The life and death of Webfuse: principles for learning and leading into the future

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Drawing on the 14-year life and death of an integrated online learning environment used by tens of thousands of people, this paper argues that many of the principles and practices underpinning industrial e-learning – the current dominant institutional model – are inappropriate. The paper illustrates how industrial e-learning can limit outcomes of tertiary e-learning and limits the abilities of universities to respond to uncertainty and effectively explore the future of learning. It limits their ability to learn. The paper proposes one alternate set of successfully implemented principles and practices as being more appropriate for institutions seeking to learn for the future and lead in a climate of change.

Keywords: e-learning, LMS, design theory, organizational change

Introduction

In the mid to late 1990s it seemed like most of the early adopters of web-based learning were developing their own "cottage industry" e-learning systems. The design of one such system at CQUniversity was described in a 1996 ascilite paper (Jones & Buchanan, 1996) and implemented in 1997 as Webfuse. Unlike many such cottage systems, Webfuse survived the top-down selection and adoption of a single, enterprise-wide Learning Management System (LMS) in the early 2000s. A practice labeled here as industrial e-learning. While CQUniversity did officially select WebCT (1999) and then Blackboard (2004) as the official institutional LMS, Webfuse was widely used until 2009 and the adoption of Moodle.

During its lifespan work on Webfuse developed a range of innovative and context specific features – many of which are still not available in other systems - that were adopted at significantly greater rates than that of other systems both within and outside CQUniveristy. Some of those features are still in use at the institution in the middle of 2012, even though Webfuse is no longer officially supported. This paper argues that a significant contributing factor to this apparent success is that the principles and practices underpinning the design and support of Webfuse are significantly different than those underpinning industrial e-learning. In particular, these principles better enabled the design and use of Webfuse to learn from prior experience and evolve more rapidly.

This paper draws on this work to demonstrate the source of the limitations of industrial e-learning and to propose that the principles abstracted from Webfuse as offering a more appropriate alternative for tertiary e-learning. The paper starts by briefly explaining the research on which this work is based and summarizing the evidence that suggests it is worth consideration. The paper then examines the source of the limitations of industrial e-learning by analyzing three different components: product, process, and people. For each of these, how industrial e-learning sees each component is described, the problems of these conceptions is illustrated, and the emergent alternative is presented. While not positioned as being without problems or as the only alternative to industrial e-learning, it is suggested that these alternative principles can offer significant advantage to tertiary institutions.

Research method and limitations

From the initial stages of its design the Webfuse system was intended to be a vehicle for both practice (it hosted over 3000 course sites from 1997-2009) and research. Underpinning the evolution of Webfuse was an on-going process of action research that sought to continually improve the system through insights from theory and observation of use. This work has contributed in varying ways to over 25 peer-reviewed publications. Other researchers have also studied Webfuse when investigating institutional adoption of e-learning systems (Danaher, Luck, & McConachie, 2005) and shadow systems in the context of ERP implementation (Behrens, 2009; Behrens & Sedera, 2004). Starting in 2001 the design of Webuse became the focus of a PhD thesis (Jones, 2011) that made two contributions towards understanding e-learning implementation within universities: the Ps Framework (Jones, Vallack, & Fitzgerald-Hood, 2008) and an Information Systems Design Theory (ISDT) titled "*An ISDT for emergent university e-learning systems*". The Ps Framework arose out of an analysis of existing e-learning implementation practices and as a tool to enable the comparison of alternate approaches to e-

learning implementation (Jones et al., 2008). The ISDT offers guidance for e-learning implementation that brings a number of proposed advantages over industrial e-learning. This paper draws on the Ps Framework and the ISDT to illustrate the limitations of industrial e-learning and a promising alternative by focusing on three (of the seven) components of the Ps Framework: product, process and people.

