The Implications of Enterprise Resource Planning Systems for Universities

Neil Pollock and James Cornford

Context

Significant changes are occurring in the nature and role of the university as a consequence of developments in knowledge and ICTs and also as a broader consequence of broader social and economic transformations. Transformations that have been occurring within higher education within recent years - for instance, the student population has increased by 40 per cent during the 1990's – are now having important consequences for the organisation, management, and administration of universities (cf. Scott, 1995; Schuller, 1995). Moreover, with the move to ‘modularity’, credit systems, semesters, auditing and the like, changes have been necessary across the whole institution (cf. Newby, 1999). Among such changes are increasing pressures for better management and administration processes and for universities to operate less according to conventional structures and more as modern, flexible ‘organisations’. Given that universities are expected to perform many more functions than has traditionally been the case, there are increasingly strong pressures to develop information systems that can handle the increasingly complex needs of universities (cf. JISC, 1995). In many cases universities are not building these systems anew, nor are they acquiring them from the many suppliers who specialise in the higher education market but, rather, they are turning to, and preferring to modify and customise software widely used by large corporations, typically Enterprise Resource Planning (ERP) systems. However, while universities choose these packages because of their economic benefits they are potentially a costly and high-risk strategy.
Introduction: Trends in Management Information System

Traditionally, in order to carry out basic administrative functions, universities have relied on small software systems, often developed in an ad-hoc manner and maintained by in-house specialists (cf. Bull et al, 1994). Sometimes, such configurations were supplemented with the 'bolting on' of other packaged software purchased from commercial organisations (ibid.). In 1988, the ‘MAC’ initiative was established by the, then, University Grants Committee, which attempted to standardise through the design of a ‘blue-print ’ document, the way in which universities carried out their management and administration processes (Goddard & Gayward, 1994). MAC was regarded as something of a failure: designed just before a period of rapid changes within the higher education system (cf. McLaughlin et al, 1999), MAC is described by many as embodying an ‘old model’ of the higher education system (cf. Pollock, 1999a).

Nowadays, after more than 30 years of developing their own management information systems, few universities develop software completely from scratch. Rather, most software applications are constructed by adapting existing commercial solutions to the specific context of higher education. Generic software packages, such as Enterprise Resource Planning (ERP) systems, cover the fullest range of organisational activities and processes and are adopted with the aim of achieving substantial cost savings as well as improved access to ‘tried and tested’ solutions, new releases, and an opportunity to update procedures and align them with perceived ‘best practice’. ERP systems have become so successful that they are now commonly described as the de facto standard for the replacement of legacy systems and it is said that some companies find it impossible to work without one (Parr & Shank, 2000).
**Procurement Strategies**: How are universities to assess and make sense of the wide range of alternatives and options available. Whether to procure one of the more ‘rigid’ of systems on offer or a more flexible ERP alternative. It is acknowledged that universities find it difficult to critically assess and evaluate the range of packages on offer. There is a growing awareness of the costs of ending up with the ‘wrong’ solution and this is provoking uncertainty among institutions.
Incommensurabilities: The wide diffusion of COTS software packages owes much to the supplier strategy of taking a technology that has worked in one place and adapting it to work elsewhere, and, in principle, all other organisations in that class (cf. Brady et al, 1992). This is evidenced by the fact that ERP packages were conceived for and used by manufacturing firms before being applied within non-manufacturing and, more recently, non-commercial settings and contexts (health care, public sector and now higher education). ERP systems embody very different assumptions, categories and divisions of labour from those typically found in higher education institutions. This means there is often a gulf between the systems and the specific contexts, practices and requirements of particular institutions. While little is known about how universities have experienced the adoption of ERP systems, in our research we found that such systems do not translate easily across the boundary from a general organisational context to a specific, university setting. This was particularly the case for the notion of ‘the student, which throughout the implementation remained something of a ‘residual category’ for the system suppliers. The primary reason for this was that Campus Management was a reworked version of the Training & Events Management Module, a system used to run internal training programmes within commercial organisations. As such, Big_Civic found many aspects of the software incompatible with existing institutional structures, processes and the characteristics and identities of actors. One issue was that the module is structured around notions such as ‘supplier’, ‘employee’, and ‘customer’, and while these may share some of the characteristics of categories found in universities they do not map straightforwardly. In one part of the system adapted for the management of accommodation on campus, for instance, the student was in effect conceived of as a special type of employee, one who was undertaking a long-term training course and thus permanently renting a room. University staff rejected this conceptualisation pointing out that it did not capture the complexity of the student-university relationship; at some pilots, for instance, students do not ‘rent’ rooms but receive accommodation as part of wider aid packages. Examples such as this led to tensions among prospective users, some of whom described the system as simplistic and ‘overly commercial’. As a result of complaints from the universities about such incommensurabilities, the supplier was forced to radically rewrite the Training & Events module, as well as develop much more new software than originally planned. The work of translating these systems across organisational boundaries is therefore increasingly recognised as involving not simply the modification of technical functionality but also the understanding of the user that is employed.
**Customisation Strategies:** In respect of such differences, the system supplier has acknowledged and tried to accommodate organisational variety through the process of ‘customisation’.

