

The teleological brake on ICTs in open and distance learning

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This paper uses the distinction between teleological and ateleological design processes to analyse projects intended to improve the use of ICTs within an institution delivering both on-campus and distance education. The paper demonstrates how the continuing acceptance of teleological development and of its associated naive understandings of organisations and information systems are placing a brake on the on-going adoption of and innovation with ICTs in open and distance learning.

Introduction

While the importance of information and communication technologies (ICTs) and elearning in promoting open, distance and flexible education in contemporary universities cannot be denied (deFreitas & Oliver, 2005), the effectiveness of those ICTs is sometimes hampered by a powerful set of boundaries that need breaking down. These boundaries allocate the work required to design and implement the ICTs to artificially separated groups of workers and formally segmented elements of a linear and rationalist process. A key limitation of these boundaries is that they fail to engage with the complexity, flexibility and fluidity of university provision of open and distance learning, in Australia and internationally.

These artificial and often stultifying boundaries are closely associated with an approach to organisational change that is concerned with setting and achieving objectives and with being purpose driven or teleological (Introna, 1996). Management concepts such as creating a corporate vision, setting goals and strategic planning are based on the notion of problem-solving, where a problem is defined as the difference between the status quo and the desired state (as defined by the goals). The aim is therefore to search continually for problems and to generate actions as solutions. Many, if not most, universities follow, or at least profess to follow, a purpose-driven approach to setting strategic directions (McConachie et al., 2005). Despite its prevalence and its status as the dominant discourse in most contemporary change management, the teleological approach seems not to have provided the returns required by organisations seeking to maximise value from ICTs (McConachie et al., 2005).

By contrast, the ateleological approach (Introna, 1996) to design sets aside the boundaries between people and processes identified above. Instead, it highlights a whole-of-organisation engagement with the particular development at hand, tempered by local adaptation and decentralised design management.

An analogy involving how to plan an overseas trip can provide a more concrete example of the differences between teleological and ateleological design. The extreme teleological approach to such a trip involves taking a package tour. Such a tour has a fixed, upfront plan designed by a group of experts, with little or no knowledge of the individual traveller, to appeal to a broad cross-section of people. The extreme ateleological approach involves the traveller not having a fixed plan. Instead, the traveller combines deep knowledge of her personal interests with a growing contextual knowledge of the destination to make unique choices that best suit her preferences and quickly modifies her journey in response to unexpected events.

While the terms 'teleological' and 'ateleological' may be new, the fundamental ideas on which they are based can be seen in a number of other works. Within the software development area, similar work includes agile development practices (Highsmith & Cockburn, 2001) and

there are also strong resonances between the ateleological approach and the rhetoric – if not the reality – of post-Fordist approaches to distance education (Watkins, 1997).

Despite these glimpses of other possible ways of structuring work in contemporary organisations, the boundaries underpinning the teleological approach are remarkably resistant to challenge and change. One reason for their resilience is the pervasive impact of corporate managerialism and economic rationalism in those organisations. Thus, as universities are subject to less public funding and investment but more accountability and control, the prospects of ateleological processes seem to recede, except in isolated pockets that succeed in evading the searchlights of surveillance.

The paper starts by providing a more detailed description of the differences between teleological and ateleological design processes. It does this by combining the nine attributes of a design process identified by Introna (1996) with descriptions of three projects from Central Queensland University (CQU), which sought to develop the use of ICTs in teaching and learning. Based on this analysis, the paper then identifies a number of implications for the use of ICTs in open and distance learning, clustered around possible ways of using an ateleological approach to break down some of the ineffective and inefficient boundaries underpinning the teleological brake on maximising the potential of that use.

The nine attributes of the design process

Introna (1996) identifies nine attributes of a design process (summarised in Table 1) and uses these to distinguish between extreme teleological and ateleological design processes. This section seeks to describe and illustrate these nine attributes by examining the design processes adopted by three projects at CQU. These projects sought to encourage the use of ICTs to support teaching and learning; however, they used design processes at opposite ends of the teleological/ateleological spectrum.

