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Toward Successful Knowledge Transfer in Web-based Self-service for Information Technology Services

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Abstract

Web-based self-service has emerged as an important strategy for providing pre- and post-sales customer support. Yet, there is a dearth of theoretical or empirical research concerning the organisational, customer-oriented, knowledge-based, and employee-oriented factors that enable web-based self-service systems (WSS) to be successful in a competitive global marketplace. In this paper, we describe and discuss findings from the first phase of a multi-method research study designed to address this literature gap. This study explores critical success factors (CSFs) involved in the transfer of support-oriented knowledge from an information technology (IT) services firm to commercial customers when WSS are employed. Empirical data collected in a CSF study of a large multinational IT services business are used to identify twenty-six critical success factors. The findings indicate that best-in-class IT service providers are aware of a range of critical success factors in the transfer to commercial customers of resolutions and other support-oriented knowledge via WSS. However, such firms remain less certain about what is needed to support customer companies after support-oriented knowledge has initially been transferred to the customer firm.

Keywords: Web-based self-service, customer service, customer support, knowledge transfer

1. Introduction

A key challenge for best-in-class companies competing in an economy where customer support increasingly yields a competitive advantage (Zeithaml et al. 2000) is the leverage of the World Wide Web to reduce high support costs while improving customer loyalty and generating revenue (Piccoli et al. 2004; Negash et al. 2003). This need is set against a business background of more complex products, increasing demand for support, and shrinking support budgets. Addressing the challenge, Web-based self-service systems (WSS) are an approach founded on a complex Web-based information system integrated with multi-channel support (Piccoli et al. 2004; Negash et al. 2003). WSS can reduce the total cost of support transactions by empowering support agents and customers to more easily capture, share, and re-use support-oriented knowledge and information. Such systems offer qualitative advantages to customers by providing them with flexible, convenient, potentially higher quality support, and may increase customer loyalty and retention (Negash et al. 2003). Moreover, customers can be involved in the co-production of high quality services and so help deliver value and a competitive advantage (Xue et al. 2003). Anticipating widespread business uptake, Gartner Group forecast a five-fold growth of WSS between 2002 and 2007 (Kolsky 2002).

WSS can be integrated with a wider organisational strategy of customer relationship management (CRM) that embraces multiple functions of customer support and service, sales automation, and enterprise marketing automation (Gebert et al. 2003). A CRM strategy aims to assist an organisation in developing provider-customer relationships, retaining customers,

and facilitating new sales and service opportunities such as cross-selling and up-selling (Gronroos 1994). A WSS has been classified by some experts as an operational CRM application (Gebert et al. 2003).

There is a need for research into the conditions required for successful WSS. Significant customer concerns have been reported with existing WSS implementations, including: onerous customer experiences, increased interactions, weakened relationships, reduced customer satisfaction and loyalty, and damaging flow-on effects from consequent negative publicity (Barnes et al. 2000; Dabholkar & Bagozzi 2002; Chmaj 2004; McGeary et al. 2004; Selnes & Hansen 2001). However to date, there has been limited published research exploring the enabling factors for successful WSS implementations, particularly in business to business (B2B) settings.

In this paper, we focus on exploring WSS in the B2B context of a multinational information technology (IT) service provider that provides IT support services to enterprise customers. The transfer from support organisations to customer firms of IT support-oriented knowledge such as best practices and resolutions, provides important advantages by improving support agent productivity and decreasing future support costs (Chmaj 2004; Ciccolini & Sorkin 2003). When a customer company quickly gains service or product support and adapts and assimilates the new processes and skills, the firm will be better able to maintain the purchased service or product, more efficient and productive, and more inclined to retain the provider's services (Kay 2004). This paper, therefore, responds to the question:

What are the critical success factors (CSFs) in the transfer of IT support knowledge from an IT services firm to its enterprise customers, when a web-based self-service system is used?

In the remainder of this paper, we first establish a theoretical foundation by integrating relevant theory in the fields of customer service, web-based self-service, and knowledge transfer. We discuss a range of factors that may influence the success of a WSS implementation and, more specifically, knowledge transfer across the support organisation and customer organisation. The research methodology is then introduced, following which we present key findings from a CSF study of WSS in a large multinational IT services company. The paper reports a set of critical success factors for knowledge transfer for WSS in the company investigated. Finally, the paper is summarised, implications and limitations discussed, and future research outlined.

