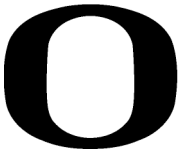

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Web Conferencing and Enterprise Information Portal Functions in Support of the Four Modes of Knowledge Conversion

CAPSTONE REPORT

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ABSTRACT

for

WEB CONFERENCING AND ENTERPRISE INFORMATION PORTAL FUNCTIONS IN SUPPORT OF THE FOUR MODES OF KNOWLEDGE CONVERSION

The purpose of this study is to explore ways that web conferencing and enterprise information portals, two collaborative technologies, support the four modes of knowledge conversion described by Takeuchi and Nonaka (2004). Modes include Socialization, Externalization, Internalization, and Combination. Content analysis is conducted on selected literature published between January 2004 and December 2004. Outcomes are intended for use in organizations seeking to improve knowledge sharing, with the goal to leverage information into knowledge.

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CHAPTER I- PURPOSE OF STUDY

Brief Purpose

Collaborative technologies are technology-based applications used to promote knowledge conversion and transfer by connecting people-to-people, thus leveraging information (Rumizen, 2002). While one collaborative technology is not right for all situations (Rumizen, 2002), the purpose of this study is to understand the potential relationship between Takeuchi and Nonaka's modes of knowledge conversion and the functions of two specific collaboration technologies commonly used in an organization: Web conferencing technologies and enterprise information portals. Web conferencing is software, which allows individuals within and across organizations to "interact with others", as if all attendees were in the same room together (Speilman & Winfield, 2003). Web conferencing facilitates collaboration in real-time and can also be recorded to playback later (Patterson, 2003). Enterprise information portals (EIPs) are Web sites with "a single gateway to a company's information and knowledge base for employees and possibly for customers, business partners, and the general public as well" (Whatis.com). According to Figallo and Rhine (2002), enterprise information portals facilitate knowledge sharing by providing a "means for employees to share with each other what they know" (p. 316).

The decision to focus on the topic of modes of knowledge conversion is based on a larger interest in how to manage a successful organization. Today, an

organization's key to success is the ability to leverage information into knowledge (Brache, 2002). Knowledge workers, according to Hammer (2004), have the "primary task" in the "creation, distribution, and application of knowledge" (Hammer, 2004). This is because they are working with knowledge that they use "in their daily work" (Hobley & Kerrin, 2004, Sep/Oct, 12). While information technology costs are easy to quantify, there is a "lack of research" on how the knowledge worker approaches knowledge management (Hammer, 2004).

The larger method of study is based on a literature review (Leedy & Ormrod, 2001). To provide context to this study, literature collection centers on two areas: (1) modes of knowledge conversion, as defined by Takeuchi and Nonaka (2004) and (2) functions of Web conferencing and EIPs, which enable the creation and sharing of knowledge.

Content analysis is performed on the literature selected on Web conferencing and EIPs (Writing@CSU). The goal of this analysis is to identify the functional elements of these two tools that may be used to leverage information into knowledge within an organization. The result from this stage of content analysis is presented in a table identifying relevant functions of Web conferencing and EIPs.

The next stage of content analysis is to align the functions of Web conferencing and EIPs identified in the previous step with the modes of knowledge conversion provided by Takeuchi and Nonaka (2004) in the form of a matrix. The tentative purpose of the matrix is to demonstrate potential ways that

Web conferencing and enterprise information portals align with each of the four modes of knowledge conversion. The matrix should be useful to organizations interested in further understanding modes of knowledge conversion and supporting these modes with selected collaborative tool technologies.

Full Purpose

Collaboration in organizations is the act of employees working together in an effort to achieve goals and objectives of the organization, whether or not those employees are located centrally or dispersed throughout various locations (Kirsner, 2001). According to Rumizen and Stemke (2001), "effective tools" to enable collaboration are needed to "achieve success". One such tool "quickly becoming a mainstream enterprise tool" according to Gartner is Web conferencing (Gartner, 2004). Another tool currently used by many companies is enterprise information portals (Patricia Seybold Group, 2004).

Web conferencing provides real-time collaboration opportunities for multi-location meetings. Application and video sharing functions assist in collaboration efforts (Patricia Seybold Group, 2004). The exchange of documents and the ability to integrate them with audio and video creates a "rich media communication form" (Davis, 2002, p. 1). Current vendors offer solutions for both large and small organizations, therefore, all firms can benefit from the ability to collaborate using Web conferencing (Patterson, 2003).