Of particular concern to practitioners 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.

While marketing their systems as ‘entirely flexible’ many suppliers actively encourage adopters to limit their attempts to tailor or modify the software by releasing upgrades and new software that are compatible only with the ‘standard system’. One study, for instance, estimates only 5% of organisations actually attempt significant customisation (Davis, 1998). That is, rather than attempt to reconfigure each and every aspect, implementation teams simply accept those ‘default’ features already embodied within systems, what one author has called the ‘power of default’ (Koch, 1999).

There is, however, no consensus about just how much customisation can be carried out. Davenport discusses the case of Visio, a small software company with unusual methods for accounting for its revenues and inventory, and how both these ‘…idiosyncrasies could be accommodated, but only with substantial extra programming’ (2000, p152). Light similarly points out that some organisations cannot completely adopt the standard model and therefore have no choice but to attempt customisation (2001). Other, more ethnographic based research has argued that even the most prescriptive of systems are typically ‘localised’ by adopters and end-users (D’Adderio, 2001). Scott & Wagner (in press) in their study of a US university describe how the standard templates in the ERP package were ‘compromised’ through ‘skirmishes’ and user resistance and this allowed the emergence of a much more ‘local information system’. In summary, then, one body of literature emphasises how adopters end up fitting their organisation to the system (rather than the other way around) and another pays particular attention to the ‘workarounds’ (Pollock, 2000) and other strategies that users deploy to adapt technologies to the local setting. A third strand has sought to reconcile these two positions through emphasising how technology and organisation are often brought into alignment through a combination of quite complicated organisational change and software configuration, a process which is sometimes known as ‘mutual adaptation’ (Orlikowski, 1992; Hanseth & Braa, 2000; McLaughlin et al, 2000).
Organisational Implications – Standardisation

As is widely understood, ERP systems seek new kinds of organisational flexibility and performance by capturing and integrating the full range of activities and transactions across an organisation.

What is notable about such systems is that they have been kept within the domain of the centralised administration and have had little influence on the primary functions of universities and their chalk-face workforce; most academic staff rarely come into direct contact with these systems, and students are hardly aware of their existence. Indeed, in some cases, MAC seemed to reinforce divisions between departments and faculties and between those who managed and administered and those who engaged in academic work (cf. Pollock, 1998a). Given that universities are expected to perform many more functions than has traditionally been the case, there are increasingly strong pressures to develop systems that can handle the increasingly complex needs of universities (cf. JISC, 1995). In this respect, MAC is regarded as something of a failure: designed just before a period of rapid changes within the higher education system (cf. McLaughlin et al, 1999), MAC is described by many as embodying an ‘old model’ of the higher education system (cf. Pollock, 1999a). Thus, within several institutions, MAC systems are currently being replaced by new generations of MIS and ERP systems. In contrast to MAC, these systems are being used, through a process of standardising certain roles and relationships, to ‘connect’ and ‘integrate’ processes that have traditionally been kept apart.

