Evaluating Processes and Platforms for Potential ePortfolio Use: The Role of the Middle Agent

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With the changing face of higher education comes a demand to include new technological tools. Universities need to build their capacity to respond to new technology-related challenges. The introduction of ePortfolios is a significant strategy in this response. A number of organizational change management models are used to analyze the incorporation of new technologies, such as ePortfolios, into university culture, including Kotter's Model of Change, the LASO Model, and the middle-out approach. This article offers a case study of using a middle-out approach to technology adoption in the context of change management. It argues that such an approach provides links between university faculty values and upper institutional management decision-making that results in a positive and collegial transition to introducing ePortfolios. This study used a staged methodological process, based on faculty and professional staff feedback, literature in the field, benchmarking with similar universities, and external reports of best practices to develop functional criteria customized to the institution's context, an analysis of available and appropriate ePortfolio software, and finally, recommendations to the institution's decision-makers. The distinction is made throughout the article between faculty, who are staff members with teaching and research responsibilities, and professional staff, who provide a range of support to faculty, including teaching support and technical services. Where a particular sub-group is identified, they are named in terms of their primary function. Findings reflect the importance of the individual context and available resources of the institution when assessing new technology implementation and the value of the middle-agent role in facilitating a seamless shift towards change inclusive of both "top" and "bottom" stakeholder groups.

The face of higher education is rapidly changing. External pressures to provide authentic learning experiences that support preparation for the real world of employment (Reese & Levy, 2009) require flexible teaching approaches. As professional accreditation organizations increase their demand for evidence of graduate competencies, documenting and recording learning through hard copy portfolios can become unwieldy for students to use and teachers to assess. Furthermore, students in a client-focused higher education environment expect improved services, including technology-enhanced learning (Universities and Colleges Information Systems Association, 2012) and teaching (Bhati, Rankin, & Thomas, 2009; Duncan-Howell, 2012). Students also face competing priorities between study demands and financial pressures, resulting in the need for flexible learning options. One response to these complex challenges (Scott, Coates, & Anderson, 2008) is an increased focus on e-learning and blended learning delivery options (Lai, 2011), even for universities that previously engaged students in predominantly face-to-face learning.

The introduction of ePortfolios is a significant strategy in an institutional approach to technology-enhanced learning, blended learning or e-learning. An ePortfolio is an online repository in which students store and share a variety of informal and formal learning experiences, collected over time, using written, visual, and auditory artifacts. The "processes of planning, synthesizing, sharing, discussing, reflecting, giving, receiving, and responding to feedback" (JISC &

Higher Education Academy, 2008, p. 6) are as important to the learning processes as the finished products. ePortfolios are flexible personal learning spaces owned by the individual students rather than by the institution (Hughes, 2008). In recent years, development of the use of ePortfolios in the higher education sector has advanced rapidly, with ePortfolios becoming a pedagogical and technological tool used to serve numerous purposes (Hallam et al., 2008). Examples of the institutional use of ePortfolios includes e-administration of a diverse student population, assessment of student learning (Stefani, Mason, & Pegler, 2007), and the demonstration of graduate attributes attained and future student career preparation.

Introducing a new technology, such as an ePortfolio, is disruptive to institutional processes at the macro level and has implications for learning and teaching practices at the micro level (Burnett, 2001). Without alignment to institutional and user needs, any new technological solution is likely to be problematic, making it more difficult for pedagogical innovation to take place. Without careful preparation for the new learning approach, teachers and students can revert back to tried and tested pedagogies, even if these are not as effective for learning (Westberry, McNaughton, Gaeta, & Billot, 2012) or they institute other solutions outside of the organizational infrastructure. For example, early adopters of ePortfolios can outpace both the existing organizational infrastructure and higher management buy-in (Jasinsky, 2007), potentially incorporating ePortfolios into their own courses/programs without

institutional support. Such bottom-up innovation, while providing a local and immediate solution, may not be long-lasting and can result in wider adoption problems (Uys, 2007), especially if any challenges are encountered. In another common approach, "ePortfolio champions" initiate trials of ePortfolio use within selected courses/programs that are supported by relevant faculty. Similarly, problems can occur at the end of the trial if institutional decision-makers do not agree to implement ePortfolios. In this situation, programs with an ePortfolio embedded into their curriculum from the trial have no guarantee of its longevity.

