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Integration, Personalisation and Contextualisation

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SUSTAINABLE KNOWLEDGE MANAGEMENT SYSTEMS: INTEGRATION, PERSONALISATION AND CONTEXTUALISATION

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ABSTRACT

Many knowledge management (KM) systems have proven unsustainable to date, exhibiting low quantities and quality of knowledge, with systems falling into disuse. In this paper, we provide and explore a model for sustainable KM systems, focusing on the advantages to be gained from integrating knowledge work with everyday work practices, and enabling sense-making through personalisation and contextualisation. We employ a discourse analysis of email as an exemplar of a sustainable KM system, thereby identifying a number of key characteristics for sustainable KM systems. Our model for sustainable KM systems adds to existing KM theory and more immediately, assists companies by providing an understanding of the kinds of characteristics likely to make KM systems more effective, and sustainable in the long term.

Keywords
Knowledge Management, Email

1. INTRODUCTION AND BACKGROUND

Organisational knowledge management (KM) – the support of the creation, transfer and application of organisational knowledge (Alavi and Leidner, 2001) – offers considerable promise to businesses of all sizes. Once defined by Nonaka and Takeuchi (1995) as justified true belief, knowledge is nowadays viewed as an holistic system of organisational information, processes, practices, norms, values and beliefs (Davenport and Prusak, 1997).

While the goal of KM has been the improvement of organisational efficiencies, effectiveness and competitiveness through knowledge, only moderate successes have been experienced to date, with recent reports suggesting the full benefits have yet to be realised (KPMG, 1999; Schultze and Leidner, 2002). Not surprisingly, significant concerns are found in the social, organisational, business and human issues, rather than the technology. The sparse population of many knowledge repositories is popularly attributed to employees hoarding knowledge, or lacking the time or attention to contribute – with a common solution being the rewarding of contributions (Davenport and Beck, 2001; Hahn and
Subramani, 2000; KPMG, 1999). A second, well-remarked concern is the low value of much of the
knowledge found in knowledge repositories, thought to be due to difficulties in capturing, articulating
and converting employees’ tacit knowledge – considered valuable for its possible strategic merit – into
explicit knowledge, for storage and subsequent reuse (KPMG, 1999; Romaldi, 2002).

These and other important KM concerns have recently been linked to the separation of KM systems
from everyday organisational work practices and business processes. Signalling a new theme for
KM, Davenport and other experts now advocate the integration of KM with normal work practices in
which knowledge development, organisation, planning, sharing and application naturally occur – thereby minimising the separate attention a worker must give to knowledge work, as well as reducing
the need to separately motivate employees for knowledge work (Markus et al, 2002; Hill, 1990;
KPMG, 1999; Lelic, 2002).

A second emergent theme derives from calls for personalised, contextualised, interpreted approaches
to KM (for example, Alavi and Leidner, 1999; Tsui, 2002). Because existing knowledge repositories
typically omit context and personal intent, they may lack meaning, and real value. To remedy this,
Thomas et al (2001) suggest that the human and social story behind knowledge must be understood,
before knowledge can be accurately represented. This view of “knowledge as interpreted” has similarly been mooted for knowledge transfer, application and reuse. For example, Malhotra (2002)
perceives knowledge in uncertain, rapidly changing environments as “a dynamic process of ongoing
reinterpretation of data, information and assumptions while proactively sensing how decision-making
process should adjust to future possibilities”, while Galliers and Newell (2000) caution that only
personally contestable knowledge can lead to the creativity and innovation greatly desired as strategic
benefits from KM.

We propose a third strand, linking these two themes – sustainable KM systems, the benefits of which
include reduced dependencies on knowledge champions, employee reward systems, monitoring and
excessive redevelopment (for example, Snowden, 1999).

To date, there has been only limited research into sustainable KM systems. We observed the
existence of the ubiquitous organisational communication and collaboration tool, email, as well as its
popularity in its adapted role as a KM tool, suggesting email as an obvious example of a sustainable
KM system (Ducheneaut and Bellotti, 2002). We recognised that email seamlessly integrates work
practice with knowledge work, and that its content, management and operation are highly personalised
and contextualised. This led us to conjecture that the integration, personalisation and contextualisation
of KM systems might well form the foundations for a sustainable KM system. Although there are
many frameworks already in existence for KM (for example, Nonaka, 1994; Alavi and Leidner, 2001),
we note that the three nominated themes have not been their particular foci – which leads us to our
research aim.