This study represents a pioneering attempt to empirically study inter-organisational knowledge transfer using WSS, and presents preliminary understandings on this important emerging research topic. For managers of support organisations, the findings provide insights into ways that the effectiveness of WSS implementations as competitive strategies might be constrained or enhanced. The study also highlights the important enabling role of knowledge management in supporting WSS.

2. Factors Enabling Competitive Web-based Self-service

Experts have identified "net-based customer service systems" (NCSS), as an important area for information systems research. Such systems are defined as "a network-based computerised information system that delivers service to a customer either directly (e.g. via a browser, PDA, or cell phone) or indirectly (via a service representative or agent accessing the system)" (Piccoli et al. 2004, p. 424). A WSS, a key type of NCSS, comprises all aspects of Web-based customer support that occur before or after the delivery of a core product or service, and which are aimed at ensuring that customers obtain trouble-free product or service use and can gain support in case of problems and questions about their previously purchased service or

product, with minimal intervention from support agents. The industry sector explored in this paper is the *IT services environment*, where IT service organisations assist with enterprise customer pre- and post-sales enquiries and problems regarding IT products and services (Negash et al. 2003). In such organisations, a multi-tiered structure of support agents assists with multi-channel integrated support that includes self-service via the Web channel (Kapella 2003).

A WSS can enable *informational*, *transactional*, and *proactive* support services (Conneighton 2004; Piccoli et al. 2004). In IT services environments, such informational support comprises the provision of unassisted support such as answers to frequently asked questions (FAQ), instructions for remedial IT troubleshooting, and white papers describing best practices. Typical assisted support offerings include communities of practice operating through peer group forums, e-mail, and chat facilities, with Voice-over-Interactive-Protocol an emerging channel. Transactional support includes downloads of software patches, and case management with customer tracking. Proactive support includes embedding problem detection support software on customer computers to alert providers in the event of problems, automated updates of customer software, and personalised messages directing the customer to potential product or service purchases (Conneighton 2004).

It is interesting to note that so important have these issues become that an industry consortium has developed a knowledge-centred support (KCS) methodology, increasingly implemented in businesses (CSI 2002). KCS aims to create a knowledge base across dispersed locations, incrementally improve the knowledge base during problem-solving, and quickly share relevant knowledge with customers.

In support of this research which seeks to identify critical success factors in knowledge transfer in WSS, we have integrated representative sources within an *extension* of the broad categories used by Croteau and Li (2003) in their study of CSFs for CRM. We have also examined other research in order to derive this categorisation. We now discuss the eight categories of factors recognised from sources that may underpin WSS success. These will be revisited later in this paper as a structure upon which to base the discussion of the CSFs that were identified in the empirical work.

2.1 Managing for delivery of strategic and operational benefits
Managing for the delivery of intended benefits such as customer loyalty, reduced costs, and increased support efficiency is a key factor in customer support systems success (Wilson et al. 2002). As Piccoli and colleagues discovered, Web-based service can sometimes be more expensive than other service channels and there is a need to intelligently direct the customer to the most cost-effective channel (Piccoli et al. 2004). A strategic approach that may also further the Return On Investment (ROI) objective is a fee-paying Web-based support model (Kanellos 2000). Opportunities also exist for increased sales through the conversion of knowledge acquired through WSS, while operational efficiencies are attainable through knowledge reuse.

2.2 Customer experience management
Links have been drawn between service quality, customer satisfaction, and customer behavioural intentions (Froehle & Roth 2004). A poor customer experience may lead a customer to avoid a channel in future (Barnes et al. 2000), however relationships developed during net service over time (Rao & Perry 2003) may reduce this effect. Customer-oriented influences include: consumer readiness; perceptions of efficiency, fulfillment, system

reliability, availability, and responsiveness; privacy; personalisation; customer autonomy; relative advantage; complexity; interface design; findability and content; and relationship with provider (Bednarz 2002; Chmaj 2004; Froehle & Roth 2004; Negash et al. 2003; Parasuraman & Grewal 2000; Parasuraman et al. 2005; Piccoli et al. 2004; Selnes & Hansen 2001; Xue et al. 2003; Zeithaml et al. 2000).