Enterprise information portals (also referred to as corporate portals) provide a single point of entry for an organization's employees, as well as "partners, suppliers, investors and customers", to access critical business information "located inside and outside of the organization" (Kounadis, 2000). This includes both structured and unstructured data, in addition to specific business applications such as enterprise resource planning (ERP) and customer relationship management (CRM) (Mercy, 2004). For this study, the focus is on the ability to use these technologies for collaboration among internal knowledge workers within an organization.

Knowledge management (KM) is the "systematic process by which knowledge needed for an organization to succeed is created, captured, shared, and leveraged" (Rumizen, 2002, p. 9). It is important to understand that knowledge, defined as an information asset within an organization, has two forms: tacit and explicit (Rumizen, 2002; Von Krogh, Ichijo, & Nonaka, 2000). A tacit information asset is difficult to quantify, as tacit information includes experiences quantified into "rules of thumb" (Rumizen, 2002, p. 8) by employees (von Grogh et al., 2000). An explicit information asset is what an organization "can write down" or capture in databases, documents, policies, or procedures (Rumizen, 2002, p. 8).

Knowledge conversion or the "social interaction between tacit and explicit knowledge" (Takeuchi & Nonaka, 2004, p. 53), occurs within the organizational context through four modes identified by Takeuchi and Nonaka.

These modes provide the analytic framework for this study. Takeuchi and Nonaka's (2004, p. 9) four modes of knowledge conversion are:

- Socialization: sharing and creating tacit knowledge through direct experience
- Externalization: articulating tacit knowledge through dialogue and reflection
- Combination: systemizing and applying explicit knowledge and information
- Internalization: learning and acquiring new tacit knowledge in practice

The chosen method for this study is literature review (Leedy & Ormrod, 2001). The purposes for the literature review are:

- To provide this researcher with a "theoretical and methodological" point of reference (O'Leary, 2004, p. 66)
- To demonstrate an understanding of Takeuchi and Nonaka's four modes of knowledge conversion and defend its use as the analytic framework for this study (O'Leary, 2004)
- To review and report on the functions of Web conferencing and EIPs collaboration tools under review in this study (O'Leary, 2004)

The use of content analysis is employed to examine the potential relationships between the four modes of knowledge conversion and the functions of selected collaboration tools: Web conferencing and EIPs (Krippendorff, 2004). It is anticipated the answer is to be found through the "systematic reading" of the selected text from the literature review portion of this study (Krippendorff, 2004, p. 342). Following the steps outlined by Writing@CSU,

conceptual analysis begins with the identification of research questions. For this study, the data analysis is conducted in two phases and guided by two questions:

1. What are the functions of Web conferencing and EIPs?
2. How can Web conferencing and EIPs potentially support modes of knowledge conversion within an organization?

The result of the first phase of content analysis is a table identifying the functions of Web conferencing and EIPS collaboration tools. The table is intended to present an easy visual aid tool for IT and business decision makers to understand the technology. The result of the second phase of content analysis is a matrix, designed to present potential ways that Web conferencing and enterprise information portals align with each of the four mode of knowledge conversion. The matrix is intended to demonstrate to IT and business decision makers how an organization can evaluate current and/or future collaboration tools, such as Web conferencing and EIPs, in the support of converting information into knowledge through the four modes of knowledge conversion. The matrix is designed to provide a new method to categorize collaboration tools in an effort to gain the intended corporate value from their implementations. Previously, collaboration tools have been categorized according to time and place of participants (Rumizen, 2002). While categorization along time and place is helpful, it lacks a connection to the modes of knowledge conversion. This lack of connection tentatively leaves the organization with gaps in their available tools for the full conversion of knowledge among the four modes.

Problem Area

This study is positioned within the knowledge management field by focusing on knowledge management behaviors and collaborative electronic tool functions. As evident from the continued introduction and transformation of collaborative tools within the marketplace, organizations are still looking at technology to solve knowledge sharing issues (Glasser, 1998/1999). According to a June 2004 study by IDC, as reported by eMarketer, over thirty percent of their survey respondents are looking for IT improvements to provide better systems for communication and collaboration (eMarketer.com). Thirty-five percent of respondents want to improve access to relevant information/data (eMarketer.com). Clearly, the selection, adoption, and use of collaboration tools have not yet created the value management looks for from their IT solutions (Desouza & Awazu, 2004).