In this paper, we develop underlying theory for a sustainable KM system, founded on the integration
of KM with daily organisational work practices, and the personalisation and contextualisation of KM.
Our study provides a deeper understanding of how and why such integration, personalisation and
contextualisation facilitate the development and application of knowledge within the complexities of a
large organisational environment. The study also provides a basis for further investigations of
characteristics which will enhance sustainability in KM systems.

Following this brief summary of the area, we overview the research design for the study, and justify
our choice of email as a case appropriate for exploring the topic. Next, a preliminary model for
sustainable KM is provided and explored through an analysis of the facilities and uses of email.
Finally, we draw conclusions, and suggest future research directions.
2. RESEARCH METHODOLOGY

We conducted an exploratory case study of the popular email client Eudora, as an exemplar of the approach we were investigating. We collected and analysed one hundred consecutive email messages, as well as thirty email conversation fragments, taken from the email archive of an academic at an Australian university. Our chosen method of analysis was discourse analysis. According to Fairclough (1992), a fragment of discourse can be viewed as “being simultaneously a piece of text, an instance of discursive practice, and an instance of social practice” (p.3). The textual dimension can be analysed via content analysis, thereby identifying recurring patterns and themes; the discursive practice dimension can be explored by examining how texts are produced and understood; the social practices dimension examines how social issues, such as the organisational circumstances of the conversation, affect the discursive practice. A fourth dimension is suggested by Klein and Truex (1995), who advise accounting for the wider context of a particular discourse. We analysed our data qualitatively according to all four dimensions, in order to identify patterns, themes and trends.

We selected an email archive owned by one of the paper’s authors, in order to improve our understanding of context and establish a meaningful frame of reference (Fairclough, 1992; Klein and Myers, 1999). Our study was thus able to benefit from participatory observation, enhancing our ability to interpret the conversations – although introducing an element of bias. In the manner of Nielsen (1999), we have illustrated our research in this paper using one only of the thirty conversational fragments (Appendix A), however we invite interested readers to contact us in order to obtain the complete set. In the next section, we justify our choice of email as an exemplar for our study.

3. EMAIL AS A SUSTAINABLE, INTEGRATED, PERSONALISED KNOWLEDGE MANAGEMENT SYSTEM

Email is regarded as the most ubiquitous organisational and inter-organisational communication and collaboration tool in use today (Jackson et al, 2001). Despite its history of flaws, misuses and abuses – including spam, flame, viruses and information overload – email continues to flourish as an essential communication and collaboration channel in many organisations, and fulfils a key role in a company’s knowledge management tool kit, having been identified as the second most common organisational KM tool after intranets, in 1997 (Alavi and Leidner, 1999; Ducheneaut and Bellotti, 2001).

Organisational usage of email has been far greater than predicted by media richness theories (Adams et al, 1992; Ducheneaut and Bellotti, 2002), a success often attributed to email’s great versatility in performing organisational tasks (Ducheneaut and Bellotti, 2001) – although we suggest it is also due, in no small measure, to email’s use for initiating, crystallising, sharing, organising and actioning knowledge. Indeed, it has been reported that three quarters of a company’s best insights are contained in its email messages (CIO.com, 2001). Evidence of the KM capability of email is growing, with Ducheneaut and Bellotti (2002) observing the phenomenon of selected, protracted email conversations transforming themselves into new knowledge artifacts such as organisational policies, and suggesting, “Email, far from being a poor, technically-limited substitute for face-to-face communication, has some unique and compelling properties that make it ideally suited for talking about things.”

Finally, we note the failure of other, newer KM tools to achieve such ubiquity and large scale, diffuse user bases, and argue that email is a salient example of a sustainable KM system—well-integrated with organisational tasks, and personalised and contextualised (although we are by no means claiming it is the ideal KM tool for these purposes). We have therefore selected email as an exemplar for the purpose of exploring our paper’s topic.
4. A MODEL FOR SUSTAINABLE, INTEGRATED, PERSONALISED, CONTEXTUALISED KNOWLEDGE MANAGEMENT

In this section, we describe and explore a model for a sustainable KM system (Figure 1), which suggests that a KM system must first win an employee’s attention from amongst competing sources. The employee naturally engages with the system during normal work practices – that is, the system, tool and technology are integrated with existing work practices. The system is personalised in order to attract employee attention, as well as provide essential motivation, understanding, desired autonomy, and personal information management capability. Ready access to relevant context further facilitates individual sense-making. The employee participates in a knowledge development lifecycle within which knowledge is initiated, crystallised, shared, and applied – leading to useful outcomes, such as decisions, ideas, plans and innovations.

![Figure 1. Sustainable Knowledge Management](image)

Below, we discuss the model’s components, and explore how email provides them.