Adoption of ePortfolios at a programmatic or institutional level requires university decision-makers' support and approval, based on consideration of the innovation and all its implications for the institution (Uys, 2007). This article offers a case study of an institutional assessment approach to the decision-making processes and potential ePortfolio platforms in an Australian regional university. The authors argue that the role of a middle agent can provide links between university faculty opinions and institutional decision-making, resulting in a positive and collegial process of introducing new technology. Based on the individual institutional context, faculty and professional staff opinions, and a review of literature and other universities' experience, this middle team developed a systematic, evidence-based approach to criteria development, investigated suitable software options, and promoted to university decision-makers an evidence-based approach to ePortfolio adoption.

Literature Review

Approaches to Institutional Change

Each institution has its own culture, which is shaped by its context, mission, and priorities (Conole, White, & Oliver, 2007). Policy development needs to consider organizational contexts and different perspectives and should focus on human aspects rather than technological developments (Conole et al., 2007). Increasingly, technologically-based learning and teaching solutions are recognized to be part of higher education's strategic business (JISC & Higher Education Academy, 2008). Responses therefore need to be strategic rather than based on technological affordances (Uys, 2007). Most institutions have a strategic document relating to e-learning: either a discrete e-learning strategy or principles embedded into wider learning and teaching strategies (JISC & Higher Education Academy, 2008). The alignment of e-learning or a blended learning strategy to support institutional goals and values enables explicit support from senior leadership and can result in widespread and impactful change (JISC & Higher Education Academy, 2008).

Aligned with its institutional top-level plans, the university that is the subject of this case study has a formal policy statement of its position on blended learning; a term defined as "the integration of educational technologies with face-to-face teaching to enhance the student learning experience" (University of the Sunshine Coast, 2012, para. 1). The stated aims of using this blended learning approach include increased flexibility, improved student preparation for face-to-face sessions, enhanced communication of assessment and feedback, increased learning networks, and embedded educational technologies in curriculum design (University of the Sunshine Coast, 2012). Thus far, these tools normally appear as part of the University's Learning Management System (LMS), with Blackboard as the core platform (University of the Sunshine Coast, 2012).

Any introduction of ePortfolios into an institution will involve management of multifaceted change processes. While there are numerous change-management models available within the literature (Cummings, Phillips, Tilbrook, & Lowe, 2005), we discuss here three methods used recently by several universities to analyze the introduction of technology-initiated changes within their institutions. These models are: Kotter's Model of Change, the LASO Model for Technological Transformation in Tertiary Education, and the middle-out approach. Kotter's Model of Change explains change according to eight strategic steps, all of which must be present for change to be effective (Kotter, 2012). These steps are: establishing a sense of urgency, creating the guiding coalition, developing a change vision, communicating the vision for buy-in, empowering broad-based action, generating short-term wins, never letting up, and incorporating changes into the culture (Kotter, 2012). This model is a popular choice for analyzing institutional change in higher education. For example, Uys (2010) discussed one university's use of this model to describe its institutional change-management processes during the implementation of an open source LMS, while Quinn et al. (2012) used it to evaluate the change-management principles employed in a collaborative university project. Carneiro (2010) used Kotter's model to interpret innovation and change within higher education, highlighting the importance of the role played by organizational structure.

The Leadership, Academic, and Student Ownership and Readiness (LASO) Model for Technological Transformation in Tertiary Education argues that top-down and bottom-up processes need to be integrated in order to achieve technological transformation (Uys, 2007, 2010). This model is based on the assumption that top-down change has failed and that the concerns and needs of academic faculty and students need to be addressed through bottom up approaches that give ownership of the

technological change to those implementing the changes "on the ground" (Uys, 2007). Strategic inside-out activities that are used to bridge the gap between stakeholders reinforce both academic ownership (Uys, 2007) and the connection between "top" and "bottom." Essentially, in a top-down approach senior university managers drive changes through policies and restructuring, while in a bottom-up approach, inspirational individual faculty members initiate change, challenging others to follow their lead (Cummings et al., 2005).

