- Given the weaknesses of the institutional decision-making process and the committee system, there was often a temptation to describe the University according to the business process templates embodied within ERP. This suggests that the collegiate model of 'rule by committee' is at odds with the demands of these kinds of systems.

In terms of the overall reshaping of universities we found that the adoption of ERP (and other ICTs) does not appear to be favouring the desired enterprise model. Rather, they seem to be reinforcing the establishment of a more:

- 'corporate' form of organisation where both policy formation and policy implementation are far tighter and goals, roles, identities, abstract rules and standard operating procedures are made explicit and formalised. This had a number of implications throughout the university in terms of local flexibility and control.

Moreover, ERP presents universities with particular sets of issues regarding the control and shaping of their own systems and ultimately their institutional and organisational autonomy.

- Through implementing a 'generic' and 'global' product universities may find that local policy discussions and processes are increasingly influenced by the direction and evolution of the ERP system. Some parts of this new functionality will be easier to reject or change than others.

In conclusion, there is a shortage of niche-specific ERP suppliers catering specifically for the higher education market (and this is part of the problem). As a result universities have no choice but to adopt a generic solution. These solutions are difficult to customise to the specific needs of institutions. An important issue for software package suppliers and universities, therefore, concerns how the benefits of generic ERP systems can be combined with strategies to improve the fit between these solutions, the needs of specific universities, and institutions in general. In this respect, suppliers need a deeper understanding of the specific organisational context and requirements of universities and how they differ from each other. Just as important, however, universities need a better understanding of the 'dynamics' of software packages and how they might effectively participate in their shaping. In this respect, adopters should be aware of how suppliers make decisions about product design and markets and how these decisions will influence the uptake and eventual fit of a package. The issue for university managers considering ERP implementation strategies is to make the most of ERP solutions but to resist their associated problems. They must learn, in other words, to manage these solutions without being managed by them.