2.3 Electronic business readiness of customers

Barua and colleagues (2005) suggest that customer firms must be capable of doing electronic business with provider organisations. In the context of B2B support, a customer firm must be ready to interact successfully with a support firm. For example, a sufficient knowledge base must be in place at a customer firm in order to assimilate received support knowledge (c.f. Cummings & Teng 2003).

2.4 Organisational readiness

Organisational strategy, technical infrastructure, and culture may be important in WSS success. *Strategic* enablers include: the management of best practices, project approvals, and prototyping of support processes; process and technology improvement; and use of a support methodology (CSI 2002; Gebert et al. 2003; Wilson et al. 2002). Alignment of business processes and applications with CRM systems may increase CRM effectiveness (Bose & Sugumaran 2003). Educating and training customers about the use of Web-based products and services can enhance customer loyalty (Negash et al. 2003). Offering service level agreements provides service guarantees (Sturm & Morris 2000). The *technical infrastructure* must be able to support expected volumes of support transactions and meet challenging security and privacy requirements (Zeithaml et al. 2000). A *culture* that is customer-oriented, employee-empowered, open, and knowledge-sharing facilitates knowledge transfer (Ladd & Ward 2002).

2.5 Top management support

Top management support has been recognised as important in a number of ways and may encourage support agent use of the WSS (Schelin & Garson 2004).

2.6 Employee experience management

Front-line support agents are concerned with job satisfaction, self-efficacy, and adaptability (Hartline & Ferrell 1996). Their satisfaction with support experiences can impact service quality, customer satisfaction and corporate profit (Heskett et al. 1997; Wilson & Frimpong 2004). In WSS, support agents are expected to contribute knowledge to the knowledge base or lower tier agents but may be reluctant to do so for political reasons (Davenport & Khlar 1998). Support agent satisfaction may be enhanced by providing opportunities for problem analysis and innovation (Heskett et al. 1997) while recognition and social relationships may be useful to motivate knowledge sharing (Bock & Kim 2002). Interestingly, Bock and Kim found that rewards were not particularly motivational.

2.7 Knowledge management capabilities and processes

Knowledge management capability may be a key enabler for WSS success (Bose & Sugumaran 2003; Gebert et al. 2003). Explicit support-oriented knowledge includes the captured knowledge of support agents and customers during support, and the outputs of support, such as resolutions, case histories, and customer feedback. Such knowledge is valuable in reuse. Tacit support-oriented knowledge such as technical skills exists in the minds of key stakeholders including support agents and customer contact personnel, and is difficult to transfer. Knowledge processes required for successful WSS include the capture,

transfer, and reuse of support-oriented knowledge (Davenport & Klahr 1998). Key advantages of a knowledge management strategy for WSS support include the ability to identify gaps, bottlenecks, barriers, and deficiencies in current business processes, and enabling the organisation to gain a better understanding of how support-oriented knowledge flows within the company and to its customers (Gebert et al. 2003). Such a strategy can provide an enhanced understanding of customer expectations and so improve support.

2. 8 Content
Concise (rather than excessive) and performance-oriented content in the knowledge base is essential to CRM success (Gebert et al. 2003) and is a key enabler for successful support systems (Chmaj 2004).

3. Knowledge Transfer for Web-based Self-service Systems
In this paper, we are particularly interested in knowledge transfer from the support organisation to the enterprise customer. For effective inter-organisational knowledge transfer, business partners require overlap of knowledge bases and good interaction (Simonin 1999). We adopt a broad perspective of knowledge transfer in customer support that includes its capture in the knowledge base and multiple points of transfer. By analysing knowledge transfer as a complex process, the deeper issues can be examined more closely. We *adapted and enhanced* Szulanski's four stage processual model of knowledge transfer (Szulanski 2003) to investigate knowledge transfer for WSS in the IT services context, as described below.

The *initiation* stage consists of all events that lead to the decision to transfer knowledge. During the initiation stage, knowledge is initially captured from support agents and customers into the knowledge base when there is a change such as a new product release or in the course of support work (Kapella 2003). There may be codification, motivational, and agent access concerns. Front-line support agents must be empowered to troubleshoot standard problems in assisted support such as e-mail and chat, requiring (a) initial training to transfer tacit knowledge from higher tiered agents, and (b) ongoing transfer of evolving tacit knowledge from higher tiered agents (Ciccolini & Sorkin 2003). Customer contacts access the WSS and search for potential resolutions from within the knowledge base or through community forums, e-mail, or chat. Intelligent software identifies optimal potential resolutions in the knowledge base. Problem escalation may lead to root cause analysis by high tier support agents resulting in workarounds which update the knowledge base (Kapella 2003).