Collaborative technologies for knowledge management are generally classified along a time/place paradigm with an overarching caveat that "no collaborative tool is idea for all situations" (Rumizen & Stempke, 2001, par. 3). Dragoon (2004) adds, "Technology plays a key enabling role in successful collaboration" (p. 5). O'Dell and Grayson (1998) caution that organizations need to "understand the limitations as well as the power of technology" (p. 25).

Rumizen and Stemke (2001) provide a time/place paradigm for choosing collaborative technologies consisting of four elements: time, place, information

richness, and social presence. As outlined by Rumizen and Stemke (2001, p. 22) each element is described below:

- Time indicates when the collaboration takes place, either synchronously or asynchronously.
- Place indicates the location of participants.
- Information richness measures the type of content delivered.
- Social presence indicates how well a collaborative tool helps people connect to each other.

Following this framework, Rumizen and Stemke (2001) provide this example (Table 1) of how to choose appropriate collaborative technology.

	Same Place	**Different Place**
Same Time	Face-to-face meeting	Videoconferencing PC Desktop sharing
Different Time	E-mail Bulletin Board	E-Mail Bulletin Board

Table 1: Choosing Appropriate Collaborative Technology
Source: Rumizen and Stemke (2001, p. 23)

However useful this framework might be, there is no consideration for the process by which knowledge is transformed between tacit and explicit forms. As seen in Figure 1, knowledge conversion is a cyclical process, regardless of time or place.

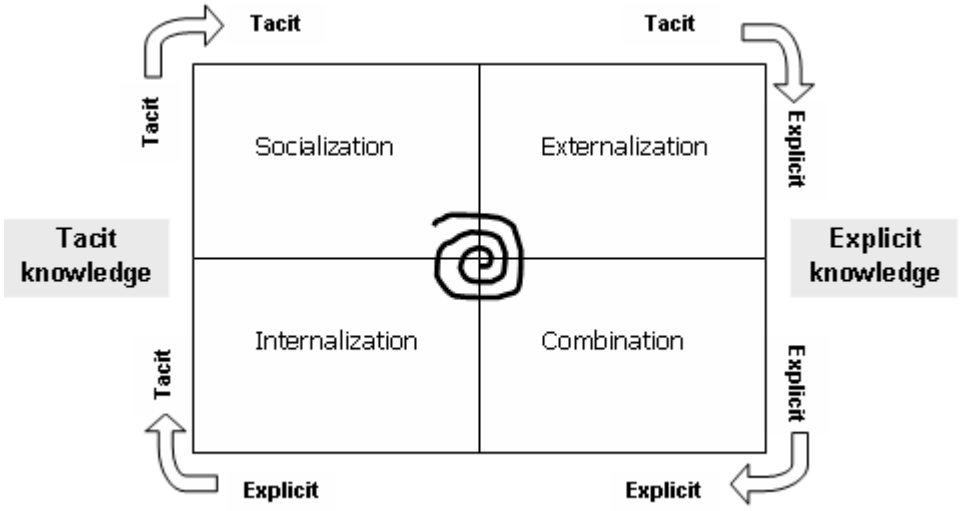

Figure 1: The Knowledge Conversion Process
Source: Takeuchi and Nonaka (2004, p. 188)

The knowledge conversion process according to Takeuchi and Nonaka consists of four modes: Socialization, Externalization, Internalization, and Combination. It is important to understand each of these modes before attempting to classify Web conferencing and EIPs according to this framework.

Socialization is the sharing and creation of tacit knowledge through direct experience (Takeuchi & Nonaka, 2004). Tacit knowledge within this knowledge conversion mode is difficult to formalize (Lee, Chae & Suh, 2004). Socialization or the sharing of experience (Iles & Yolles, 2002) occurs through face-to-face interactions between individuals or groups (Lee, Chae & Suh, 2004). Therefore, the organization must provide a place for this exchange of ideas to occur (Lee, Chae & Suh, 2004).

Externalization is the articulation of tacit knowledge through dialogue and reflection (Takeuchi & Nonaka, 2004). During externalization, tacit knowledge becomes more specific (Lee, Chae & Suh, 2004) such that others can understand without explanation (Sabherwal & Becerra-Fernandez, 2003). Concepts, theories or models evolve into a form that is easy to share through access to databases and other technology repositories (Lee, Chae & Suh, 2004).

