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KNOWLEDGE MANAGEMENT SYSTEMS:
THE ROLE OF 'ENCOURAGEMENT'

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ABSTRACT

Some organisations appear to be more successful than others at adopting and implementing Knowledge Management (KM) systems. In this paper, the authors investigate why this situation may occur through a case study analysis of two organisations that have implemented KM systems. In the first case, the authors consider why one supposedly technologically literate organisation experienced problems implementing what could be termed a 'tried and tested' technical solution. In the second, the authors consider a supposedly technologically illiterate organisation's more positive experiences with a 'state of the art' application. The focus of the analysis is on the interplay amongst the organisational factors that inhibited and facilitated the KM projects. Our case analysis suggests that a key factor is the levels of encouragement/discouragement for the use of the system that occur and their source: the technology, the organisation or both.

1   INTRODUCTION

Unsurprisingly, organisational experiences with Knowledge Management (KM) systems vary greatly. It was the authors' different experiences with two projects involving KM systems that prompted the study reported in this paper. In the first project, an industrial manufacturing company with global clients had implemented Customer Relationship Management (CRM) software in an attempt to improve customer monitoring and statistical reporting activities. The application was based on standard software and had been widely implemented by other organisations. Even though the organisation had previous experience of selecting, implementing and working with IT based systems, the CRM project proved problematic. In contrast, a recruitment agency, the subject of the second case study, implemented a state of the art KM system, without prior IT based system experience, in a relatively non-problematic fashion. The agent-based software was chosen in an attempt to alleviate the problems of high staff turnover by supplying electronic records of how consultants interacted with client and applicant records. This paper reports on how the implementations were integrated into the working environment, the impact they had on the organisations and any changes that occurred as a result of the introduction of systems that focused on knowledge sharing. The paper specifically aims to undertake a comparative analysis of the success or otherwise of the introduction of the more

884

traditional CRM system against the state-of-the-art agent-based knowledge management solution. In the next section we provide a landscape of the issues associated with KM effectiveness in order to provide a platform for the analysis of the case data. The conduct of the research is then reported before the details of the two cases are presented. A comparative analysis of the case data is then performed leading to the authors' conclusions.

2 THE ISSUES ASSOCIATED WITH KNOWLEDGE MANAGEMENT EFFECTIVENESS

A diverse set of definitions for knowledge, knowledge management and knowledge management systems, exist. It is not the intention of the authors to engage in a debate about the merits of these, however it is absolutely crucial that we inform the reader of where we reside. We concur with (Alavi and Leidner 2001) who see knowledge as a state of mind. In taking this view we believe that knowledge is personalised information, information is processed/interpreted data and that data can be seen as facts/raw numbers. The implication of this for our thinking on knowledge management is that it should focus upon exposing individuals to potentially useful information and the assimilation of information. KM systems, in turn, will not appear to be radically different (and may be part of) existing IS, but will be extended toward helping in user assimilation of information (hence we include a case study of a CRM system and a KM system). Having laid the conceptual foundations for how we view KM, we can now move on to think about why some KM initiatives are more successful than others. Work in this area is extensive and we cannot possibly provide an exhaustive picture of the situation, however we offer here what we consider to be some of the more useful contributions for the purposes of this paper. It is argued for example that:

− KM initiatives should be integrated into daily procedures and activities, there should be no additional time or effort overhead required (Senge, 1990);

− Although knowledge transfer can be initiated by identifying and following a rigorous set of procedures within a clearly identifiable situation, in reality, not all situations are repeatable; indeed those which generate valuable new knowledge are often unique in their instance. Hence knowledge management procedures should ideally be capable of supporting improvisation based on past experiences (Kao, 1997);

− To ensure that knowledge can be disseminated over the longer term it must be managed in a systematic manner. Furthermore, effective knowledge management systems should support the incremental refinement of knowledge by the integration of new and existing knowledge as an iterative process.

− In many environments, there is a dichotomy between knowledge sharing and maintenance of an individual's advantage over their peers. Whilst individuals may be prepared to make explicit routine and operational activities, it is usually the knowledge gained from the highly personalised, exceptional activities that can be of real benefit to a wider audience if the knowledge *'owner'* is prepared to allow dissemination;

− That intuition rather than systematic reasoning plays a major role in the decision making process employed by individuals (Bechara et al, 1997), (Klein, 1998).