The ISDT – and the sub-set of principles presented in this paper - seek to provide theoretical guidance about how to develop and support information systems for university e-learning that are capable of responding to the dominant characteristics (diversity, uncertainty and rapid change) of university e-learning. This is achieved through a combination of product (principles of form and function) and process (principles of implementation) that focus on developing a deep and evolving understanding of the context and use of e-learning. It is this deep and evolving understanding and the ability to make rapid changes to the system, which ultimately encourages and enables adoption and on-going adaptation. The argument is that any instantiation built following the principles of the ISDT will support e-learning in a way that: is specific to the institutional context; results in greater quality, quantity and variety of adoption; and, improves the differentiation and competitive advantage of the host institution.

As with all research, this work has a number of limitations. Through its use of action research, this work suffers the same limitations, to varying degrees, of all action research. Baskerville and Wood-Harper (1996) identify these limitations as: (1) lack of impartiality of the researcher; (2) lack of discipline; (3) mistaken for consulting; and (4) context-dependency leading to difficulty of generalizing findings. These limitations have been addressed within this work through a variety of means including: a history of peer-reviewed publications throughout the project; use of objective data sources; the generation of theory; and, an on-going process of testing. The nature of this research means that the resulting ISDT and the principles described here have not been "proven". This was not the aim of this work. Instead, the intent was to gather sufficient empirical and theoretical support to build and propose a coherent and useful alternative to industrial e-learning. The question of proof and further testing of the ISDT in similar and different contexts provides – as in all research aiming to generate theory - an avenue for future research.

On the value of Webfuse

This section aims to show that there is some value in considering Webfuse by summarising the empirical support for the ISDT by presenting evidence that the development of Webfuse led to a range of features specific to the institution and to greater levels of adoption of those features. From 1997 through 2005 Webfuse was funded and controlled by one of five faculties at CQUniversity. During the life-span of Webfuse CQU adopted three different official, institutional LMSs: WebCT (1999), Blackboard (2004), and Moodle (2010). In 2005/2006, Webfuse became a system controlled by a central IT division. After this centralization development of Webfuse was restricted by much the same practices – but not entirely - as industrial e-learning.

Specific to the context

During the period from 1999 through 2002 the "Webfuse faculty" saw a significant increase in the complexity of its teaching model including the addition of numerous international campuses situated within capital cities and a doubling in student numbers, primarily through full-fee paying overseas students. By 2002, the "Webfuse faculty" was teaching 30% of all students at the University. Due to the significant increases in complexity of teaching, a range of teaching management and support services were added to Webfuse including: staff and student "portals", an online assignment submission and management system, a results upload application, an informal review of grade system, a timetable generator, student photo gallery, academic misconduct database, email merge facility, and assignment extension systems. Many of these tools and especially some of the features provided by these tools are not present in other systems, then and now. For example, Rossi and Luck (2011, p. 68) describe some of the differences between the Webfuse and Moodle online assignment management systems.

The value of these tools to the faculty is illustrated by this quote from the Faculty annual report for 2003

> [t]he best thing about teaching and learning in this faculty in 2003 would be the development of technologically progressive academic information systems that provide better service to our students and staff and make our teaching more effective. Webfuse and MyInfocom development has greatly assisted staff to cope with the complexities of delivering courses across a large multi-site operation (Danaher, Luck & McConachie, 2005, p. 39).

Further evidence of the contextual value of these services is that by 2003 the faculties not using Webfuse were

actively negotiating for access to the services. By 2009, over 12,000 students and 1100 staff from across the institution made use of these services. Even though Webfuse is no longer officially supported, a few of these services continue to be used by the university into 2012.

Quotes from staff using the Webfuse systems reported in various publications also provide some insights into how well Webfuse supported the specific context at CQUni.

> my positive experience with other Infocom systems gives me confidence that OASIS would be no different. The systems team have a very good track record that inspires confidence (Jones, Cranston, et al., 2005, n.p.)

> The key to easy use of OASIS is that it is not a off the shelf product that is sooooo generic that it has lost its way as a course delivery tool. (Jones, Cranston, et al., 2005, n.p.)