Combination systemizes and applies explicit knowledge and information stored from the externalization mode (Takeuchi & Nonaka, 2004). Explicit knowledge is expanded (Lee, Chae & Suh, 2004) and made more complex in nature (Sabherwal & Becerra-Fernandez, 2003) by "adding, combing, and categorizing knowledge" (Iles & Yolles, 2002, p. 39). This 'new' knowledge is usually passed along to others through "documents, meetings, conversations, and computer networks" (Lee, Chae & Suh, 2004, p. 285).

Internalization is learning and acquiring new tacit knowledge in practice (Takeuchi & Nonaka, 2004, p. 9). This involves taking the 'new' knowledge created in the combination mode and using it in a new way. This learning process, which takes place in face-to-face meetings and by observation (Sabherwal & Becerra-Fernandez, 2003) creates new tacit knowledge (Iles & Yolles, 2002). This new tacit knowledge from this mode is now ready for movement through the knowledge conversion process through socialization, and the cycle begins again.

This study seeks to examine the classification of collaborative tools along the four modes of knowledge conversion, rather then the time/place matrix offered by Rumizen and Stemke (2001). The goal of the research is to provide IT and business decision makers with a new way to evaluate and select tools for their knowledge management efforts. In viewing collaborative tools in terms of the four modes of knowledge conversion, it is hoped they can see how their current tools or prospect new ones enable this transfer, therefore providing them the value they seek.

Significance of Study

Brache (2002) describes information as an organization's "lifeblood" (p. 148). An organization's success is dependent upon the its ability to leverage information into knowledge, with knowledge driving an organization's strategies and initiatives for competitive advantage (Brache, 2002). Information can be leveraged through a process called Knowledge Management (Rumizen, 2002).

Knowledge management (KM) is the approach to set up procedures for identifying, assessing, organizing, storing and using knowledge to help meet the needs of an organization (Rumizen, 2002). According to Rumizen (2002), organizations must recognize knowledge gained from information as an asset (Glasser, 1999). Furthermore, a study conducted by CIO Insight (eMarketer, 2003) found IT executives view KM as the method to respond rapidly to changing business conditions. Glasser (1998/1999) adds that an organization

wins when knowledge assets are managed effectively and quickly. However, implementation of KM falls short of organizations' expectations due to the challenges presented by "acting on" and "processing" knowledge (Glasser, 1998/1999, p. 9).

Limitations

The following section outlines the criteria used in the selection of the focus, research approach, kind of data selected, and time frame used for this study. However, not all details are predetermined because of the emergent nature of the methodology used for this study (O'Leary, 2004).

KM Focus

The focus for this study is to explore the relationship between the modes of knowledge conversion and the collaboration tools of Web conferencing and EIPs for acting on and processing knowledge. I decided to work with Takeuchi and Nonaka (2004) four modes of knowledge conversion based on evidence from the KM community that their knowledge spiral theory is highly regarded. Firestone and McElroy (2003) note that this model "has informed the knowledge management programs of many companies" (p. 21). Another author proclaims Takeuchi and Nonaka's theory as "an elegant characterization of the knowledge conversion process" (Lock Lee, 2004, p. 406). While not all citations endorse Takeuchi and Nonaka, their theory provides a useful foundation upon which to frame this study.

Selection of collaboration tools

Two collaboration technologies, Web conferencing and EIPs, are selected for the focus of this study. Collaborative technologies tools fall into two categories: real-time and asynchronous (Dragoon, 2004). Web conferencing and EIPs represent of each category type, respectively.

Research Approach

A quantitative methodology paradigm was not selected because it does not support the goal of this study. This study does not explore the correlations between the modes of knowledge conversion and Web conferencing and EIPs, but rather the goal is to draw inferences from the data (Leedy & Ormrod, 2001). Therefore, the most appropriate method is a qualitative design. The key strength to this approach is "it can explore unanticipated issues as they emerge" (Lewis, 2003, p. 47). One drawback to the qualitative method is the inability to project results across all collaboration technology tools (Leedy & Ormrod, 2001).

Kinds of Data Selected

The primary data collected for the purpose of the study are qualitative in nature and text-based. The kinds of data selected for literature review and content analysis are naturally occurring in the form of text (O'Leary, 2004). The

goal of this data is to capture specific characteristics and themes within the body of material (Leedy & Ormrod, 2001).