There is also little doubt that information technology plays an important role in effectuating the knowledge based view of the firm. It can be used to systematise, enhance and expedite large-scale intra and inter-organisational knowledge management activities (Alavi and Leidner 2001). Interestingly it appears that the majority of organisations who are reporting successful implementations of KM systems are in one of two areas, they are themselves IT companies or their core business activity is the identification, synthesis and dissemination of knowledge - such as the

885

management consultancy company. For example, leaders in the use of IT to support knowledge management initiatives include: McKinsey who employ an interesting, informal, bottom up approach, which leaves the consultant free to summarise and disseminate their acquired knowledge as they see fit. Consultants are evaluated by a peer review hence dissemination of knowledge creates visibility and credibility for the consultant; IBM with their Guide to Market Information (the *catalogue-of-catalogues*) which links information areas to key personnel; Texas Instruments with the implementation of their I-BEST (The IT Business Excellence Strategy) methodology for identifying, specifying, monitoring and deploying business excellence and Hewlett Packard through their *Knowledge Links* system, implemented using Lotus Notes, which incorporates support for informal groups via *'learning communities'* and *'project snapshots'* (lessons learnt). These groups, through their extranet-based *Electronic Sales Partner* system, include customer representatives. As witnessed particularly at McKinsey's and Hewlett Packard, certain organisations recognise that KM is a people-centric activity which relies on both formal and informal networks of collaborating individuals (Winograd, 1988), (Cannon-Bowers and Salas, 1999), (Wellman and Hampton, 1999). Such networks may reside not only within organisations but also between organisations. Therefore, technology that supports KM activity should have at its core support for collaboration (Castells, 1999), (Hagel and Singer, 1999). By supporting user collaboration IT systems may be able to close Nonaka's SECI (Socialization, Externalization, Combination, Internalization) model's knowledge generation circle (Nonaka and Konno, 1998). The challenge today is to go beyond KM systems that can codify and quantify existing knowledge. The KM systems of tomorrow should aim to proactively disseminate archived knowledge to support current users and unite users operating within similar spheres of interest (Socialization), to allow them to leverage off each other's experiences (Externalisation), to incrementally create new knowledge (Combination), for reintroduction into the system (Internalization). It is within this backdrop that our cases reside.

3   CONDUCTING THE RESEARCH

A qualitative case study research strategy was employed (Miles and Huberman 1994; Yin 1994). The research was descriptive in that the data collected was used to describe events in a given context for the purposes of increasing understanding of the area under investigation (Gummesson 1991). Our approach was to build up stories of two organisations that had implemented KM systems. Two cases were used in order that we could demonstrate how the different conditions interacted with the KM projects. In no way do they, nor are they intended, to answer all questions about success and failure in KM implementation. However, the cases offer useful insights into a couple of organisational situations that in turn, have utility in developing practitioner and academic thinking. The case data was collected using formal and informal interviews with various people involved in the KM projects, observation of the use of the KM software, and documentation such as consultancy reports and meeting minutes. Informal data gathering and feedback also occurred throughout the lifetimes of the respective projects. The data was collected at the case sites over one year. The validity of the case data was reinforced in a number of ways. Several people in each of the case organisations were interviewed at different times and places. Also, two researchers were involved in the collection and interpretation of the data (MacNealy 1997). In addition to the interviews, observation was used in order to find out about *what* people did rather than just what they *say* they did (Silverman 1998).

In the first case study a CRM system was implemented to manage customer interaction more effectively. In the second case study, an industry specific (recruitment agency) customer relationship data management application was employed across the organisation. A newly released knowledge management system was chosen to replace it, the aim being to provide more intelligent information retrieval and thereby increase the organisation's competitive advantage. For brevity, the salient features are condensed into Table 1 and Table 2. These are intended to act as a platform for discussion.