Table 1 Teleological and ateleological development systems (Introna, 1996, p.26)

Attributes of the design process	Teleological development	Ateleological development
Ultimate purpose	Goal/purpose	Wholeness/harmony
Intermediate goals	Effectiveness/efficiency	Equilibrium/homeostasis
Design focus	Ends/result	Means/process
Designers	Explicit designer	Member/part
Design scope	Part	Whole
Design process	Creative problem solving	Local adaptation, reflection and learning
Design problems	Complexity and conflict	Time
Design management	Centralized	Decentralized
Design control	Direct intervention in line with a master plan	Indirect via rules and regulators

The first project, chronologically, is labelled Webfuse. Webfuse commenced in 1996 as a project to develop an integrated online learning environment for CQU's Department of Mathematics and Computing (Jones & Buchanan, 1996). After an organisational restructure, Webfuse became the core information system for CQU's Faculty of Informatics and Communication (Infocom). As of early 2005, over 18,000 CQU students and 1000 CQU staff have made use of Webfuse services.

CQU Online is the name given to the report from the Online Strategic Planning Group to CQU's vice-chancellor in June 1999 (Central Queensland University, 1999). The group was formed to examine issues associated with online teaching and learning, identify existing online initiatives, establish a process by which this expertise could be reused and develop a

process for the progression of online developments at CQU. Adoption of the recommendations of this report has been limited with little long-term influence on CQU's use of ICTs in learning and teaching.

Around the same time, 1999, a survey and a limited evaluation of learning management software led to the choice of WebCT for use in trials and eventual central funding and support (Sturgess & Nouwens, 2004). In early 2002, the University undertook an evaluation of course management systems that would be appropriate for its use as the license for WebCT was due for renewal. After the evaluation of four potential course management systems (CMSs), Blackboard was chosen as the replacement CMS and was in full operation by March 2004.

Ultimate purpose

The ultimate purpose of teleological development is to achieve some goal or purpose. It encapsulates the classical notion of problem solving, where the problem is how to overcome the difference between the current state and the stated goal. Once the purpose has been defined, the system conforms to the behaviour required to achieve the purpose (Introna, 1996). Any action not seen to contribute to achievement of the stated purpose is seen as inefficient and not effective. Teleological development is based on the idea of modernism where human rationality and methods of inquiry can achieve their ultimate purpose of discovering and identifying universal truths (Baskerville, Travis & Truex, 1992).

The CQU Online project was intended to be just such an inquiry with its purpose being as follows:

In line with the Vice-Chancellor's brief, this document covers reasons for going online, current online activities as well as directions for and management of future online development at CQU. (Central Queensland University, 1999, p.5)

This ultimate purpose was developed by the Online Strategic Planning Group, a group of eight senior CQU staff drawing on the work of two task forces to develop a set of recommendations that would become the 'purpose' of online development at CQU. Beyond identifying that ultimate purpose, the report had little or no effect on practice at CQU. Some of the recommendations were mentioned within the context of a small number of projects but the recommendations were not widely known or accepted.

Around this same time another group of staff commenced investigation into the adoption of a CMS. The stated purpose of this group was to establish a means to enable teaching staff to develop and manage online courses with little professional support (Sturgess & Nouwens, 2004). This work led to the adoption of WebCT.

By contrast, an ateleological design process's ultimate purpose is to maintain the wholeness and harmony of the system. Each change must be meaningful; it must reflect actual human events (Introna, 1996). This is a different type of purpose; the goal is unachievable, which implies that design and development are inextricably linked in an on-going enterprise (Introna, 1996).

Webfuse commenced as a teleological process intent on providing 'a set of tools, systems, procedures and documentation that allows any and all parts of the learning experience to occur using some form of computer mediated communications' (Jones & Buchanan, 1996, n.p.). Limited usage of Webfuse led to the adoption of a more ateleological design process. This new process emphasised adoption, appropriation of innovation and evolution and 'being adopter-based and focusing on the human, social and interpersonal aspects of innovation diffusion' (Jones & Lynch, 1999, n.p.).