During the *implementation* stage, knowledge flows between the support organisation and the customer contact who must be motivated to understand, learn, and assimilate received knowledge (Simonin 2004; Szulanski 2003). Social ties are established between the source and recipient and the transfer is customised to suit the needs of the recipient (Szulanski 2003). Care is taken to avoid problems encountered in previous transfers. During this stage difficult relationships or power issues may obstruct the process (Szulanski 2003). Customer firms tend to replicate poorly understood transmitted knowledge (Szulanski 2003), while well-understood knowledge is transferred and adapted to the customer context (Williams 2003). Too large a gap in service/product understanding between the support and customer organisations can preclude transfer (cf. Szulanski 2003). Customer core competencies enable independent operation and maintenance of the resolutions provided.

In the *ramp-up* stage, a customer company begins using the resolution, perhaps inefficiently at first, but gradually identifying and resolving unexpected problems (Szulanski 2003). A phase of knowledge application or practicing is needed for the customer to acquire tacit and

contextual aspects of knowledge (Simonin 2004). Through support organisation training services, the customer can acquire knowledge to reduce the likelihood of recurring technical issues, and so avoid costs. Customer satisfaction with support received is transferred to the support firm via customer feedback (which may be tacit and/or explicit) and consolidated in the knowledge base or assimilated as tacit knowledge by support agents (Kapella 2003).

In the *integration* stage, transferred knowledge becomes institutionalised at the customer site (Szulanski 2003). The enterprise customer experiences similar issues as the support organisation in transferring resolutions and best practices within its support team and product/service end-users.

4. Research Design

In this section, we describe the research design for the first phase of a multi-method research project investigating CSFs in knowledge transfer for WSS. The CSF method as developed by Rockart (1979) has been employed. This method can be used for strategic planning in the extended enterprise, such as where commercial customers and/or suppliers are partners (e.g. Tillquist 2002). The CSF method proposes that organisational strategy may best be based on "identifying elements of the organisational environment that are critical to operation or exposed to significant threat" (Tillquist 2002, p. 78). The CSF method has been successfully adapted for a variety of research environments (e.g. Somers & Nelson 2001). Given the gap in the literature with respect to the key enablers of successful knowledge transfer in WSS *in practice*, and as we were considering large *extended* service provider enterprises (cf. Tillquist 2002), the CSF method was selected for the first phase of the project, reported in this paper.

For this phase, we adapted Shank et al. (1985) version of the CSF method. The modified steps comprised: (1) develop a broad understanding of the organisation; (2) develop a first list of CSFs; (3) sell the CSF method during an introductory workshop; (4) educate personnel on the CSF method; (5) interview participants for CSFs in knowledge transfer for WBSS; (6) synthesise a chart of CSFs from all interviews; and (7) aggregate the CSFs to produce a final integrated set of CSFs across the organisation. After Somers and Nelson (2001), this study applied the CSF method to identify CSFs across each of the four phases of knowledge transfer (described earlier) to customers via WSS. This also resulted in a greater richness of identified CSFs (c.f. Somers & Nelson 2001).

A best-of-class IT services organisation was selected based on its progressiveness in customer support, extended enterprise status, and mature WSS. We sought a large multinational IT services firm to enable issues of high service volume, complexity, dispersion and electronic business to surface in the data collection and analysis. The unit of analysis was the Australian headquarters of a large multinational IT services organisation "SERVIT" (a pseudonym).

Seven research steps were undertaken as follows. After gaining an understanding of SERVIT from online literature (Step 1) and conducting a literature review to understand related theory and theoretical success factors (Step 2), two of the authors attended an introductory workshop in mid 2004 with two key senior executives (Step 3). At this meeting, a background of the context of WSS was obtained, and the significance of the knowledge transfer process as a key component for successful WSS was established. The CSF concept was explained to the two executives who acknowledged its value. Key participants were identified for future interviews.