Introduction of new technologies requires organizational change produced as "the result of a team effort in which the most-appropriate and best-positioned people are involved in a process of action learning" (Scott, 2003, p. 73). This suggests that top-down and bottom-up approaches may not always be the most suitable. The analysis of change-management processes at one Australian university identified an alternative option in which middle managers, sometimes called middle agents or change intermediaries, filled the leadership gap and responded to early adopter demands in a collegial manner (Cummings et al., 2005). Middle agents have that title because they can exercise agency and have capacity and resources to introduce change. They are usually trusted by senior management and also have a good track record with practitioners working in the field. They have established information channels that allow them to liaise between top and bottom (Parag & Janda, 2010). Rouleau (2005) investigated the micro-practices of middle managers in terms of how they interpret and communicate change every day and found that they engaged in four specific practices uniquely possible for them because of their position in the organization. Middle managers' practices, according to Rouleau (2005), translate the orientation of senior management to others, communicate the strategy differentially on the basis of socio-cultural codes, discipline the participant to receive the message positively by using particular words, gestures, and symbols, and justify the change by providing good reasons that are acceptable to the participant with whom they are communicating. Balogun (2003) described middle managers as a strategic asset in implementing change. This suggests that middle agents' work is often subtle and focused on influencing others to take on institutionally-endorsed change. The middle-out approach is appropriate for managing change within an institution and therefore provides a suitable model for analysis of the processes and outcomes of this research.

Method and Findings

Context and Background

In late 2012, a small but rapidly growing regional university, which had reached sufficient student enrollments to consider ePortfolio use, undertook a six-month feasibility study to determine whether university academic faculty and professional staff would consider using ePortfolios as a teaching and student learning tool. The university maintained a neutral position on the introduction of ePortfolios but was aware of sector trends and potential benefits of ePortfolio adoption. The feasibility study was funded through the ICT Governance Committee's Strategic Asset Management Plan (SAMP). Throughout the study, the project team submitted regular reports to this group, both for funds acquittal and as an advocacy tool, reflecting the middle-out approach adopted for the project. Furthermore, research ethics approval was sought and granted. This facilitated the project team's capacity to gather and share information about the project beyond the university.

The aims of this feasibility study were to:

1. Investigate the purposes that academic faculty and professional staff have for using an ePortfolio within the context of blended learning, current university systems and resources, and the higher education sectoral experiences;
2. develop a set of criteria regarding the functional requirements of an ePortfolio at the university, taking into account existing systems and resourcing;
3. investigate available technologies for achieving these purposes; and,
4. make recommendations to the university's senior management regarding ePortfolio use at the university.

Although some overlap occurred, these stages were undertaken in a linear fashion, building evidence from one stage to input into the decision-making of the next stage. The project team included the Director of the Learning and Teaching Center, the Project Manager, and an Information Technology (IT) Functional Analyst. No members of the project team held strong views about the adoption of an ePortfolio solution.

Faculty and Professional Staff Opinion Associated with ePortfolios

The study used a number of consultative methods to engage with academic programs and support services across the University. Potential participants were recruited through posters, word-of-mouth recommendations, networks and program presentations, and the invitation to join an e-mail interest group. An initial survey (see Appendix) was used to elicit views of ePortfolios for student use. Questions centered on perceptions of how ePortfolios might be used, enabling

factors for successful implementation, and the main barriers and problems associated with their use at the university. A limited response resulted in a second data-collection phase using discussion groups and interviews with faculty. Further responses came from the ePortfolio e-mail interest group. Project team participation in external cross-institutional forums and conferences supplemented the internal data.