Time frame

The literature collection centers on two areas: (1) modes of knowledge conversion, as defined by Takeuchi and Nonaka (2004) and (2) functions of Web conferencing and EIPs. Takeuchi and Nonaka's Four Modes of Knowledge Conversion theory of organizational knowledge creation was first introduced in 1995 (Takeuchi & Nonaka, 2004). Therefore, literature for this area will represent a period from January 1995 – December 2004. In an effort to use the latest and most up-to-date information concerning Web conferencing and enterprise information portals, the material collected is limited to text published between January 2004 and December 2004 since IT technologies change rapidly.

CHAPTER II – REVIEW OF REFERENCES

Within this section, the literature used to frame and support this research is reviewed. An alphabetized, annotated bibliography for each key reference is presented to provide a summary of the key aspects of the reference used to support the purpose and/or problem area of this paper. This includes a description of the section of the paper in which the specific reference is used along with the criteria used to assess the credibility of the selected references.

Dragoon, A. (2004, November 15). A Travel Guide to Collaboration. ***CIO Magazine*****. Retrieved November 22, 2004, from CIO.com Web site** http:/www.cio.com/archive/111504/guide.html

Alice Dragoon's article is used in this study to establish the focus and selection of Web conferencing and EIP collaborative tools. The article provides timely and up-to-date information about collaborative technologies under consideration within the information technology community. CIO Insight, a business journal, serves the business and IT management needs of today's organizations by concentrating on strategy, management techniques, and technology for today's knowledge economy. Alice Dragoon is a Senior Editor for CIO Insight where she focuses on feature writing.

Glasser, P. (1998/1999, Dec/Jan). The Knowledge Factor. ***CIO Magazine*****. Retrieved September 11, 2004,** http:/www.cio.com/archive/010199/know.html

Perry Glasser's article supports the significance and problem area of the study. Glasser outlines four common knowledge management goals that are difficult to reach in organizations. Acting on and processing knowledge are two of the four KM goals addressed in this study. Perry Glasser is currently a contributing Editor and Columnist for The North American Review.

Krippendorff. (2004). Content Analysis: An Introduction to its Methodology. Thousand Oaks, California: Sage Publications, Inc.

This book provides a historical and conceptual foundation for content analysis. Content Analysis: An Introduction to its Methodology is a valuable resource for this study as it supplies the principles of content analysis for the method and data analysis portion of this paper. Originally published in 1980, the second edition clarifies several issues in content analysis with an added emphasis on computer-aided text analysis as well as providing a practical guide to the researcher. Klaus Krippendorff holds a Ph.D. in Communication and is a Professor of Communication at the Annenberg School for Communication, University of Pennsylvania, where he teaches numerous undergraduate and graduate courses. Other works by the author include Information Theory, Structural Models for Qualitative Data, and a Dictionary of Cybernetics. The first edition of Content Analysis: an Introduction to its Methodology is also published in Hungarian, Japanese, Spanish, and Italian.

Leedy, P., & Ormrod J. E. (2001). Practical Research: Planning and design (7th ed.). Upper Saddle River, NJ: Prentice-Hall, Inc. (Original work published 1985)

Leedy and Ormrod's Practical Research: Planning and design, now in the eighth edition, is used extensively as the primary textbook for research method instruction at academic institutions such as the University of Oregon. The book provides a broad overview of the fundamentals of the research process, various research methodologies, and tools of research. This text is used for the planning, design and preparation of this study.

O'Leary, Z. (2004). The Essential Guide to Doing Research. Thousand Oaks, CA: SAGE Publications Inc.

This book is the primary reference used for the development of the entire study beginning with the formation of the research question, to working with the literature, methodological design, and data collection, management and analysis as well as the final write-up of the conclusions. Key features of this book include in-depth coverage of the entire research process, chapter summaries and further reading lists to enhance the understanding of the concepts presented throughout the text. Not only is Dr. Zina O'Leary a senior lecturer in the School of Environment and Agriculture at the University of Western Sydney, she is the Research Advisor for the Centre for Environmental Heath Development, a WHO collaborating Centre. Her interests are in teaching and education in the area of research methodologies. This is her first published book in the field of research methods.

Rumizen, M. (2002). The Complete Idiot's Guide to Knowledge Management. Madison, Wisconsin: John A Woods, CWL Publishing Enterprise.