> I remember talking to [a Webfuse developer] and saying how I was having these problems with uploading our final results into [the Enterprise Resource Planning (ERP) system] for the faculty. He basically said, "No problem, we can get our system to handle that"…and 'Hey presto!' there was this new piece of functionality added to the system … You felt really involved … You didn't feel as though you had to jump through hoops to get something done. (Behrens, 2009, p. 126)

Webfuse also included a number of context-specific learning and teaching services, a sample includes:

- the *course barometer*;
  Based on an innovation seen at a conference (Svensson, Andersson, Gadd, & Johnsson, 1999) the barometer was designed to provide students a simple, anonymous method for providing informal, formative feedback about a course (Jones, 2002). Initially intended only for the author's courses, the barometer became a required part of all Webfuse course sites from 2001 through 2005. In 2007/2008 the barometers were used as part of a whole of institution attempt to encourage formative feedback in courses hosted by both Webfuse and Blackboard.
- *Blog Aggregation Management* (BAM); and
  BAM allowed students to create individual, externally hosted web-logs (blog) and use them as reflective journals. Students registered their external blog with BAM, which then mirrored all of the students' blog posts on an institutional server and provided a management and marking interface for teaching staff. Created by the author for use in his own teaching in 2006, BAM was subsequently used in 26 course offerings by 2050+ students and ported to Moodle as the BIM module. In reviewing BAM, the EDUCAUSE Learning Initiative's Guide to Blogging suggested that

> One of the most compelling aspects of the project was the simple way it married Web 2.0 applications with institutional systems. This approach has the potential to give institutional teaching and learning systems greater efficacy and agility by making use of the many free or inexpensive—but useful—tools like blogs proliferating on the Internet and to liberate institutional computing staff and resources for other efforts (Coghlan et al., 2007, n.p.).

- A *Web 2.0 course site*.
  While it looked like a normal course website, none of the functionality – including discussion, wiki, blog, portfolio and resource sharing – for this 2007 course site was implemented by Webfuse or any other institutional system. Instead, freely available and externally hosted Web 2.0 tools and services provided all of the functionality. For example, each student had a portfolio and a weblog provided by the site http://redbubble.com. The content of the default course site was populated by using BAM to aggregate RSS feeds (generated by the external tools) which were then parsed and displayed by Javascript functions within the course site pages. Typically students and staff did not visit the default course site, as they could access all content by using a course OPML file and an appropriate reader application. The presence of the course site satisfied an expectation that there still be a course site.

Greater levels of adoption

Encouraging staff adoption was one of the main issues raised in the original Webfuse design paper (Jones & Buchanan, 1996). A difficulty in encouraging high levels of quality use of e-learning has remained a theme in the broader industrial e-learning literature. Initial use of Webfuse in 1997 and 1998 was not all that successful in achieving the goal. With only five – including the designer of Webfuse who made 50% of all edits using the system - of 60 academic staff making any significant use of Webfuse by early 1999 (Jones & Lynch, 1999).

These limitations were addressed from 1999 onwards by a range of changes to the system, how it was supported and the organizational context. The following illustrates the success of these changes by comparing Webfuse adoption with that of the official LMS (WebCT 1999-2003/4; Blackboard 2004-2009) used primarily by the non-Webfuse faculties. It first examines the number of course sites and then examines feature adoption.

From 1997 Webfuse automatically created a default course site for all Faculty courses by drawing on a range of existing course related information. For the official institutional LMS course sites were typically created on request and were then manually populated by the responsible academics. By the end of 2003 – 4 years after the initial introduction of WebCT as the official institutional LMS – only 15% (141) of courses from the non-Webfuse faculties had WebCT course sites. At the same time, 100% (302) of the courses from the Webfuse faculty had course sites. Due to the need for academics to populate WebCT and Blackboard courses sites, the presence of a course website didn't necessarily imply use. For example, Tickle et al (2009) report that 21% of the 417 Blackboard courses being migrated to Moodle in 2010 contained no documents.