Intermediate goals

A teleological design process is successful if it moves towards the specified ultimate purpose in an efficient and effective means. Any approach which seeks to move away from the ultimate purpose is considered to be bad, to be inefficient and/or ineffective. This choice between good and bad leads to conflict and consequently the organisation must spend a significant amount of time to address the conflict that is generated (Introna, 1996).

By late 2001, CQU effectively had two online course development platforms: Webfuse, funded and used by staff from one of CQU's faculties; and WebCT, centrally funded and used predominantly by staff from other faculties. This duplication led to contention between the staff supporting the various systems. For example, an email distributed to all CQU staff, with the subject line 'Full Adoption of WebCT', included a range of statistics intended to demonstrate the importance of WebCT to CQU. Table 2 summarises those statistics and provides similar statistics from Webfuse. In addition, Paulsen (2002), after a visit to the institution in 2002, reports that CQU's only CMS was WebCT.

Table 2 Webfuse and WebCT usage statistics in 2002

Statistic	WebCT	Webfuse
Course sites	42 + 40 under development	188 + 66 under development
Staff maintaining course sites	40	99
Students using facilities	5000	3655*
Support staff	3	3

* This number represents only those students using the small number of Webfuse services requiring authentication.

The intermediate goals of ateleological design are to maintain equilibrium and homeostasis. Change does happen, but it is small-scale change that contributes to and enhances the current understanding of the organisation rather than radical change that may interrupt and cause disconnections (Introna, 1996).

Since 1999, the Webfuse development methodology selected and designed changes based on an evaluation of how well each innovation maximised relative advantage, maximised compatibility with current practice and minimised complexity. It is important to note that this evaluation was one based on the perspective of the potential adopters of the innovation rather than the perceptions of the development team. This emphasis meant each innovation was based on a modification or an extension rather than on a replacement of an existing information system.

Design focus

The teleological design process involves continual problem solving as the distance between the current state and the ultimate purpose closes. Throughout this process, the focus is on reducing the distance to the ultimate purpose. The traditional, dominant view of ICT development focuses on an artefact that is developed, built and then deployed for a long period of stable use (Truex, Baskerville & Klein, 1999). The CQU staff supporting WebCT were employed in the standard roles of technical support, staff training and helpdesk. There was no local ability to modify WebCT significantly in response to local needs.

In ateleological design there are no ends on which to focus. Instead the focus is on the means, the on-going process by which the organisation uses small-scale change to respond continually to local needs. The focus with Webfuse was the on-going modification of the system in response to requirements. While the staff employed to support Webfuse also undertook technical support, staff training and helpdesk roles, a major responsibility was to modify the system based on the knowledge gained while performing those roles.

Designers

In a teleological design process there is a small group of individuals who are responsible for identifying the one right solution to problems. In the development of ICTs in open and distance learning this generally involves instructional design and computing professionals. For a teleological design process to work, these designers must be able to manipulate directly the system's behaviour and must be able to determine the correct goal (Introna, 1996). In an ateleological design process the members of the organisation, the users, take on responsibility for design. It assumes that members of the organisation draw on their local knowledge to identify changes that are meaningful to their context.

Initially, the complexities and costs of ICT meant that specialised knowledge was required to develop computer applications. It has, however, become apparent that it is impossible for systems designers to capture all conceivable systems requirements and that the need has developed for systems that can be tailored by users (Patel, 2003), a task that has been made increasingly easy with the advent of end-user development tools.

Of the thirty-five people involved in the development of the CQU Online report, no more than four had any significant experience of online delivery. Only 20 per cent of the participants were, at that stage, teaching regularly. No students were consulted as to their needs. More than 60 per cent of the participants were in senior management or were technical support staff. The designers in this process were not the end users.

By contrast, a key non-functional requirement of the Webfuse system is to enable, where possible, all users to modify, adapt or opt out of the system based on their preferences. The work performed by those users which choose any of these options is closely monitored with the intent of identifying good ideas that can inform the default system. The users can influence the design of the system.