The data collection phases resulted in only forty formal responses from the faculty and professional staff cohort of about 600. Although the small number of responses limits the capacity of the study to provide meaningful quantitative data, participants who responded valued the opportunity to engage with initial development of the ePortfolio implementation and requisite change processes. Having a survey instrument elicited opportunities for further conversations about ePortfolios with interested faculty. The largest number of responses came from faculty teaching in professional degree programs who were seeking tools to evidence student competencies and to meet accreditation standards, as was explained by one group participant: "Accreditation is very important. At the moment it is hardcopy and not very stringent but it will become more rigorous." A second area that gained a number of responses was employment enhancement: "As a prospective employer, I would look very favorably on this [ePortfolio] as a type of resume or application." While most of the findings were related to the technological affordances gained by using ePortfolios, participants also saw pedagogical benefits in using an ePortfolio for reflective practice, for assessment and feedback, and for evidencing graduate attributes.

Development of Set of Functional Requirements for ePortfolio Use

Choosing the right platform for ePortfolios is also challenging because the platform needs to align with the institution's purposes (Goldsmith, 2007). Therefore, any effort towards adopting an ePortfolio should establish a set of criteria that has this alignment (Goldsmith, 2007). Data collected from faculty and professional staff, together with a literature review, provided insight into the development of functional criteria suitable to the individual context of the university. Constructivism was used as the theoretical basis for the requirements, as the aim of having students use ePortfolios was to encourage "independent, self-reliant learners who have the confidence and skill to use a range of strategies to construct their own knowledge" (Stefani et al., 2007, p. 12). Based on this theoretical foundation, pedagogical and technological functions were identified as important by the project team.

Pedagogical priorities from participants who responded to the survey questions centered on reflection, assessment and feedback, and the gathering and collation of evidence to support claims that learning had occurred. Interest from professional programs with external accreditation and registration requirements were the most frequent, as faculty saw the ePortfolio as a vehicle to evidence and assure graduate learning outcomes to authorities with a vested interest in student achievement. These criteria were important in identifying an appropriate ePortfolio platform because, without the capacity to respond to these needs, even a platform that met all of the identified technological priorities would not be acceptable.

The technological priorities that were identified include interoperability, security, ownership, and usability. For the purposes of this article, we focus on the technological functions with the view that the criteria would ultimately guide the evaluation of a number of ePortfolio platforms that might be suitable for the university's purposes. The project team met for a brainstorming session to discuss the data collected from participants, criteria found in scholarly literature, and themes drawn from the experience of other universities, as expressed in cross-institutional ePortfolio meetings. Table 1 outlines the set of functional requirements developed from this meeting that addressed the need for a suitable ePortfolio software platform by the university's technical support staff responsible for ePortfolio implementation.

Investigation of Available Technologies

Based on the data collected and the development of pedagogical and technological criteria chosen for this institution, the next step was to link these criteria with suitable ePortfolio software. Recognizing the extensive list of ePortfolio solutions available to evaluate, the project team chose to only consider options for which there was either experience available within the University or more generally, in the higher education sector in Australia. Table 2 details the list of applications identified based on key categories developed by Himpsl and Baumgartner (2009). The list of software solutions is based on data collected from three main sources. First, formal feedback from surveys and verbal data collected from the participants of the focus groups identified solutions already used in the University or those used by participants in a previous higher education setting. The group contained both faculty and professional staff. In Table 2 the software identified from this source are classified as "Ex." The second source of potential ePortfolio software came from an investigation of software solutions currently licensed and available under the university's ICT infrastructure. In Table 2, the software identified from this source are classified as "ICT." The final source was the group of leading software applications used in the

Table 1
Set of Functional Requirements Developed for Potential ePortfolio Platform

Requirement	Details
Links to LMS (i.e., Blackboard)	• Grade center • Single sign-on • Add/retrieve artifacts
Interoperability	• Between schools/university • Export/import (universal standards) • Use after leaving the university
Sharing	• External • Internal • Comments/ feedback • Groups • Control access
Functionality	• Grade artifact • Templates • Customisable/able to personalize • Professional • Easy to use • Facilitates graduate attributes
Accessibility	• Compatible with screen readers
Support	• Supportable • Self-support
Hosting	• Hosted solution • Self-hosted • Self-maintain /develop • Off the shelf
Corporate Look & IT Infrastructure	• Customisable to achieve a corporate look • Meets current IT infrastructure and skills