Research examining the adoption of specific categories of LMS features provides a more useful insight into LMS usage. Figures 1 through 4 use the research model proposed by Malikowski, Thompson, & Thies (2007) to compare the adoption of LMS features between Webfuse (the thick continuous lines in each figure), CQUni's version of Blackboard (the dashed lines), and a range of adoption rates found in the literature by Malikowski et al (2007) (the two dotted lines in each figure). This comparison is available for four of the five LMS feature categories identified by Malikowski et al (2007): content transmission (Figure 1), class interaction (Figure 2), student assessment (Figure 3), and course evaluation (Figure 4).

The Webfuse usage data included in Figures 1 through 4 only include actual feature use by academics or students. For example, from 2001 through 2005 100% of Webfuse courses contained a course evaluation feature called a course barometer, however, only courses where the course barometer was actually used by students are included in Figure 4. Similarly, all Webfuse default course sites contained content (either automatically added from existing data repositories or copied across from a previous term). Figure 1 only includes data for those Webfuse course sites where teaching staff modified or added content.
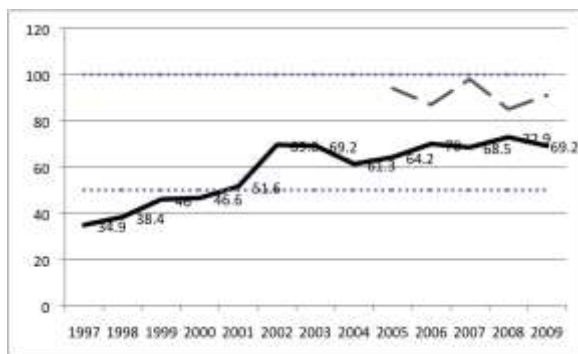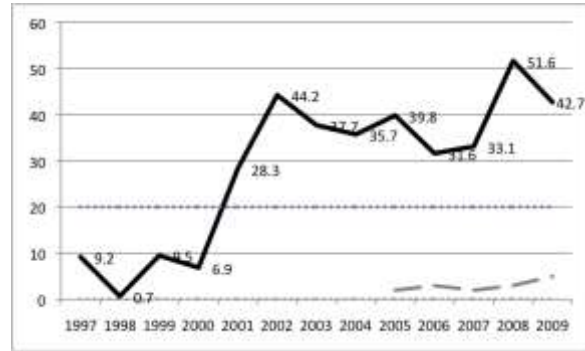

Figure 1: Adoption of content transmission features: Webfuse, Blackboard and Malikowski
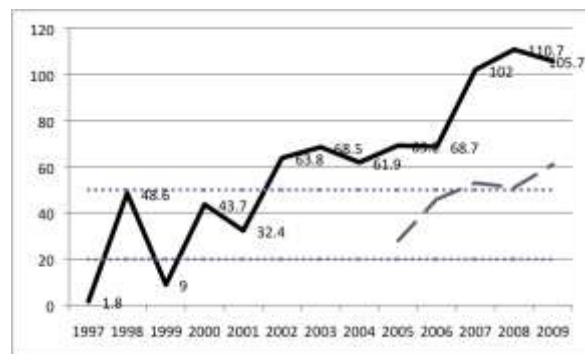
Figure 2: Adoption of class interactions features: Webfuse, Blackboard and Malikowski (missing archives of most pre-2002 course mailing lists)
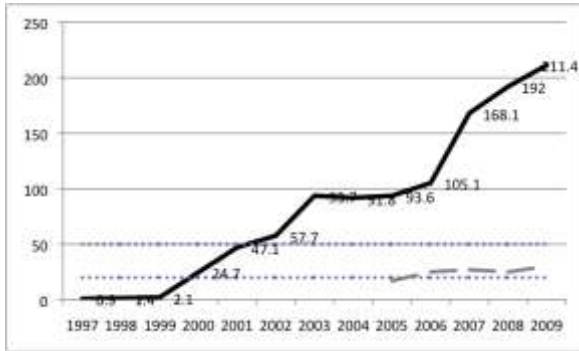
Figure 3: Adoption of student assessment features: Webfuse, Blackboard and Malikowski