886

	Case 1
Rationale for Project	Reduce sales staff time spent on *non-value added* tasks; Introduce a system that field sales and technical staff would be prepared to use; Centralise, coordinate and control pre and post-sales activities (stock availability, lead times etc.), both internally and with external partners; Provide statistical and reporting functionality to support tactical decision making e.g. identification of profit centres, monitoring of client base; Improve operational staff accountability and explicit identification of staff expertise; Reduce dependence on individuals by making information available centrally; Facilitate proactive interaction with prospective and existing customers.
Summary of Implementation and Project Handover	The decision to purchase the system was made at board level, there was no system '*champion*' at the operational level; System configuration was undertaken by the IT department with limited input from the users; Lack of structure during the pilot trial, no error log, no monitoring of level of system use. It became apparent that the testers did not actually use the system but did provide feedback on the system; Initial system population was poor resulting in missing, inaccurate or duplicate customer accounts. This did not improve post release, there were ongoing issues of inaccurate and incomplete data input; Following system release, core system functionality was as per specification however there were peripheral problems that were rectified quickly but did contribute to user dissatisfaction. Overall, at the time of system handover, the system was poorly received and staff were concerned that the new implementation would bring changes to their roles. Users refused to use the new system completely, or used only used subsections which they felt to be of direct benefit to them – managers did not enforce comprehensive system use; The system was not linked to the other core customer related IT functions, accounts and quotation generation, thereby limiting the system's value; Field sales staff felt that the system could be used for monitoring and controlling their interactions with customers and ultimately allow their position to be eroded; Training courses had to be repeated as users forgot how to operate the system; Finally crisis meetings were held with users to attempt '*buy in*'.

Table 1: Summary of Case Study 1

Case 2	
Rationale for Project	Reduce the effects of high recruitment consultant staff turnover;
	Concern that the system structure was resulting in missed sales opportunities;
	Aim to mimic the informal networks that support headhunting activity;
	Improve data storage and retrieval by reducing the dependence on category and keyword assignment;
	Provide automated analysis of CVs to identify suitable recent applicants for current positions and historical applicants who may be ready for new employment (possible headhunt targets);
	Analysis of vacancies, alleviate the semantic gulf resultant in organisations develop their own vocabularies which could result in disparate views regarding the nature of the vacancy;
	Possibility of identifying suitable personality types for specific job roles.
Summary of Implementation and Project Handover	The generic product was extended and developed as a bespoke solution to include basic CRM features including a client contact database and a set of diary functions;
	Feedback on prototypes highlighted missing, non-core, functional requirements. The additional financial overhead prohibited implementation, this resulted in some resentment on the part of the operational staff;
	The system started *'empty'*, for the more historical CVs the applicants were likely to have now found employment, whilst the company had regular clients it was decided to input them on an incremental basis as vacancies arose – this both reduced the data entry load and ensured that current data was input.
	Overall, at the time of handover, the system was well received and staff had a positive view of the benefits that the new implementation could bring to their roles. However, a number of issues did arise:
	There were repeated help desk calls over, from a technical perspective, minor issues, a number of which were raised on more than one occasion. The implication was that user training was poor, certainly there was a *technology gulf* – the trainers assumed that the users were more technically aware than became evident;
	There was reluctance on the part of the users to seek clarification on points that they did not understand, on a number of occasions it became evident that users were entering data into the system based on guesswork rather than an understanding of the required input.
	A detailed project review was undertaken 6 months after system handover. The resource to requirement matching features of the system received much positive feedback. Some specific points of interest were:
	The majority of users felt that the more unlikely matches of applicants to jobs had been beneficial, a number of examples were quoted where applicants had been placed who would not have been presented to the employer if the previous system had still been in operation;
	One of the data sources used by the system to support matching was free text comments input by both applicants and consultants on the applicants desired career direction and the consultant's view of the applicant's strengths and weaknesses. The system could be configured to widely or narrowly scope the use of this data. Two distinct views emerged. Some consultants trimmed the applicant's inputs into these fields and did not input comments of their own – their view was that they did not want the less obvious matches that the system was capable of producing and they saw this as a way of ensuring that such potential interviewees would not emerge from the system. Other consultants made extensive use of these fields and actively supported the presentation of less immediately obvious candidates;
	The online side of the system appeared to be working well however, there was limited input into the system of CVs that did not arrive at the agency via the Internet. Although the functionality was available to import electronic CVs into the system, this was not done generally due to time constraints.