Next, the first author provided potential participants with background material for the study (Step 4), and in November 2004 interviewed twelve key personnel in predominantly managerial, but also operational roles ranging across knowledge management, customer service and support, self-service and technology areas (Step 5). Thus, consistent with the approach of Shank et al. (1985), participants ranged across multiple levels in the organisation, enabling more wide-ranging insights to emerge. Individual sets of initial CSFs were obtained from participants in advance of interviews. Interview schedule questions required participants to provide definitions of key terms and context, and elicited discussion of CSFs for each of the four stages of knowledge transfer in WSS, and for knowledge transfer overall. Analysis of interview transcripts employed inductive qualitative content analysis techniques (Mayring 2000). The chief researcher reviewed each transcript and allocated a tag for each factor indicated by the participant as critical for WSS-enabled competitive advantage overall and critical for each of the four stages of knowledge transfer via WSS. Inductive analysis, with progressive new factor identification, was used iteratively until factors converged to a set of twenty-six CSFs (Steps 6 and 7). A second researcher conducted independent analysis for cross-verification of findings. This completed the first phase of a three phase research project.

5. Findings

A brief background of the service, support, and WSS context at SERVIT follows. Several divisions are responsible for delivering a wide range of IT-based business solutions to end-customers, including individual consumers, small to medium size, and enterprise size clients. This study focused on support given to commercial companies. Support comprises "break-fix" and more advanced IT support delivered via multiple integrated channels including the Web. The WSS is integrated with problem- and incident-management processes. SERVIT's support arm aims to save time for customers and personalise their support experience. Support facilities include: service-level agreements; integrated multi-channel support including WSS; on-site support teams; customer tracking of support transactions and cases; and proactive remote alert service technology. Specific services include: downloading of software; troubleshooting; set up, installation and configuration of products, maintenance, upgrade, and migration. Such services are available through a Web site interface and supporting WSS. At the Web site, customers can search for electronic documents, initiate and monitor support cases, engage in forum-based discussions with other customers and support agents, and register for training. Savings from web-based self-service have been estimated at over $18 M per annum, and over 75% of calls for support are planned to be redirected to the WSS.

Participants agreed that knowledge management was important to IT support in terms of maximising service delivery effectiveness through applying known resolutions to known problems and enabling proactive support for problem prevention. Strategic and operational benefits were cited as operational excellence and customer satisfaction. Knowledge transfer between the tiers of support agents, and between the support organisation and the customer, was considered critical to IT self-service success:

> "Knowledge transfer is absolutely critical in terms of any self-service strategy. There have to be methods of encapsulating and sharing of tacit knowledge across the individuals who require access to that knowledge." [IT service manager]

Participants identified twenty-six CSFs for knowledge transfer for WSS (summarised in Appendix A). In Appendix A, summary descriptions of CSFs are provided together with the numbers of participant responses raising each factor during each stage of knowledge transfer. As can be seen, some CSFs were considered overarching (or, a fundamental perquisite for

implementing WSS as well as for ongoing viability) while others were specific to a given stage. We now briefly discuss the CSFs within the eight categories presented earlier, although some CSFs apply to more than one category (a finding that will be the subject of a future publication). Due to paper size constraints, we discuss only a selection of the CSFs in order to illustrate factors in each category, as well as selected findings about the specific stages of knowledge transfer. CSFs are shown in italics.

5.1 Managing for delivery of strategic and operational benefits

Five participants raised the need for WSS to meet criteria related to *cost-effectiveness (CSF-1),* as previously found for CRM applications (e.g. Wilson et al. 2002). Participants also saw the need to measure increased employee efficiency (an aspect of *employee focus (CSF-16)*) and a need to manage the offer of new opportunities to the customer *(additional value and cross-selling (CSF-2))*. Such opportunities became important during the integration stage of knowledge transfer. Managing relationship development between the customer firm and the provider organisation was also identified as critical (*positive relationship (CSF-14)*) in respect of enabling open communication and developing trust between the provider and its customers to facilitate knowledge flow.

5.2 Customer experience management

Participants believed that customers would be sensitive to their service experience. As one participant stated:

> "You need to have good experiences and good results from using the tool or they won't come back."   [Manager]

Several participants mentioned that for the customer, an *early positive experienc*e *(CSF-10)* was important, a finding that, to our knowledge, has not previously been reported. Various aspects of usability *(ease-of-use (CSF-9))* were frequently cited, such as intuitive navigation and search. The representation of knowledge on the screen was considered critical in terms of structure, language and customer accessibility *(presentation (CSF-22))*. An effective search engine *(effective search engine (CSF-7))* was nominated by almost half the participants, supporting the associated findings of Bednarz (2002) and Chmaj (2004). The language used by the customer in a search text box had to be understood by the search logic, corresponding to increasing usage of natural language processing in search engines.