Table 2
List Software Solutions Identified for Further Analysis

Software Solution	Provider	Type	Identified by
Blackboard Portfolios	Blackboard Inc.	L	ICT
Campus Pack - ePortfolio	Learning Objects	I	Ex, ICT
Mahara	eCDF New Zealand	M	Ex, Re
OneNote	Microsoft	A	Ex, ICT
PebblePad	Pebble Learning Ltd	M	Ex, Re
Wordpress	Automatic	A	Ex

Note. Key to column "type" using Himpsl and Baumgartner (2009): M = ePortfolio-Management-Software products offered to institutions as ePortfolio software; L = LMS/LCMS with integrated ePortfolio functions ("learning platform" with ePortfolio elements); I = Integrated systems respectively software families (CMS with possible Portfolio functions); and, A = Other systems, respectively kinds of software.

Australian higher education sector (ACODE, 2011) highlighted as "Re" in Table 2. The list of solutions covered a representative range of the types of applications available. A high-level analysis was performed on each of the software solutions identified in the first step. Each solution was assessed at a high level and rated against the criteria. Reviews of product documentation, video demonstrations, and high-level investigation of functionality in the software solutions formed the basis for the analysis. As Table 3 explains a positive ("+") rating was awarded if the criteria was met at an acceptable level and a negative ("-") rating if the criteria was not met. A "0" indicates that the criterion was not applicable. Based on a count of positive criteria, it was decided to proceed with further analysis on the Mahara (5 +'s), Blackboard Portfolios (5 +'s), and PebblePad (8 +'s) software solutions.

Table 3
List of Software Solutions Identified for Further Analysis

Software Solution	Links to LMS (Blackboard)	Interop-erability	Sharing	Function-ality	Access-ibility	Support	Hosting	Corporate Look & ITS Infrastructure
				Criteria				
Blackboard Portfolios	+	+	-	-	-	+	+	+
Campus Pack	+	-	-	-	-	+	+	-
Mahara	-	+	+	+	-	+	+	-
OneNote	-	-	-	-	-	-	0	-
PebblePad	+	+	+	+	+	+	+	+
Wordpress	-	+	-	-	-	-	+	-

Detailed Analysis of Performance

A detailed analysis of the three most suitable software solutions, Blackboard, Mahara, and Pebble Pad, was performed by the IT Functional Analyst. The Blackboard portfolio was the simplest application to analyze, as the University uses Blackboard as its LMS. Although benefits include no additional licensing or IT infrastructure costs, plus the ability to be well integrated into the existing LMS, it very quickly became apparent that Blackboard's functionality was limited in terms of the pedagogical and technological priorities. It provided an inflexible solution, with minimal opportunity to share; to produce professional-looking artifacts was difficult and time-consuming. Ongoing investigations highlighted that Blackboard Inc. would not be developing their portfolio functionality any further and that early discussions were underway to develop links between Blackboard and established ePortfolio providers (Koch, 2012). Based on these findings no further investigation continued and Blackboard was ruled out as a possible solution.

The open source solution Mahara was simple to install and set up. It offers an intuitive solution that enables easy initial uptake by users and allows for the creation of high-quality artifacts with a good level of customization. It was a pedagogically and functionally rich solution. Mahara provided no links to the LMS (Blackboard) but did provide the opportunity (with the right expertise) to develop and customize the software to meet the needs of the university. At first glance, Mahara is a relatively inexpensive solution because open sourcing means no licensing or purchase cost. However, the university's ICT infrastructure is Microsoft-based and to self-host Mahara, a Linux-based solution, would incur considerable costs for installation, maintenance, and support. Another option considered was finding an external vendor to host, manage and support an installation of Mahara.