Figure 4: Adoption of course evaluation features: Webfuse, Blackboard and Malikowski

Figures 2 and 3 indicate Webfuse adoption rates of greater than 100%. This is possible because a number of Webfuse features – including the EmailMerge and online assignment submission and management tools - were being used by Blackboard courses (i.e. non-Webfuse courses). Webfuse was seen as providing services that Blackboard did not provide, or that were significantly better than what Blackboard did provide. Similarly, the spike in Webfuse course evaluation feature adoption in 2008 to 51.6% is due to a CQU wide push to use the Webfuse course barometer tool to improve formative feedback across a range of courses regardless of the LMS. Figures 2, 3 and 4 show that adoption of Webfuse features was significantly higher than the adoption of equivalent Blackboard features at CQU. It was also significantly higher than the adoption rates found by Malikowski et al (2007) in the broader literature.

Product

One of the defining characteristics of the industrial e-learning paradigm is the reliance on the Learning Management System (LMS) – be it open source or proprietary - as the *product* component of e-learning. The LMS is an example of an integrated or monolithic information system. Different types of information systems have specific sets of advantages and disadvantages that make them appropriate for certain circumstances. An integrated system offers cost efficiencies and other benefits through standardization but, at the same time, such systems constrain flexibility, competitiveness, autonomy, and increase rigidity (Light, Holland, & Wills, 2001; Lowe & Locke, 2008). Such systems are best suited to circumstances where there is commonality between organizations and stable requirements with low uncertainty. This does not seem to be a good description of tertiary e-learning over the last 10 years and especially not for the next 10. This section looks at two of the repercussions of this mismatch: 1) organizations and people must adapt to the system; and, 2) the single vendor limitation – before describing the alternate principles from the ISDT.

The first repercussion of an integrated system is captured a technical staff member participating in CQUni's 2003 LMS selection process who suggested that "we should seek to change people' behaviour because information technology systems are difficult to change" (Sturgess & Nouwens, 2004, n.p.). Rather than being an isolated perspective, this comment captures the accepted industry best practice recommendation to implement integrated systems in their "vanilla" form because local changes are too expensive (Robey, Ross, & Boudreau, 2002). Maintaining a vanilla implementation constrains what is possible with the system, limiting change, innovation and differentiation. So rather than enable exploration of and learning from contextually appropriate pedagogical designs, the nature of an LMS encourages adoption of pedagogical designs that are supported by the LMS.

For example, in 2007 an instructional designer working on a redesign of a CQUni course was stymied by the limitations of the Blackboard LMS. Blackboard could not support the required number of group-based discussion forums required by the new course design. Normally, with an integrated system the pedagogical approach would have to be changed to fit the confines of the system. Instead the implementation of the course site was supplemented with use of one (at this stage Webfuse had three different types of forum) of the Webfuse discussion forums allowing the original educational design to be followed. Similarly, when CQUni adopted Moodle, academic staff teaching large first year courses using the Webfuse BAM functionality were encouraged to modify this practice to better fit with the capabilities of Moodle.

The regular forced migration to another version of an LMS is the extreme example of the organization being forced to change in response to the technology, rather than the technology fitting to organizational needs. It is

not uncommon to hear Universities being forced to adopt a new LMS because the vendor has ceased supporting their current system. The cost, complexity and disruption caused by an LMS migration has significant ramifications. First, institutions seek a long period of "vanilla" use to recoup the cost of migrating to the new system. This reinforces the problems of forced adaptation of practice to fit the technology's limitations. Second, there is the problem of the "technology dip" (Underwood & Dillon, 2011) where the introduction of new technology creates a reduction in learning outcomes while teaching staff grapple with the new technology. Lastly, the cost and complexity of the upgrade encourages organization to engage in a long period of vanilla use of the integrated system in order to recoup the expense of the forced migration.