Table 2: Summary of Case Study 2

4 DISCUSSION: THE ROLE OF ENCOURAGEMENT

4.1 Knowledge Stick

The idealised notion of an organisation as a *'unitary knowledge system'* where knowledge and experiences flow freely is diametrically opposed to the frequently echoed quote, which was probably originally voiced by Jerry Junkins, CEO of Texas Instruments in the mid-80's: *'if TI only knew what TI knows'* (O'Dell and Grayson, 1988). In reality even the smallest firms have conflict and divisions that inhibit the development of a unitary knowledge system this is sometimes referred to as *'knowledge stick'* (Von Hippel, 1994; Szulanski, 1996). This study aims to consider the *'stickiness'* of knowledge within the 2 presented case studies. Specifically, the aim is to identify IT functionality, which may contribute to reducing *'knowledge stick'*. We identify two categories of *'knowledge stick'* - individual *'knowledge stick'* and group *'knowledge stick'*.

4.1.1 Individual Knowledge Stick

The first is at the individual level, where affinity at either the micro level of the group or at the more macro organisational level fails to occur. Such individual affinity takes time, and may occur to different degrees dependent on job role. However, it is important that an individual does become affiliated to their group and ultimately the organisation in order for movement towards a unitary system to occur. In the first case study individual *'knowledge stick'* appeared to be an issue. Individuals were reluctant to impart their knowledge; this was evidenced by the inaccurate data that staff entered into the system, which suggested that they did not intend to rely on the system for their personal data management needs. The perception that the system may be used for monitoring and control activities and may ultimately usurp the external field sales role contributed to the lack of *'buy in'* on behalf of the field sales staff. In the second case study individual *'knowledge stick'* had also been an issue pre the installation of the new agent-based system. Consultants tended to retain their client preference and contact details as this information was regarded as valuable collateral should they seek employment with an alternative agency. Interestingly, when the agent-based system was introduced there appeared to be little reluctance on the part of the consultants to relinquish client preference details to the system, although client contact details were input on a more ad-hoc basis. An independent, contract consultant was also employed by the agency and there was some evidence that this individual was more reluctant to relinquish their personal knowledge, presumably as they regarded this knowledge as their *'unique selling point'*. In order for the system to function it required details of client preferences, indeed to maximise the efficiency of the system detailed client requirement specifications were required. In discussion with consultants it became apparent that initially they had been reluctant to relinquish their client preference knowledge. However as it became apparent that the system could support the resource-to-requirement (applicant-to-job) matching activity more effectively if detailed client preference information was provided so both the agency consultants and the independent consultant became more willing to impart the knowledge. As they could see no personal benefit to relinquishing client contact details, so the level of data entry in this area remained low.

4.1.2 Group Knowledge Stick

The second category of *'knowledge stick'* that we identify is at the group level. Examination of supposedly individualised tasks has repeatedly identified informal communities of practice which emerge with the aim of refining and developing *'know how'* or dispositional knowledge to support the whole (Wenger, 1998), (Brown and Duguid, 2001). The term dispositional specifically refers to