The WSS also had to meet high customer demands for functionality *(usefulness (CSF-4))*, according to most participants. For example, when resolving a particular technical problem, the resolution must be accurate and of high quality. Usefulness was particularly important in the initiation stage of knowledge transfer when customers needed confidence in *perceived* usefulness of the forthcoming resolution and in the implementation stage when the resolution was received and assessed. Measures to increase customer confidence in problem resolutions are needed such as the roll-back of information on the screen and support status information displays *(confidence in solution (CSF-12))*. Personalised service *(customer focus (CSF-13))* was mentioned in terms of presenting a personalised view and was considered important to creating valuable social ties for developing relationships, supporting the findings of Piccoli et al. (2004) and Rao and Perry (2003) who suggested that provider/customer relationships can be developed using internet services, over time. Responsiveness was considered important *(speed (CSF-5))* and system assurance in terms of security, privacy, reliability and recovery was mentioned by several participants *(security, privacy and assurance (CSF-8))* as was also found by Zeithaml et al. (2000) and other experts.

5.3 Electronic business readiness of customers

Supporting recent findings concerning the importance of customer e-business readiness to successful self-service (Barua et al. 2005), participants mentioned that the customer firm needed to have sufficient IT infrastructure and access to the Internet *(access, connectivity, performance (CSF-6))*. However, participants did not raise the issue of the capacity of the customer organisation – in terms of possessing an adequate knowledge base – as was proposed by Cummings and Teng (2003).

5.4 Organisational readiness

Various supporting strategies were considered critical. For example, the marketing of Web-based support to customers was considered important by eight participants, particularly during the initiation stage, when customers needed to become aware of this support mechanism *(awareness and marketing (CSF-18))*. A strategy also cited by three participants was the alignment of support processes with WSS, and integration of WSS with other support channels, applications, and processes (*alignment and integration (CSF-24))*. Knowledge management capability was viewed as important as we discuss later. However interestingly, no participant cited a knowledge-centred support methodology as advocated by CSI (2002), even though this company uses such an approach.

The provision of adequate education and training to customers in applying a resolution in their own company was considered important *(additional support (CSF-15))*, particularly during the ramp-up stage when customers first attempt to apply a resolution. However, little consideration was given to other means of supporting customers during this important stage, other than hoping that customers would use the peer-based forums rather than costly support agents. There was also little consideration given to supporting a customer in institutionalising transferred resolutions. Technical infrastructure readiness was mentioned in terms of sufficient and reliable high speed internet access *(access, connectivity, and performance (CSF-6))* as well as *security, privacy and assurance (CSF-8)*. Organisational *culture (CSF-17)* was considered a critical factor by three participants in terms of the organisation fostering an environment that is customer-oriented, open, trusting and facilitates the sharing of knowledge. The ability to measure performance in terms of service levels was cited by six participants *(performance measurement and feedback (CSF-23))* supporting the findings of Sturm and Morris (2000).

5.5 Top management support

Surprisingly, top management support was not directly raised by participants as a factor. Subsequent discussions with participants suggested that this may possibly be simply the result of an assumption by all participants that top management support is always essential to pursuing any significant strategic organisational initiative, and as such it did not explicitly occur to them as critical to WSS.

5.6 Employee experience management

Half of the participants reported that the management of support agents was critical *(employee focus (CSF-16))*. For example, one participant mentioned that if support agents were considered redundant, there would be a loss of valuable tacit knowledge, citing a recent situation at SERVIT where valuable personnel left the company in a restructure and later had to be rehired for their valuable tacit knowledge. It was also mentioned that it was important to ensure that agents could contribute knowledge without fearing loss of employment. This result supports similar findings by Davenport and Klahr (1998). Rewards were mentioned as valuable for motivating knowledge sharing with other agents or prompting contributions to

the knowledge base, in accord with reports from many knowledge management experts but contrary to the findings of Bock and Kim (2002). However, employee recognition was identified as a type of reward and such recognition has previously been found an effective motivator (e.g. Bock & Kim 2002). It was mentioned that support agents may not find the frequent reuse of known resolutions particularly stimulating, and that this could be a concern for job satisfaction.