Another characteristic of an integrated system is that the quality of the tools available is limited to those provided by a single vendor or community. For example, a key component of the disquiet about the Curt Bonk MOOC hosted within a Blackboard LMS was the poor quality of the Blackboard discussion forum (see Lane, 2012). Similar reservations have been long held about the quality of the Moodle Wiki and Blog tools. LMS-based tools also tend not to fare well in comparisons with specialist tools. In addition, integrated systems tend to support only one version of every given tool. Leading to the situation where users can pine for the previous version of the tool because it suited their needs much better than the new.

The ISDT formulated from the experience of developing Webfuse proposes 13 principles for the form and function of the product for emergent e-learning (Jones, 2011, p. 344). These principles were divided into 3 groups:
1. Integrated and independent services.
   Rather than a system, Webfuse was positioned as the glue used to "fuse" together widely different services and tools into an integrated whole. Webfuse was an example of a best-of-breed system, a type of system that provides more flexibility and responsiveness to contextual needs (Light et al., 2001). For example, when the existing discussion forum tool was seen as limited, a new discussion forum tool was selected and integrated into Webfuse. At the same time the old discussion forum tool was retained and could be used by those for whom it was an appropriate fit. While new tools could be added as required, the interface used by staff and students remained essentially the same. There was no need for expensive system migrations and the resulting technology dip.
2. Adaptive and inclusive architecture.
   Almost all LMS support some form of plug-in architecture where external users can develop new tools and services for the LMS. This architecture, however, is generally limited to tools written specifically for the LMS and its plug-in architecture. The Webuse "architecture" was designed to support the idea of software wrappers enabling the inclusion of a much broader array of applications.
3. Scaffolding, context-sensitive conglomerations.
   A conglomeration is not simply a service such as a discussion forum. Instead, it may combine multiple e-learning services with additional scaffolding such as institutionally specific information and expert knowledge. Conglomerations should also provide opportunities for academics to observe, question and discuss applications of the services. This echoes Laurillard's (2008, p. 144) suggestion that academics need tools and environments that enable them to gain "access to others' ideas and outputs, but also to support their own innovation, changing others' design, exploring, experimenting, adapting, reflecting and collaborating".

Writing about the need for universities to embrace diversity Thomas (2012) talks of Procrustes who "would stretch and sever the limbs of his guests to fit the size of his bed. We, too, are continuing to stretch and shape our higher education to a particular standard to the detriment of students and society alike" (para 22).
In terms of e-learning, that "particular standard" is defined by the integrated information systems – the products - we are using to implement industrial e-learning. Rather than learn from the use of these systems, universities are being constrained to a particular standard.

Process

Industrial e-learning – almost by definition – uses a planning or purpose driven approach to its process. Such an approach to process – labeled as teleological by Introna (1996) – has dominated organizational theory and practice to such an extent that it has become taken for granted. Anything else is often seen as irrational or inefficient. This is despite the debate between the "planning school" of process thought and the "learning school" of process thought being one of the most pervasive debates in management (Clegg, 2002). Prior papers (Jones, Luck, McConachie, & Danaher, 2005; Jones & Muldoon, 2007) have used the nine attributes of a design process formulated by Introna (1996) to demonstrate the limitations of teleological approaches to process when applied to the practice of e-learning. Rather than repeat the argument from these papers, this section offers two new examples of the limitation of teleological processes to e-learning before briefly describing the alternative,

emergent approach used in Webfuse.