The title of the book does not lend itself to high credibility; however, Rumizen provides a clear presentation of the basics of knowledge management models, including instructions for implementation of KM in an organization. Rumizen also covers the fundamentals of a pilot program and how information technology is used for KM. The Complete Idiot's Guide to Knowledge Management establishes KM as the foundation for the significance and problem area of this study. Melissie Rumizen holds a Ph.D. and is a knowledge strategist for Buckman Laboratories.

Rumizen, M., & Stemke, J. (2001). Assessing KM Technology Choices. *Knowledge Management Review*, 4(5). Retrieved November 10, 2004, from (AN 5801409)

This article, from a peer-reviewed academic journal, discusses the challenges in choosing collaborative technologies for collaboration within an enterprise. Rumizen and Stemke outline the dimensions of collaboration using a framework of time, place, information richness and social presence and the key points in selection of collaborative technologies. In addition to providing the research context of this study, the framework discussed within this article is central to the problem area of this study.

Takeuchi, H., & Nonaka, I. (2004). Hitotsubashi on Knowledge Management. Singapore: John Wiley & Sons.

Many credit the development of the theory of organizational knowledge creation process to Takeuchi and Nonaka's original book, The Knowledge-Creating Company (1995). Within this new book, Takeuchi and Nonaka revise

their theory to reflect today's ever-changing competitive environment. The four modes of knowledge conversion presented in their first book and expanded in this 2004 version provide the foundation of the knowledge management focus and problem area of this study. Ikujiro Nonaka is the Xerox Distinguished Professor in Knowledge Management at University of California, Berkeley, and Professor of Hitotsubashi's School of International Corporate Strategy. Hirotaka Takeuchi is the Dean of Hitotsubashi Business School in Tokyo. Both are considered experts in the field of knowledge management.

CHAPTER III - METHOD

A qualitative approach is the overall research methodology for this study to explore collaboration technology tools for knowledge conversion (Silverman, 2000). This approach is appropriate for a study in which the primary form of data under analysis is in the form of words (Silverman, 2000). Drawing inferences from the data is the goal of this study, not to identify cause-and-effect relationships (Leedy & Ormrod, 2001). The larger data collection method for this study is literature review (Leedy & Ormrod, 2001). Beyond providing this researcher with a "theoretical and methodological" point of reference (O'Leary, 2004, p. 66), the purpose of the literature review is to:

1. Demonstrate an understanding of Takeuchi and Nonaka's four modes of knowledge conversion and defend its use as the analytic framework for this study (O'Leary, 2004)
2. Review and report on the functions of Web conferencing and EIPs collaboration tools under review in this study (O'Leary, 2004)

Data Collection

The initial search strategy for the literature review is conducted on material found online among the University of Oregon's Library databases and indices. Data collection advances in two stages: first, to collect information about the four modes on knowledge conversion, as presented by Takeuchi and Nonaka (2000), followed by information about the selected collaboration tools.

Four modes of knowledge conversion

Indices, such as Business Source Premier offer peer-reviewed, carefully documented articles and papers, two characteristics of quality sources to use for scholarly research (O'Leary, 2004). The initial search begins with sources available in the periodical indices of Business Sources Premier and Academic Search Premier using author-supplied keywords, 'knowledge management' and 'knowledge conversion'. This yields over 300 items. Adding the following criteria further refines the list of items returned in the initial search:

- Full-text
- Peer-reviewed journals
- References available
- Published between January 1995 – December 2004

This yields 65 records, which are organized into an Excel spreadsheet. Using each AN number, this list is sorted and duplicates removed to identify 52 unique records. After each of the 52 records are saved in PDF format into a centrally located folder, each document is further examined using Adobe's multiple files search function. Using this feature, documents are searched for the mention of each of the four modes of knowledge conversion: Socialization, Externalization, Combination, and Internalization. Only documents that had the mention of at least two of the four modes of knowledge conversion were considered for the study. Nineteen documents met the criteria, but one document

only contains the four modes within a footnote, therefore this document is excluded, leaving 18 documents for inclusion in this study for literature review.

Selected Collaboration Tools: Web conferencing and EIPs

Again, the initial search begins with sources available in the periodical index of Business Sources Premier. Due to the various terms associated with 'Web conferencing' and 'EIP', searches began by finding the preferred term by using the databases 'suggest subject terms' feature. The preferred subject term for Web conferencing is 'COMPUTER Conferencing', while the preferred term for EIPs is 'WEB Portals'.