Design scope

Teleological design encapsulates a traditional view of problem solving that draws on logical decomposition. This is where large problems are broken down into smaller and smaller problems until arriving at sub-problems that are individually solvable but that still contribute to the ultimate purpose. Each sub-problem then has a solution designed and the solutions are joined back together. This focus leads to the loss of emphasis on the whole problem and results in the organisation concentrating on parts of the problem (Introna, 1996). A teleological design does, however, seek to retain an emphasis on the entire system so that each proposed change is evaluated in terms of its influence on the entire organisation.

The ultimate purpose behind CQU's adoption of WebCT was to enable teaching staff to develop and manage online courses with little professional support (Sturgess & Nouwens, 2004). Through problem solving, it was decided that WebCT was the solution that would allow eventual convergence on the ultimate purpose. Once that decision was made, the design scope of the responsible staff became how to use WebCT most effectively. The fact that staff within one faculty found it easier to develop and manage online courses with Webfuse became less important than the fact that they were not using WebCT.

This limited design scope had ramifications beyond WebCT. Members of the organisation were, for some time, aware that changes to WebCT would, in the long term, make it inappropriate for CQU. The evaluation of replacement systems, however, did not commence until very late as there was no single person or group responsible for making the decision to change. When the evaluation did commence its scope was limited to the choice of a replacement CMS. There was no questioning of whether or not there were more appropriate solutions.

Design process

Traditional information systems development (ISD) is an example of a teleological design process. As such it relies heavily on a design process based on rational, predictable problem solving. Traditional ISD includes lengthy periods of analysis and design, prior to implementation, in order to ensure long periods of low volatility and minimal maintenance until eventually it is necessary to develop a replacement system (Truex, Baskerville & Klein, 1999). This process requires a context that is relatively stable and predictable (Introna, 1996). This does not fit well with the pace of change faced by many contemporary organisations owing to the rapid development of technology and global markets.

Ateleological design is built around a process of reflection, learning and local adaptation. The changes made in ateleological design are small, many and meaningful to the individuals in the local contexts. Large-scale systems development projects represent the bold strategic stroke, which is seldom brilliant in its effect, while incremental change can lead to organisational excellence through the accumulated effect of many minor improvements non-synchronously effected by many people (Baskerville, Travis & Truex, 1992).

As an outcome of an evaluation, CQU replaced WebCT after almost four years of use. This change required a significant investment of funds in terms of converting course materials and retraining staff and students. It also meant that the knowledge and expertise around the use of WebCT became redundant to the organisation. Since 1996, Webfuse has undergone continuous redevelopment through the application of small steps driven by changes in requirements and context.

Design problems

Teleological design, with its emphasis on large, transformative change, must deal with the issues of complexity and conflict. Large change is difficult to implement, understand and gain consensus about.

Ateleological design involves small, local changes made by decentralised, local designers. It rejects the notion of centralised designers whose sole intent is to achieve some ultimate purpose in as efficient a manner as possible. An ateleological design process may take a considerably greater amount of time than a teleological process to implement a specific change. It is, however, more likely to achieve change that is more meaningful to the organisation as a whole.

Design management

Management decisions in a teleological design process are made by either the small group of designers or their managers. Once WebCT was implemented at CQU the only decisions made by academic staff using WebCT were how they would use the available tools. Decisions about how to provide appropriate technology and support, and CQU's policy around WebCT, were set by staff from CQU's information technology division, CQU's distance education division and in some cases chancellery. Staff members without direct knowledge of local conditions are making decisions about the direction of the system.

In ateleological design, individual users have a level of control over the direction and type of changes made, and management is decentralised. In such a process, those people with direct knowledge of local conditions are making the decisions. For much of its life cycle, Webfuse has not been 'managed' by any senior manager; instead, the Webfuse development team has been responsible for management decisions. While more teleological than ateleological, this approach has some advantages in that the development team reside within the faculty and provide training and helpdesk support and most have studied and taught courses within the faculty. This experience provides them with improved local knowledge, particularly when they have to understand the staff and requirements only of a single faculty.

Design control

Teleological design uses a master plan that outlines the specific steps being used to achieve the ultimate purpose. This master plan is used to control the design process. Only those practices and changes that fit with the master plan are allowed. With WebCT the various policies and practices around how WebCT was to operate at CQU become the master plan.