5.7 Knowledge management capabilities and processes
Several knowledge processes were cited as key enablers of successful knowledge transfer. As already mentioned, the transfer of knowledge between support agents and across to the customer firm was considered critical to WSS success and is the subject of this research. Knowledge processes mentioned by participants included the capture of support-oriented knowledge such as new resolutions - developed following problem escalation - in the knowledge base *(knowledge capture and reuse (CSF-19))*. Such knowledge must be validated before it is codified and stored *(knowledge validation (CSF-20)*; *knowledge storage/retrieval (CSF-21))*. One participant noted that the transfer of invalid knowledge could become a source of serious problems in terms of malfunctioning customer technology. An understanding of how effectively resolutions were applied by customers was considered essential to capture through customer feedback *(knowledge capture and reuse (CSF-19))*.

5.8 Content
A critical mass of customers and high quality content in the knowledge base was needed for success, according to two participants *(critical mass (CSF-3))*. During the ramp up stage of knowledge transfer, this factor was deemed important due to the expectation that the customer might now rely on peers in a forum (rather than the support company) for continued support. Without sufficient and high quality content, such forums are clearly ineffective.

6. Conclusion
Web-based self-service has emerged as an important strategy for customer support in the era of electronic business. This study is a pioneering attempt to understand such systems from an organisational perspective in terms of the critical success factors involved. Our investigation has focused, in an IT services context, on identifying and understanding the key enablers of the successful transfer of knowledge from IT support agents who possess or develop support-oriented knowledge such as resolutions to other support agents, and across to external customer firms where such knowledge is assimilated and institutionalised. The empirical CSF study has revealed twenty-six (26) CSFs (Appendix A) which have been grouped, to facilitate the discussion of results in this paper, into seven categories: Managing for delivery of strategic and operational benefits; Customer experience management; Electronic business readiness of customers; Organisational readiness; Employee experience management; Knowledge management capabilities and processes; and Content. This categorisation provides a structure for understanding how the factors may contribute to the success of WSS, thus contributing to the developing body of theory relevant to net-based customer service (Piccoli et al. 2004) and knowledge-enabled CRM (e.g. Gebert et al. 2003). Drawing upon the findings, two key conclusions emerge:

- Managers have shown a well-developed awareness of the strategic importance of WSS. Many of the factors identified are clearly customer-oriented and show an understanding of the need to satisfy and retain customers through the support service and the relationships developed through integrated channels. There was, however, no deep understanding of how relationships might best be developed through unassisted Web-based self-service (which Rao and Perry (2003) suggests is possible).

Well-recognised service quality antecedents were among the most commonly cited CSFs. In contrast, while there was some recognition by participants of support agent needs, only six participants believed that agent support experiences were critical to the success of such systems, suggesting that, for many of the participants, customer rather than support agent needs were considered more important. This finding suggests a need for further investigation of the issues involved.

- Little attention was given to issues of knowledge transfer inside the customer firm. Participants were aware that customers would need technical access and good service in the initiation and implementation stages of knowledge transfer, but had not given deep consideration to the importance of customer capacity and competence for assimilating and later routinising the received resolutions. This finding offers an avenue for future research.

In summary then, this study indicates that progressive, best-in-class IT services organisations are aware of a range of key enabling factors for successful knowledge transfer to commercial customers using Web-based self-service, while remaining less certain about what is needed to support customer firms in terms of providing further support after the initial provision of knowledge.

Whilst important foundational work has been completed, it should be noted that a single study of one organisation such as reported herein, does not produce results which can be immediately generalised. In a future phase of this research project, the researchers plan to conduct a workshop involving participants from a selection of organisational sites, to further explore the critical success factors identified in this study. Such studies will be the subject of future publication.