4.1 Attention – the crucial first step to sustainable KM

Davenport and Beck (2001) identified attention as the scarcest resource in the age of information overload, while Markus et al (2002) recognised the importance of “customer engagement” in their design theory for emergent knowledge processes, citing how in one KM application, textual representations of knowledge such as lessons learned and best practice were ignored, with engagement obtained via more entertaining representations, based on computer games. This suggests that the first imperative of a sustainable KM system is to attract employee attention through possession of significant, attention-attracting characteristics. Davenport and Beck reported a study identifying the four most important characteristics for a message to command scarce attention, as: personalisation; emotion-evoking content; information provided by a trustworthy source; and concise, easy-to-digest information.

**Personalisation**

People have become increasingly narcissistic, responding quickly to personal attention, noted Davenport and Beck. Email provides highly personalised attention, with its self-managed content, high levels of autonomy, and significant proportion of exclusive content. We elaborate on this aspect of KM in Section 4.3, where we discuss personalisation as a separate component of the model.

**Emotion-evoking content**

Much of email evokes strong, positive or negative emotions in the recipient. The prevalence of “flaming” in email messages, in response to often quite minor provocation, indicates both what an
evocative medium email can be, and what an accessible path it provides to the recipient. Interestingly, Davenport and Beck found “slightly aversive” information to be highly attractive to recipients. As much of organisational email implicitly attributes accountability to the receiver (according to organisational norms), email effectively solicits slightly aversive attention – that is, attention given because receiver inattention, lack of response, unawareness, or an inappropriate, untimely, inaccurate or tardy response, “may” lead to negative consequences for the receiver.

Notification of opportunities and invitations to pleasant events, both popular uses of email, are two examples of how organisational email provides Davenport and Beck’s “attractive attention” (enjoyment is experienced as reward for paying attention).

*Information provided by a trustworthy source*
With email, there is opportunity for the email recipient to “consider the source” of the knowledge therein, through sender identification and other indicators. This enables the recipient to personally evaluate the reliability, credibility, completeness, comprehensiveness, accuracy and overall value of the knowledge, using her subjective judgement of the source.

*Concise and easy-to-digest information*
The nature of email is brevity and simplicity, making it easy for a reader to digest. This promotes a high level of comprehension and, according to Davenport and Beck, attracts attention. Correspondingly, Hansen and Haas (2001) found that a steady flow of small amounts of knowledge possesses high attention attraction qualities.

Other strong attention attraction features of email, according to Davenport and Beck’s attention attraction criteria, are found in its tendency to form a captive environment or habitat for the employee, its social nature, the use of push technology, and the provision of immediate benefit. In this section, we have highlighted the many attention attraction characteristics of email – a persistent KM tool – suggesting that gaining employee attention is the crucial first step for achieving sustainable KM systems.

4.2 Integration of KM with everyday work practices

“Email has … become a powerful way to organize one’s work and rapidly access work objects.” (Ducheneaut and Bellotti, 2002: 2) Email naturally integrates KM with normal work practices and business processes, as we summarise below (compiled from Bellotti *et al*, 2002; Ducheneaut and Bellotti, 2001; 2002; Gwizdka, 2002; National Archives of Australia, 2002). We also observed almost all of the following facilities in the email fragments studied.

Email is utilised for activity recording, organising, meeting scheduling, file transfer, referencing of digital work objects, assigning responsibilities and decision-making—with time and task management, evolving functions. Quoting previous, related messages is a popular feature, the quoted messages being appended to the end of a new post in order to facilitate understanding through the disclosed history of a conversation. Email record-keeping as evidence for accountability and legal reasons is becoming increasingly important. Knowledge development occurs within some conversations, as we discuss later in this paper. Finally, email provides a complete personal knowledge archive, including personal knowledge trails. The email fragment in Appendix A is an example of a knowledge trail.

In this section, we have described the significant integration of KM and organisational work practices occurring within email practice – suggesting that such integration is important for sustainable KM systems.
4.3 Personalisation – or “what’s in it for me?”

Tsui (2002) and others have suggested the need for personal, rather than enterprise, KM tools. We have already discussed the role of personalisation in attracting employee attention, and focus here upon its other advantages.

An email recipient can readily identify whether the message has been sent to her alone, or to a group. A message sent to only one person is likely to be expressed in personal, contextualised language which the recipient can readily understand, or clarify via an exchange of emails. This type of personalisation is well-demonstrated by the sample conversation in Appendix A. In addition, email is almost entirely owner-managed – including its retention, reading, despatch, filtering, organisation, confidentiality, integrity, privacy and disclosure (via forwarding, printing, dissemination and quoting). This high degree of knowledge work autonomy is particularly attractive to employees, placing control of knowledge overload, and personal KM in general, in the hands of the employee.