Ateleological design does not have a master plan. The only ultimate goal in ateleological design is maintaining a system's wholeness and harmony. In this context, control is provided by a set of rules and regulators. Each proposed change is evaluated against these rules and regulators in order to determine if it is successful. The regulators for Webfuse were drawn from diffusion theory (Rogers, 1995). Each proposed change was evaluated to determine how much relative advantage, compatibility with existing practice and complexity are involved.

Implications and conclusions

Ultimately, teleological and ateleological approaches represent different worldviews and divergent ways of understanding information systems, organisational change and human behaviour. At one level, the authors of this paper assert the superiority of the ateleological approach in promoting, and the teleological approach's function as a brake on, ICTs and open and distance learning in contemporary universities. At another level, there are potentially risky

extremes inherent in both approaches that must be avoided if organisations and systems are to be functional rather than dysfunctional.

In terms of the first half of this argument, teleological design is claimed to be possible only in the presence of the following three conditions (Introna, 1996):

- The system's behaviour must be relatively stable and predictable.
- The designer(s) is/are able to manipulate the system's behaviour directly.
- The designer(s) is/are able to determine accurately the goals or criteria for success.

Clearly none of these conditions can – and possibly should – be met in contemporary organisations, whether universities or other kinds of enterprises. It follows, therefore, that teleological design processes are acting as a brake on the development of ICTs in open and distance education, because they are striving to operate in an environment that does not exist and not engaging with the environment that does exist. This situation results in organisations adopting much the same approaches regardless of local context, thereby limiting the possibilities of innovation using ICTs and rendering open and distance learning inflexible rather than flexible. It is hardly surprising, then, that there is strong evidence that the ongoing use of teleological design processes severely limits an institution's capacity to respond effectively to organisational information requirements (Baskerville, Travis & Truex, 1992).

For example, Sausner (2005) reports on four best-case implementations of CMSs at universities in the United States. Each of these cases was nominated by the vendor of the CMS and appears to have taken a teleological approach to development. The best faculty adoption rate quoted is 55 per cent. As of mid-2005, Webfuse, using an ateleological approach, has a faculty adoption rate of greater than 90 per cent.

In relation to the second half of the argument elaborated above, while ateleological design may be more appropriate, there are potential problems to consider. One is that the information systems development field, in terms of both training and practice, is dominated by teleological processes (Baskerville, Travis & Truex, 1992), consequently, while the ongoing development of new technology and new development methodologies are making it possible to adopt an ateleological design process, finding staff, and even more so management, who understand this approach, is difficult. Without this level of understanding and the associated 'top-down' support from managers, individuals and groups committed to an ateleological approach will be driven underground or else will spend their time justifying themselves, rather than doing the necessary work. Furthermore, and from a different perspective, an extreme ateleological approach might lead to organisational anarchy, with no overarching plan for bringing together localised energies and initiatives.

It follows from this that what contemporary universities need is the most productive elements of both teleological and ateleological approaches to the eight elements of the design process identified by Introna (1996). Such a synthesis is crucial to addressing the plethora of issues competing for the attention of university decision makers, whether in Australia or internationally. Those issues range from promoting international and transnational education to engaging productively with the benefits of globalisation while minimising its defects to encouraging and facilitating innovation and quality in substance and not merely in rhetorical terms to enhancing the effectiveness of information and communication technologies and professional development in open and distance learning. Despite the diversity of assumptions and interests underpinning this broad range of issues, each of them cannot be understood, let alone taken up strategically, with either a teleological or an ateleological approach in isolation; it is the combination of the two approaches that is necessary to ensure an appropriate articulation of multiple perspectives within an efficient and sufficiently resourced framework.

This synthesis of teleological and ateleological was to a large degree evident in the development of Webfuse, and would have enabled the positive potential of CQU Online and the move from WebCT to Blackboard to be realised to a much greater extent than was the case in reality. So the most effective means of breaking down unhelpful boundaries segmenting people and processes lies in navigating pathways between these two approaches if the brake on ICTs and open and distance learning is to be transformed into an accelerator.

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