The final option, PebblePad, offered a pedagogically and functionally rich solution, with a visually appealing user interface. It is more difficult to learn and requires a conceptual understanding of how to collate and produce an ePortfolio. The high-quality help functionality and video tutorials assist in development of the necessary skills to begin to producing content. After the steep learning curve was overcome, PebblePad began to reveal its true potential as an ePortfolio solution. It contains the flexibility to produce templates to meet virtually all requirements. It provides an authentic personal learning space in which content truly belongs to the user, with no possibility of anyone else accessing content that has not been shared intentionally. It also provides a solid mobile device and accessibility compatible solution, which does not provide a full visual experience but offers an equivalent content-creation platform. The providers, Pebble Learning, have strong higher education connections and relate to the pedagogical needs of an ePortfolio solution that is evident in the software.

User Trial

A trial was conducted for both PebblePad and Mahara, with volunteer users from the e-mail interest group. Five users participated in trials of PebblePad and seven of Mahara; two of these users were given access to both. An initial 2-hour training session aimed to provide for the users a conceptual view of using the software. Comprehensive training was intentionally not provided so as to identify the ease with which the solution can be self-taught. The users were encouraged to begin the trial by implementing their resume and to then explore the software's functionality for their own specific uses. The trial ran for approximately four weeks.

Upon completion of the trial, a feedback session was conducted for users. Information was gathered from each user to determine their overall experience

and opinion of the software, their ability to learn and use the software easily, identify strengths, weakness, and potential concerns or risks identified with rolling out the solution. The overall feedback was positive for both solutions, but two key points were noted for consideration in the final recommendation:

- PebblePad was conceptually difficult to understand and not easy to learn, with the implication that users would require additional user training and support than with Mahara.
- Independent of the solution chosen, a concern was raised that a well-defined training and support model would be required for a successful implementation of an ePortfolio solution. It would, in most cases, be difficult for faculty to manage independently the training and support for their students.

Recommendations to Institutional Decision-Makers

Using the data from all steps in the process, the following summary of analysis of the proposed software platforms explained in Table 4 was produced and presented to the University's senior management in order to enable evidence-based decision making.

As part of the recommendation document, a high level cost comparison was also presented. The cost comparison produced a surprising result. The implementation and running cost for Mahara, as an open source option, did not produce as low a cost as had been anticipated. A vendor-hosted solution of Mahara was only marginally less costly than the commercially licensed solution of using a hosted PebblePad solution. The unit cost comparison worked out at a ratio of 7:8 (Mahara:PebblePad). The University's IT infrastructure and lack of resources to manage, support, and implement Mahara made it unrealistic to implement, and no cost was presented. The self-hosted solution of PebblePad was more expensive, at a comparison cost of 10.5. The costs were calculated based on following data:

- institutional rollout of 8,000 users;
- access to 50 mb of storage for each user; and,
- hosted costs, based on a three year hosting contract with a vendor, including a pro-rata value for all one-off implementation costs.

The self-hosted PebblePad costs were based on a four year hardware replacement cycle; Mahara self-hosted costs were not presented, as this option was deemed unfeasible in the university's current ITS infrastructure. The research and investigation of software solutions resulted in the project team recommending to the University decision-makers the implementation of ePortfolios for student learning, and in particular the adoption of a hosted PebblePad software platform.

The results of the ePortfolio feasibility study were prepared and presented as a report directly to the Deputy Vice Chancellor and to the ICT Governance Committee, which had initially funded the project. The Director of the Learning and Teaching Center, who had the most ready access to these senior management groups and who is a member of the ICT Governance Committee, presented the reports and discussed them formally at meetings. The comprehensive data-gathering and analysis that had taken place both in terms of staff readiness for ePortfolios and the functional requirements of an ePortfolio platform provided a useful framework for discussion that led to positive endorsement of the further development of the ePortfolio project. The focus of decision-making was on the institutional advantages of introducing an ePortfolio, balanced against the possible risks and costs of doing so. Student learning outcomes and staff readiness featured predominantly in these discussions. It was felt that the choice of platform had been sufficiently investigated in terms of the criteria identified, so the recommendation for choice of platform was endorsed with little further discussion.