889

situated *'know how'* - the development, exploitation and dissemination of knowledge embedded within the working practice. Knowledge may be collectively created and disseminated within a group but, as a group, there may be reluctance to see dissemination and exploitation within a wider community (Cole, 1998). The examination of how knowledge is created and disseminated through a group has given rise to Whalen and Vinkhuyzen's term *'the collective mind'* (Whalen and Vinkhuyzen, 2000). Knowledge created within a community may become *partial* or *fragmented* in that no one individual holds a complete knowledge set. Whilst the community members may change, the knowledge *whole* is not destroyed, rather it evolves. Additionally, such collective knowledge is likely to evolve through *improvisation* or *reinvention*, as situations emerge so the collective may identify alternative practices to address them (Orr, 1996). It is this issue of the *'collective mind'* that knowledge management systems are perhaps most useful at supporting - subject to a willingness on behalf of the group to relinquish their collective knowledge. In the first case study there was evidence of group *'knowledge stick'* within the field sales and engineering communities. There was little staff turnover within these groups and a tight knit community spirit had evolved. Due to low staff turnover, different members of the groups had interacted with clients over time, creating a *'collective mind'*, the *'collective mind'* is an emergent property of an environment that has reciprocity at its heart (Whalen and Vinkhuyzen, 2000). Initially this group categorically refused to enter data into the CRM system, despite directives from management. It was recognised that without the cooperation of this group the system would fail. At the time of writing repeated reassurance from management has resulted in some relinquishing of the group knowledge into the CRM system. In the second case study there was little evidence of group *'knowledge stick'*, this can largely be attributed to high staff turnover which inhibited group structures and made the evolution of a wide *'collective mind'* unlikely. However, there were elements of a *'micro collective mind'* developing between the agency's senior management and a contracted consultant - the longest serving employees. Interestingly, as the agent-based system relied on the relinquishing of personalised knowledge in order to function and because the system champions were the senior management and the contracted consultant, there was no evidence of group *'knowledge stick'*. This necessity to relinquish personal knowledge in order to enable the system to function supports Senge's view that effective KM initiatives should be integrated into daily procedures (Senge, 1990).

4.2 Technology - Enabler or Inhibitor

Whilst the traditional view is that it is tacit rather than explicit knowledge that is difficult to capture, more recently it has been suggested that tacit knowledge in the form of socially embedded practice disseminates freely within communities of practice, however codification for formal dissemination both inter and intra-group is less successful (Brown and Duguid, 1998). When moving outside of a community of practice, by definition the knowledge context is no longer known, therefore, even if dissemination occurs freely, when the knowledge is disassociated from its context meaning and value can be lost. Socially embedded knowledge, which resides within communities of practice is key to the ongoing creative development of intellectual capital, yet Information Communication Technologies (ICTs) may inhibit rather than enable this creative process. In using ICTs as knowledge management mechanisms the case studies highlighted a number of issues should be addressed.

4.2.1 Trust

Informal dissemination relies on *trust*, codification introduces a degree of formality and the potential for rapid dissemination that makes *trust* unlikely. The issue of trust was particularly evident in the first case study, the belief that the organisation had an alternative agenda for the introduction of the CRM system made accurate population of the system virtually impossible. Community practice may

890

contradict stated organisation policy, although such scenarios may be tacitly accepted, communities may be unwilling to enunciate them. This supports KPMG's findings that 20% of KM system users claimed that they were reluctant to use KM ICT systems because they had not received sufficient training, they had insufficient time to familiarise themselves with the system and they could perceive no personal benefit ensuing from using the system (KPMG, 1999). In the second case study, the system could not function without personalised knowledge from the consultants - a certain amount of *'carrot and stick'* came into play. Of specific interest is the collaborative functionality of the agent-based knowledge management application. Over time the system builds profiles of users and, subject to user permission, those profiles are available for others to see. Note that the degree and extent of transparency is determined by the owner of the profile. User profiles are leveraged off to derive new knowledge - mimicking the concept of the *'collective mind'*. Interestingly, overtime users became more willing to share their profiles, they realised that the system was more effective if its *'collective mind'* features were encouraged, and they grew to *trust* their colleagues and allow access to their profiles. Finally, it was noted that each consultant highly personalised the access rights to their profiles, allowing some peers full access whilst more narrowly scooping access for others - this could potentially be viewed as electronic support for *'degrees of trust'*.