The strategic process used to transition CQUni to the Moodle LMS described by Tickle et al (2009) is almost an archetypal example of a teleological process. One of the institutional policies introduced as part of this strategic process was the adoption of Minimum Service Standards for course delivery. This approach was intended to act as a starting point for "integrating learning and teaching strategies that could influence students study habits" and to "encourage academic staff to look beyond existing practices and consider the useful features of the new LMS" (Tickle et al., 2009, p. 1042). The minimum standards were planned ahead of time and embedded in a web-based checklist. The expectation was that teaching staff would actively compare the design of their course site against the minimum standards and tick off elements against the checklist. A senior lecturer widely recognized as a quality teacher described the actual process adopted as

> I go in and tick all the boxes, the moderator goes in and ticks all the boxes and the school secretary does the same thing. It's just like the exam checklist (Anonymous, personal communication, 1ˢᵗ October, 2010).

The checklist was removed in 2011.

One of the three necessary requirements for teleological processes identified by Introna (1996) is that the designers must be able to manipulate the system's behaviour. Such manipulation is necessary to ensure achievement of the plan. Technology development and diffusion needs cooperation, however, it takes place in a competitive and conflictual atmosphere where different social groups – each with their own interpretation of the technology and the problem to be solved – are inevitably involved and seek to shape outcomes (Allen, 2000). In terms of tertiary e-learning, academics form a significant part of the social group. Academics are trained not to accept propositions uncritically and subsequently cannot be expected to adopt strategies without question or adaptation (Gibbs, Habeshaw, & Yorke, 2000).

By definition, a teleological process is focused on achieving the established purpose. Introna (1996) identifies two other requirements for teleological processes: a stable and predictable system, and the ability to accurately determine goals ahead of time. Such assumptions do not provide space for learning and changes to the plan. The philosophical foundations of teleological processes –"notions of rationality, science and method" (Ciborra, 2002, p. 1) – are in direct contradiction to views of learning meant to underpin the best learning and teaching. Rossi and Luck (2011) talk about how "[c]onstructivist views of learning pervade contemporary educational literature, represent the dominant learning theory and are frequently associated with online learning" (p. 62). Wise and Quealy (2006) argue, however, that

> while a social constructivist framework may be ideal for understanding the way people learn, it is at odds not only with the implicit instructional design agenda, but also with current university elearning governance and infrastructure (p. 899).

Amongst the many negative ramifications of this mismatch is where staff development sessions become focused on encouraging use of the features of the chosen LMS, rather than quality learning and teaching. It is one of the factors that contributes to staff developers being "seen as the university's 'agent'" (Pettit, 2005, p. 253). It encourages the perception that change is being done to academic staff, rather than with or for them.

The ISDT abstracted from the Webfuse work includes 11 principles of implementation divided into 3 groups (Jones, 2011, p. 354). The first and third groupings will be described in the next section. The second grouping – An adopter-focused, emergent development process – involves using in-depth knowledge of the human, social and interpersonal aspects of the institutional context to actively develop the system to respond quickly to real, contextual needs. It is through this type of process that the institutional implementation of e-learning – more correctly the people involved with e-learning - can learn from what is going on, prepare for the future and lead in a climate of change.

People

The conceptions of product and process found within industrial e-learning directly influences the type of positions created to support industrial e-learning and the organizational structures within which they operate. The cost of an integrated system, the assumption that it is the only valid tool for e-learning, and a process focused on achieving a planned purpose (i.e. widespread effective use of the LMS) leads to the creation of positions tasked with achieving that process, rather than with responding to changes in the environment. In

addition, it leads to these roles being slotted into hierarchical structures that divide roles (e.g. technical, instructional design, teaching etc.) into different branches of the organization with separate reporting lines. This section briefly examines just some of the limitations of this approach.

The logical decomposition inherent in teleological design creates numerous, often significant, organizational boundaries between the people involved with using and supporting e-learning. Such boundaries inhibit the ability to integrate knowledge across the organization as illustrated by Rossi and Luck (2011):

> During training sessions … several people made suggestions and raised issues with the structure and use of Moodle. As these suggestions and issues were not recorded and the trainers did not feed them back to the programmers ... This resulted in frustration for academic staff when teaching with Moodle for the first time as the problems were not fixed before teaching started (p. 68).