In this section, we have summarised key personalised aspects of KM in email – and suggest that personalisation is an important requirement for sustainable KM systems.

4.4 Context

Collison and Parcell (2001) discuss the need for knowledge workers to “know what, who, where, when and why”, about knowledge – in other words, to have access to the knowledge context, for sense-making purposes. Such context is well provided for by email, through the process of discourse, reference to work objects (for example, digital documents), and the historicity of appended, quoted emails in an email conversation. Conversation participants can provide important context about the organisation or group culture, norms and beliefs, business strategy and objectives, political and power structures, authority, relevance, pressures and sense of urgency. These types of elements are typically unavailable within knowledge stored in existing organisational KM systems (Wickramasinghe, 2002). An advantage of email is that if the context provided by a received message is insufficient, the recipient can communicate this to the sender or others by email, requesting the missing knowledge.

In the example in Appendix A, participants communicated contextual aspects such as the norms and constraints of the university’s teaching methods, the willingness of participants to seek a solution, and the pressing need for that solution.

In this section, we have highlighted the context-providing characteristics of email, suggesting that providing sufficient and accessible, valuable context for knowledge, is a desirable requirement for sustainable KM systems.

4.5 Knowledge development lifecycle

Wickramasinghe (2002) identified the absence of “knowledge creation through sense-making” in three large consulting firms’ KM systems. Email enables such creation, according to Ducheneaut and Bellotti (2002:2), who wrote: “email users draw on the persistence of the medium to make sense of the objects being talked about, and sometimes even transform the conversation itself into an object of conversation” – such as an organisational policy. We also observed this pattern in the email fragments studied (refer example in Appendix A, which shows the development of a new teaching method for a particular subject).

There are many knowledge development lifecycles already in existence, an early example being Nonaka’s (1994) seminal SECI model and, more recently, Birkinshaw and Sheehan’s (2002) model of four stages: creation, mobilisation, diffusion and commoditisation. It is not our intention in this paper to define yet another model, but rather to suggest that email naturally facilitates such a lifecycle, by describing how knowledge development takes place in email.
Cope (2000) highlights the importance of the individual in initiating knowledge development. The email fragments we studied included the following categories of knowledge initiation, *inter alia*: challenge, instruction, link to stored knowledge reference, plan, accusation, question, responsibility assignment, assertion, statement of intent, and statement of emotion. Our description of the knowledge development lifecycle follows, featuring four underlying knowledge processes: *initiation*, *crystallisation*, *sharing* and *application*. The lifecycle is illustrated by the email fragment in Appendix A.

*Initiation*: Email knowledge micro-communities form around an initial knowledge seed, spawned by an individual or organisational need. An initial message is posted as the knowledge seed email—for example, asserting a fact, asking a question, assigning a responsibility, or sharing knowledge. This is the first email in a knowledge trail consisting of successive, related emails (within one or more related threads, all stemming from the first knowledge seed email).

*Crystallisation and sharing*: The initial email and its recipients form the first circle knowledge micro-community, a circle which later expands or shrinks according to the needs of the micro-community. Each successive micro-community with whom the next email in that thread is shared, is either informed with the complete knowledge trail by virtue of having been in the circle from the beginning, or receives only those segments passed on to it by earlier circles. However, along the knowledge trail, the knowledge grows and is crystallised by the micro-community and by reference to authorities, documents and other knowledge sources. Insights, ideas, suggestions, and contextual information are provided along the way. Eventually the knowledge trail concludes when, for example, the needs of the various micro-communities are satisfied, or they simply change priorities, or there is another reason for termination. Aspects of the knowledge trail are now “known and understood”, according to individual sense-making, by at least some of the people in the micro-communities involved. At that point, some people who had access to and followed and understood the entire trail, are in possession of all the knowledge represented by that trail. Therefore, knowledge sharing has taken place during and as a byproduct of the development of the knowledge itself.

*Application*: Outcomes are discussed in Section 4.6, below.

4.6 Outcomes

By the conclusion of a knowledge development lifecycle, there should be one or more outcomes which apply the knowledge gained. Most of the email conversations we studied appeared to result in new knowledge for one or more participants (as described above), as well as actions, decisions, plans and storage of selected, newly formed knowledge. In the email fragment in Appendix A, the outcomes include a plan for a new teaching method, for one of the subjects discussed.