4.3   War Stories

Orr (1996) identifies the concept of the *'war story'*, informal experiential discussions that further contribute to the ongoing refinement of the *'collective mind'*. *'War* stories' are frequently disseminated in informal language or by analogy, the more formal data structures demanded by ICTs are diametrically opposed to this informality. The CRM system in the first case study provided limited support for unstructured text. Although free format text input was possible, search and retrieval was limited to keyword matching which is of limited effectiveness. The agent-based KM system used in the second case study supports concept matching using proprietary patent pending algorithms. In order for the system to function free format text must be input - both by the applicant who can specify the types of employment they are seeking and by the consultant who can specify the types of applicant their client requires. Applicants and clients are matched based on predefined fields such as qualifications, industry sector and location but more interesting the free format text is reviewed in an attempt to match *'like'* entities. Over time an *'electronic war story'* is created and historical resource-to-requirement (applicant-to-client) matches are reviewed when attempting to make a new match - past experience is considered automatically. This feature proved extremely popular with the consultants, especially when attempting to match applicants to jobs in areas that they did not perceive themselves to be *'expert'* in - they relied on the system to provide suitable candidates. This development of *'electronic war stories'* supports Kao's view that KM initiatives should support improvisation as many activities are unique in their instance (Kao, 1997). Additionally, a number of comments from consultants regarding the proposed matches presented by the system suggest that some of the matches were *'intuitive'*. This did not occur until the system had had time to evolve by building up extensive user and client profiles however unusual matches that proved popular with clients and did emerge, without the system's intervention should matches could have been described as *'intuitive'*, a concept that Bechara et al (1997) and Klein (1998) believe it is important that KM systems should support if they are to be truly useful.

4.4   Knowledge Maps

Whilst the Internet and corporate intranets are ideal mechanisms for supporting the dissemination of information their restrictive structure and format limit their use when it comes to the more esoteric properties of knowledge. Perhaps the most major contribution to knowledge dissemination that

intranets have made is the ease with which expert and peer directories can be built - frequently referred to as '*knowledge maps*'. Pioneers in this area include Ford Motor Company and Hoffmann-LaRoche (Lucier and Torsilieri, 2001). It should be noted that whilst there has been considerable success in the creation of intranet-based expert directories there are still issues of who should be included; what attributes identify an individual as '*expert*', willingness of individuals to be labelled '*expert*' (potential query overload) and self or cataloguer maintenance of entries. The CRM system implemented in the first case study potentially provided a detailed '*knowledge map*'. Subject to accurate data input, a clear definition of roles, responsibilities and thereby a notion of '*expertise*' emerges. Potentially it may have proved more acceptable to field based employees if the system had been '*sold*' as an opportunity to publicise their knowledge. Indeed, in the second case study, over time a '*peacock effect*' occurred. One of the features of the agent-based knowledge management system was the opportunity to broadcast to peers information that an individual felt should be broadcast to a wider audience. As with other collaborative features that resided within the tool, initially this functionality was only used to a limited extend. However, as staff became more comfortable with the system, so the '*knowledge push*' feature was used more regularly, to the point where a certain amount of bravado existing within the organisation regarding who could disseminate the most information - hence the term '*peacock effect*'.

5   CONCLUSION

This paper has reviewed the implementation of two applications purporting to support knowledge management activity. The first case study was concerned with the implementation of a more traditional CRM system within an industrial manufacturing environment, the vendors claim that the system is appropriate for knowledge management activity. At the time of writing the system continues to receive considerable resistance from users. The second case study was concerned with the implementation of an innovative agent-based resource-to-requirement matching system within a globally sourcing recruitment agency. The application is new and has had limited commercial exposure. Key functionality includes entity profiling (consultants, clients and applicants), experience leveraging (users are put in contact with peers who may be able to offer advice - either directly of via their electronic profiles) and '*knowledge push*' - users may broadcast information that they perceive may be of benefit to the group (or subgroup as defined by the user). Some key lessons for KM implementation can be learnt from these case studies:

- To develop a '*collective mind*' reciprocity must be supported, it is essential that knowledge management using ICTs should support '*knowledge push*' and the full SECI cycle (Hagel and Singer, 1999);

- KM implementations should support the evolution of the '*collective mind*' through collaborative knowledge initiation, dissemination and management (Castells, 1999);

- KM systems should subtly '*force*' users to input their knowledge;

- KM is a people-centric activity (Winograd, 1988), (Cannon-Bowers and Salas, 1999), (Wellman and Hampton, 1999);

- KM solutions should aim to have collaboration at their core, this should help close the SECI circle (Nonaka and Konno, 1998).

The title of this paper is: Knowledge Management Systems: The Role of 'Encouragement'. We have presented two case studies, both of which purport to be implementing a knowledge management system. We believe that, considering the relative maturity of the two organisations and the extent to which the proposed solutions proved to be acceptable, a collaborative user profiling based approach which '*encourages*' users to relinquish initial personalised knowledge has clear advantages.

892

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