As a result of the endorsement, further funds were provided for the 2013 academic year for an "early adopter phase," with two programs using ePortfolios. The institution's intention is to support, within in the next couple of years, a further, staged ePortfolio implementation process that will be funded through the Strategic Asset Management Plan.

Discussion

Pedagogical and technological responses to the changing needs of universities require decision-making processes about the implementation of new tools, such as an ePortfolio. In this case study, three principles are drawn from the middle-out approach to decision-making. First, it is vital to have the right skill mix of people on the project team—those who can collaborate with stakeholders but also have the power to make initial decisions that will lead to the final recommendations to institutional decision-makers. Cummings et al. (2005) remark on the unique position of middle agents, who possess "some authority and resource to implement change" (p. 11) and "are in a unique position to mediate between the more individualized interest of teaching staff [faculty] and the broad strategic focus of senior staff" (p. 11). In this case, the Director of the Learning and Teaching Center reported directly to the Deputy Vice Chancellor, the Project Manager was well known by faculty, and the Functional Analyst had strong knowledge of product analysis, development of functional criteria, and the

Table 4
Software Solution Criteria Comparison

Criteria	Mahara		PebblePad	
Corporate Look	✔		✔	
Links to Blackboard	✘		✔	
Facilitates the Graduate Attributes	✔		✔	
Portability (LEAP2A & HTML compatible)	✔		✔	
Sharing (internal, external, groups)	✔		✔	
Accessibility Version (HTML only)	✘		✔	
Mobile Compatible Interface	✔	(very limited)	✔	
Alumni Solution	✘	(university to provide)	✔	
Support Materials Provided	✘		✔	
Easy-to-learn (initial)	✔		✘	(more initial training required)
Easy-to-use	✔		✔	
Fully Hosted Option	✔	(independent vendor)	✔	
Self-Hosted Option	✔		✔	(> 1000 users only)
• Aligned to ITS infrastructure	✘		✔	
• Aligned to ITS expertise	✘		✔	
Institutions Using	> 290 (currently registered)		> 120	

Note. ✔ = meets criteria, ✘ = does not meet criteria.

enterprise architecture and infrastructure of the university's IT systems.

Second, the middle-out process also allowed the information collected from the earlier stages to be aligned with the institution's strategic priorities and compared to existing ICT infrastructure capabilities. Making change decisions based on an understanding of the needs of the individual context of the institution is vital to the success of this approach (Goldsmith, 2007). For example, the extensive investigation undertaken to develop a set of functional requirements for the implementation of ePortfolios led to the systematic elimination of unsuitable software platforms, and the final choice of an appropriate one, based on the needs of the institution as well as the available resources and ICT infrastructure. Other institutions may have a different set of criteria, resources, and infrastructure that result in a different outcome. Therefore, any ePortfolio or other technological software solutions need to be rigorously investigated to ensure alignment with existing ICT infrastructure before recommendations are made to the institutional decision-makers.

Finally, the collegial approach to data collection was valued by respondents and produced strong support for recommendations to the institutional decision-makers. Middle-out agents have the capacity to introduce change because of their unique position in the University. In this case study the staged investigative process undertaken by the project team allowed faculty and professional staff values to be heard and distilled into initial decision-making processes before engaging the senior management. Traditional institutional change

management involves top-down or top-down and corresponding bottom-up approaches that do not account for the significant role of middle agents in initiating, supporting, and advocating for change. Figure 1 depicts the "go-between" role of the middle agents engaging, on the one hand, with senior management decision-makers and on the other, with faculty and professional staff. The reciprocal relationships developed between the two groups enable a potentially smooth early introduction to new technology, such as ePortfolios.