5. FINDINGS AND CONCLUSIONS

In this paper, we explored key elements for a sustainable KM system, using a case study of the email client, Eudora – and provided a preliminary model for sustainable KM. Although our results are limited to a sample of thirty conversational email fragments and a set of one hundred consecutive emails from an individual archive – and of course we cannot generalise from this small sample of data – our results are yet indicative of the important roles of attracting attention, integration with everyday work tasks, personalisation, accessibility of context, a knowledge development lifecycle, and outcomes arising from knowledge development, for achieving sustainable KM systems. As a result of our research, we arrived at some interesting insights.
In the age of information overload, there is limited time and attention available from employees. A sustainable KM system must therefore command high levels of employee attention, as our model suggests. Because communication plays a central role in organisations – and email is a highly successful, ubiquitous communication tool – for newer KM tools aimed at sustainability to succeed (for example, personal portals), their communication facilities must be equally as good as those of email, while they will also need to be competitive with email in respect of the different components of the model. A study of personal portals could therefore yield useful research results.

We made several interesting observations about the micro-communities engaged in knowledge development. People were included in the circulation of messages as appropriate, including: affected parties, decision makers, knowledge experts, collaborating peers and knowledge archivists. These participants were clearly trusted with the shared knowledge and its development. As mentioned at the commencement of the paper, employees are thought to hoard knowledge, resulting in sparsely populated widely accessible knowledge repositories – whereas in our research study, we found that the smaller, mutually-trusting, micro-communities freely initiated, crystallised and shared valuable knowledge. We suggest that knowledge development for a common organisational purpose engenders sufficient trust amongst micro-community participants for knowledge development to take place freely. Further research into this area could provide a greater understanding of the role of trust in knowledge development and sharing.

A related observation is the key role played by authorities and power figures in shaping the outcomes of knowledge development; in our email fragment sample, the authority figure is clearly Marcia. The timely referrals of still-evolving knowledge to relevant authorities, through their inclusion in message circulation, enables checks and guidance, so that final outcomes will be acceptable to the organisation, and knowledge development efforts will not have been in vain.

We found there is a fleeting quality to some organisational knowledge, which is developed when needed for specific purposes, for use by particular workers – an idea that fits well with the dynamic, “just in time” and “one time use” perspective of KM (Malhota, 2002). This could also be viewed as knowledge development on a “need to know” basis. Moreover, what is often regarded as static knowledge (in our sample email fragment – the subject teaching practice) is not necessarily taken as commonly understood, but rather is consulted, queried and debated – that is, interpreted – indicating that even such “stable” knowledge is only a starting point for developing a more useful form of the knowledge, specific to the context and situation. These types of knowledge development can be facilitated through discourse involving sense-making – features which email clearly provides. We noted in the email studied, that subsequent offline discussions firm up tentative plans that had been initially formed in email, creating static knowledge which was then stored. Future, focused research into the knowledge development process would enable a deeper understanding of the issues, and potentially identify a range of efficient, effective knowledge development strategies.

To conclude, we anticipate that the understanding we have provided in this paper will enhance the sustainability of new KM systems, as well as adding to existing theory in this area – theory of which there is little to date. Although our model is preliminary, we believe we have provided a solid foundation upon which to build, in future research.

In an era where information and knowledge overload continue to exhaust the human capacity for attention, understanding and reuse, and KM systems fall by the wayside accordingly, it would behoove companies to look toward developing sustainable KM systems – those which build on natural employee tendencies, practices and needs, rather than managers’ and technologists’ proclivities.
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APPENDIX A: SAMPLE EMAIL FRAGMENT

Ray: “I am planning to teach Subject A next year on week nights, instead of weekends. In order to do that, I need a free week night when there are no other classes for students. Bob, can you swap times with me for Subject B, and teach on weekends?”
Bob: “I wish I could help, Ray, but I can’t do weekends, either. I’ve been thinking though of changing the teaching for Subject B. I’ve noticed students don’t get much out of Tutorials in Subject B, so I might omit those and have two hour seminar which I can put on at 4pm. You can then teach three hours of Subject A afterward at 6pm, Ray. What do you all think?”
Author: “As I recall, Marcia says all postgraduate subjects need three hours of class contact.”
Marcia: “Colleagues, yes, the students like three hours of class contact a week, to provide the understanding they need in the subject.”
Ray: “Maybe it is time to look at alternative ways that provide even better value?”
Marcia: “Well, perhaps Bob can find an innovative way of doing that? Bob, I will leave it to you to come up with something.”
Bob: “After some discussions with others about this, I suggest we have a two hour workshop each week at 4pm, and a two day workshop during the mid-semester break.”
Marcia: “Sounds good to me. What do you think, Author and Ray?”
Author: “Good idea!”
Ray: “Yup. Thanks, Bob.”
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