In order to have ‘common processes’ across an organisation this often involves a major business process restructuring and standardisation effort (to replace ad-hoc practices with formal ones, and to replace inconsistent procedures within departments with uniform ones across departments). Several studies have considered the ‘impact’ such standard solutions have on organisations. Davenport (1998), for instance, discusses how ERP systems typically force adopters to replace informal way of working with the more formal ‘business process templates’ embodied in the software.

*Within Big_Civic, this involved a major process restructuring effort, leaving faculties and departments with potentially less flexibility in dealing with students.*

One objective of the system was to ‘rationalise’ the processes and practices for managing students. On review, many were deemed to be ‘ambiguous’, ‘inconsistent’, and contain to many ‘ad-hoc agreements between departments’. One example is the method for calculating course fees where 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. Indeed, while many saw the implementation as an opportunity to update management and administration practices, there was also found 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.
Organisational Implications – Corporate Institution

Implementing ERP systems appears to require, not only more formalised roles and standardised practices, but the construction of a far more corporate structure capable of co-ordinated action.

When we conducted the first part of our research, Big Civic was in the process of implementing the financial, human resource and project management modules, prior to adopting the student management module. The implementation was being handled by a project team made up of University staff and external consultants from small organisations specialising in the implementation of Enterprise. On a number of occasions, members of the team met 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. We directly observed some of these meetings. During one of the sessions, the consultants had a set of ‘workflow process diagrams’, which describe the proposed sequences of events by which 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 is 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 are 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 are 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 is more than one way, in current practice, in which a particular step in the process was being handled. If the issue cannot be resolved one way or another, the consultant leading the meeting identifies 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 is a standardisation of working practices and roles. Moreover, as Enterprise makes visible the variety of local practices and where these cannot be reconciled with the system (and thus with each other), this goes onto generates a constant flow of ‘demands for policy’. Indeed from later interviews with members of the team we know that there were hundreds of such requests for a central policy decision; 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 customisation procedures involve both the building of a university specific system and the re-building of the university: the roll out of Enterprise is requiring the simultaneous rollout of a new (and more standardised) institution to host it (Cornford, 2000).
Reconstituting the Policy Making Process?

We found attempts to shape the ERP system placed a strain on the formal management and decision-making processes overseeing the project, such that these mechanisms were often bypassed or found to be ineffective.

This ‘co-production’ of system and university is a complex process, however. As we found out in a later phase, these demands for policy were so copious that many of the requests simply remained on the database without senior management ever having the time to deal with them. The Committee overseeing the system roll-out (made up of a number of Pro-Vice Chancellors, the Registrar, Bursar, various Deans, and senior administrators) met once a week intending to resolve these demands but, as described by the project administrator: ‘the Committee were getting 20 issues a week to resolve and therefore usually did not get past the first or second one on the agenda’. In other words, as the rollout of the system begins to highlight the variety of local practices around departments and these cannot be reconciled within the system, the sheer number of issues generated provides a problem for those attempting to decide on the future direction of the University. As a result, most of the issues have to be resolved within the project team on more technical grounds, meaning the team had to deploy its own criteria whilst configuring the system. And, in many cases, this meant just accepting the default settings (discussion with Project Administrator).

Our conclusion here is that because of the amount and complexity of the issues ERP systems raise, they place a strain on institutional structures, sometimes shifting the locus of decision-making from established mechanisms to the more informal, loosely based coalitions surrounding the implementation. From a more policy perspective, this suggests that the collegiate model of ‘rule by committee’ is at odds with the demands of ERP systems, which generate more issues than the part-time membership of such committees is able to realistically deal with.

Changing Relationships: Generally there appears to be much enthusiasm for the introduction of these systems (particularly in the more paper-based and time-consuming functions for administering staff and students), there is also concerns that they could undermine foundational relationships. For instance, one trend is towards the use of ‘self-service’ functionality and allowing students to administer their own academic and administrative records. In our research we found that this raised concerns about nature of universities relationship to their students and how such systems may undermine longstanding pastoral responsibilities.
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