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Appendix A: Critical Success Factors for Knowledge Transfer via WSS

Critical Success Factor	Description	No. Participants						Critical Success Factor	Description	No. Participants					
		Total	Overarching	Initiation	Implementation	Ramp-up	Integration			Total	Overarching	Initiation	Implementation	Ramp-up	Integration
CSF-1: Cost Effectiveness	Web-based support must deliver a beneficial cost equation for provider and customer alike.	5	5	2				**CSF-14:** Positive Relationship Between Organisation & Customer	Management of the relationship between the provider and customer firm aims to establish open and trusting relationships.	5	2			5	3
CSF-2 Additional Value & Cross Selling	Knowledge captured about customer sales and support must be analysed for opportunities to increase sales and increase value for the customer.	3	1	1			2	**CSF-15:** Provision of Additional Support: Education and Training	Provide education and assistance to the customer to use the WBSS system and resolutions transferred.	7		1	1	5	1
CSF-3: Critical Mass: Knowledge Content and Knowledge Contributors	A minimum, critical number of people who actively use the WBSS and contribute knowledge to its knowledge base is needed. A minimum content is needed in the knowledge base.	2	1	1	1	1	1	**CSF-16:** Employee Focus	Focus on support agent needs such as coaching to promote knowledge transfer and reuse and improve productivity. Such efficiency gains should be measured.	6	3	3			1
CSF-4: Usefulness: Meets User Requirements	The system must provide functionality in the application of resolutions or other received knowledge or information.	11	5	6	5	2	1	**CSF-17:** Culture	Foster a customer-oriented, open, trusting, knowledge sharing culture.	3	1				2
CSF-5: Speed	A response from a support request should be speedily provided to the customer.	6	4	3	2			**CSF-18** Awareness and Marketing	Establish awareness and marketing programs promoting Web-based self-support to customers.	8	4	5	2		
CSF-6: Access, Connectivity & Performance	Technical infrastructure at provider and customer firms must be able to provide sufficient system access, internet connection and technical performance to support service needs.	8	4	8	3	1		**CSF-19:** Knowledge Capture and Reuse	Manage enquiries, problems, and cases so that support agent knowledge is captured during support work processes and so that customer knowledge is captured and reused through customer co-contribution.	4	2	3	3		1
CSF-7: Effective Search Engine	Search engines must be efficient and effective in terms of improving speed of search and findability of relevant knowledge.	5	3	3	3			**CSF-20:** Knowledge Validation	Establish processes to validate knowledge before it is captured in the knowledge base and processes that review and update the knowledge base to ensure its validity.	7	3	2	1	4	4
CSF-8: Security, Privacy and Assurance	Secure systems and data privacy are needed.	4	2	1	1			**CSF-21:** Knowledge Storage/Retrieval	Establish processes to codify and store explicit support knowledge in the knowledge base in a structured way so that it can be easily retrieved by a variety of customers.	5	3	1	3		1
CSF-9: Ease-of-Use/Usability	The customer must perceive that obtaining support requires a minimum level of cognitive and ergonomic effort.	9	7	6	6	2		**CSF-22:** Presentation of Knowledge	Support knowledge and information presented through the Web interface must be readily accessible to a wide span of customer types.	10	1	4	5	5	
CSF-10: Early Positive Experience	The first few customer experiences with the system must result in positive outcomes for the customer contact, in terms of valuable support and feeling valued by the support firm.	6	3	2			2	**CSF-23:** Performance, Measurement and Feedback	Performance methods and metrics to evaluate the effectiveness of the Web self-support strategy must be in place such as tracking and surveys. Results should be used to customise and otherwise improve the system.	6	3			2	3
CSF-11: Positive Experience	Customer experiences with the system must generally result in positive outcomes for the customer contact, in terms of valuable support and feeling valued by the support firm.	4	1	2	2	1	1	**CSF-24:** Alignment and integration	WBSS must be aligned and integrated with the wider business environment including other strategies, business processes and applications.	3	1	1	1	2	1
CSF-12: Confidence in Solution	Measures to provide customer confidence in solutions are needed such as "roll back" of information and status information.	4			4	2		**CSF-25:** Web-based customer self-support Recovery/ Over-ride	The capability for either the customer or system to over-ride the self-support transaction must be in place so that other support channels (e.g. telephone) can be used as necessary.	5		2	2	3	

| CSF-13: Customer Focus: Understand Needs of Recipient | Personalisation of support for individual customers must be provided through the knowledge base and system. | 8 | 3 | 5 | 4 | 3 | 1 | CSF-26: Ease Re-initiation | A process is needed so that a customer can easily re-initiate a support transaction in the event of need. | 5 | | | | 5 |