Conclusion

The article presented a case study example of an approach to technology adoption in the context of change management. The authors argued that a middle-out approach, which provided links between university faculty and professional staff values and senior institutional management decision making, resulted in a positive and collegial transition to introducing new technology, such as ePortfolios. Based on the exploration of the opinions of faculty and professional staff about the value of ePortfolios for student use, this approach developed a systematic, evidence-based approach to criteria development, investigated suitable software options, and individualized recommendations to the university decision-makers. Findings suggest that the skills of the project team are a vital component for the success of this approach. In this case study, the middle agents adopted roles of investigation, analysis, synthesis, and preliminary decision-making before presenting their findings to the senior management

Figure 1
*Cohesive Impact of the Middle Agent's Role on the Relationship between Faculty and
Professional staff and University Management*
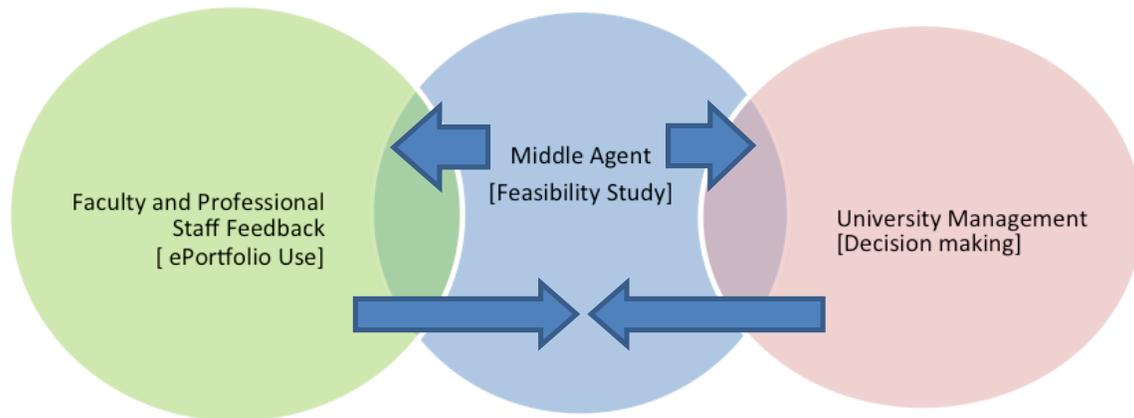
decision-makers, with whom they played an advocacy role. Next, the project team needed to consider both the individual priorities and needs of the institution and also the currently available ICT infrastructure and resources. Finally, the collegiate approach to data collection was valued by participants and enabled improved recommendations for the institutional decision-makers.

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Appendix
ePortfolio Feasibility Project Survey

Questions 1-4:
Please circle the numbered option/s that best suit your responses. The questions allow some space for further comments if needed.

1. **Which faculty are you from?**
   1. Faculty of _____
   2. Faculty of _____
   3. Other area of the university _____

2. **What is your role at the university?**
   1. Staff
   2. Student
   3. Both staff member and student
   4. Other_____

3. **Have you had any previous experience with ePortfolios?**
   1. Teaching purposes
   2. As a student
   3. Personal use
   4. Other_____

4. **What do you see as the main ways ePortfolios could be used?** *(More than one option can be selected)*
   1. Reflective practice
   2. Student learning
   3. Assessment
   4. Graduate career showcase
   5. Accreditation
   6. Continuing professional development
   7. Evidence of teaching practice
   8. Employment promotion
   9. Performance review evidence
   10. Other_____

5. **Why is your selection in Q4 your preference/s for ePortfolio use?** *(Please comment)*

   _____

   _____

   _____

   _____

   _____

Questions 6-10: *(Please comment)*

6. **How would you feel about using ePortfolios as part of your teaching or learning repertoire?**

    _____

    _____

    _____

    _____

    _____

7. **What enabling factors do you see as necessary to successfully implement ePortfolios at the university?**

    _____

    _____

    _____

    _____

    _____

8. **What do you envisage as the main barriers or problems associated with the use of ePortfolios at the university?**

    _____

    _____

    _____

    _____

    _____

9. **Any other comments you would like to make about ePortfolios?**

    _____

    _____

    _____

    _____

    _____

Thank you for your participation