Logical decomposition separates out the trainers, the programmers and the academic staff that hinder knowledge sharing. This separation is typically bridged by a governance structure that requires any need for changes to flow up from the users to a central committee that includes senior leaders from the faculties, academics and central IT and learning and teaching representatives. If approved, changes are passed onto programmers. The length of the communication chain from the source of the original need up to this central committee (and back again) translates into a game of Chinese Whispers as the original need is interpreted through the experiences and biases of the people along the way. Leading to the impression reported by Rossi and Luck (2011) "[t]he longer the communication chain, the less likely it was that academic users' concerns would be communicated correctly to the people who could fix the problems" (p. 69). In addition, the significant cost of traversing this chain of communication also means that it is typically not worth the effort of raising small-scale changes thereby starving such needs of attention. Especially when the nature of the process and the product typically precludes the ability to make small changes efficiently.

Logical decomposition also encourages different organizational units to focus on their part of the problem and lose sight of the whole picture. An IT division evaluated on its ability to minimize cost and maximize availability is not likely to want to support technologies in which it has limited expertise. This is one explanation for why the leader of an IT division would direct the IT division's representatives on an LMS selection panel to ensure that the panel selected the Java-based LMS. Or a decision to use the latest version of the Oracle DBMS – the DBMS supported by the IT division - to support the new Moodle installation even though it hasn't been tested with Moodle and best practice advice is to avoid Oracle. A decision that - at one institution - led to significant periods of unavailability during the first few weeks of the "go live" term.

An extension of the problem of mixed purposes is the need to have the support and engagement of a senior leader. Often seen as a critical success factor for any significant change project, this also brings problems as the successful completion of the project is tied to the leader's progression within the leadership hierarchy. Consequently creating the situation where the project will be deemed a success, regardless of the outcome.

The first five Principles of Implementation from the Webfuse ISDT (Jones, 2011, p. 354) were grouped under the label "A multi-skilled, integrated development and support team". The Webfuse development team were responsible for and had expertise in help-desk support, software development, user training and some ad hoc instructional design/staff development. The team was a part of the faculty and members regularly interacted with academics in the common room, in corridors, and on social occasions. Members of the Webfuse team had been students and took on a range of teaching tasks. Team members were able to make changes to the system in response to their experience. At its best, the team organized the governance process with oversight from faculty management and academic staff members. The people and organizational structures enable the on-going modification of the system in response to new insights gained during system use.

Conclusions

It has been argued that the characteristics of the industrial e-learning model currently dominating the practice of tertiary e-learning are inappropriate for the requirements of tertiary e-learning, both now and especially into the future. In particular, the nature of the components of industrial e-learning examined here – product, process and people – actively prevent the individuals and organizations involved from learning from their experience and responding to change. The product – the LMS, an example of an integrated system – is difficult to change and best-practice advice is to implement it as is. The process – a plan-driven approach to process – is typically focused on the successful and efficient implementation of the chosen integrated system, rather than responding

to and learning from change. Finally, the people and roles involved in industrial e-learning are created and organized to support the chosen process. These mutually reinforcing trio of conceptions appear to limit the capability of university e-learning from learning for the future and leading in a climate of change.

An alternative to industrial e-learning was presented. This alternative is based on a product that can be rapidly modified in response to learning that arises from an adopter-focused, emergent development process implemented by a multi-skilled development team interacting regularly and deeply with the users of the system. As implemented with the Webfuse system this alternative approach has resulted in a system that is specific to the needs of the institutional context and shown greater levels of adoption. The underpinning philosophy of this alternative is closer to that of social constructivism, situated cognition and communities of practice and seems a better match for institutions wishing to learn for the future and respond effectively to a climate of change. While by no means a simple set of principles to adopt - not the least because of the entrenched and almost unquestioned acceptance of the principles of industrial e-learning – this approach does appear to offer a better fit for the requirements of tertiary e-learning and the broader context within which it operates.

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