The search for literature is conducted using an advance search strategy on each preferred subject term. Results for this search were limited to full text records, published during January 2004 to December 2004, in academic journals as defined by the Business Source Premier database. Six articles on Web conferencing and four articles on EIPs are selected for this study. Articles selected for content analysis purposes are based on their ability to answer the following research questions:

1. What are the functions of Web conferencing and EIPs?
2. How can Web conferencing and EIPs potentially support modes of knowledge conversion within an organization?

Data Analysis

With data collection complete, content analysis begins. Content analysis provides a reliable and valid technique to make "inferences from texts" (Krippendorff, 2004, p. 18). Conceptual content analysis is used to identify key themes and concepts found in the data collected on Web conferencing and EIPs (Writing@CSU). The goal is to document the functions of Web conferencing and EIPs and to align these functions to each of Takeuchi and Nonaka's modes of knowledge conversion.

According to Krippendorff (2004, p. 32), "content analysis starts with the research questions" and for this study the questions that provide the initial orientation are those noted in the data collection section above, repeated here:

1. What are the functions of Web conferencing and EIPs?
2. How can Web conferencing and EIPs potentially support modes of knowledge conversion within an organization?

Grounding the content analysis to the research questions provides the researcher with a purpose for the reading of text in pursuit of answers to the questions (Krippendorff, 2004, p. 32). However as Krippendorff points out, "content analysis involves a specialized procedure" (2004, p. 18). The following outlines the conceptual content analysis process for this study using the data analysis spiral as outlined by Leedy and Ormrod (2001). A detailed description of

the step-by-step process of organization, perusal, and classification of data is found in **Chapter IV – Analysis of Data**.

Organization

Organization of the data requires a method that enables the breakdown of the body of text collected into smaller and more manageable units (Leedy & Ormrod, 2001: O'Leary, 2004). This is accomplished by sorting selected texts into two general overall categories: Web conferencing or EIPs (O'Leary, 2004). Once sorted, material is collected into an Excel database in preparation for the next step in the data analysis spiral.

Perusal

According Leedy and Ormrod, at this stage of analysis the goal is to "suggest possible categories or interpretations" (2001, p. 161). Individual sentences are examined for key terms or words, which suggest possible classification schemes for the next stage of the data analysis spiral.

Classification

During this stage of the analysis Leedy and Ormrod suggest the researcher should get a "general sense of patterns" or begin to see what the data mean (2001, p. 161). To answer our research questions, categories are identified along the following key themes (framed as a question): (1) what are the functions of Web conferencing and EIPs, (2) how are these two tools used for

collaboration. This is an iterative process not limited to one review, therefore classification of data to find meaning in the data is conducted several times (Leedy & Ormrod, 2001). While working through classification, irrelevant text not directly related to the key themes in each review round is ignored (Writing@CSU, 2004).

Synthesis

During this stage, the classifications developed in the previous stage are summarized to "describe relationships among the categories" (Leedy & Ormrod, 2001) and the linkage of this data to the "outside variables" of the modes of knowledge conversion (Spencer, Ritchie, & O'Connor, 2003). Describing the relationship is the core goal of this study. Results from the synthesis stage are framed for presentation as outcomes in this study, designed for the intended audience.

Data Presentation

Data presentation covers the intended outcomes from data analysis, how the outcomes are presented and the intended use of the outcomes by the audience. Two outcomes are identified in the brief purpose section of this study: a table and a matrix. An example of the table that will represent the outcome from the content analysis of Web conferencing and EIPs data is provided in Table 2.

Collaboration Tool	**Functions**
Web conferencing	Function description
EIPs	Function description

Table 2: Presentation of Collaboration Tool Functions

This table is intended to provide a quick overview for IT and business decision makers of the functional elements of these two tools that may be used to leverage information into knowledge within an organization.

The matrix, the second outcome, is designed to display potential ways that Web conferencing and enterprise information portals align with each of the four modes of knowledge conversion: Socialization, Externalization, Combination, and Internalization of tacit and explicit knowledge (Takeuchi & Nonaka, 2004). This matrix (Table 3) is designed to enable IT and business decision makers to understand the knowledge conversion process when selecting and implementing selected collaboration tool technologies. One potential benefit of the matrix is to help the organization evaluate all of their collaboration tools or prospective new tools in terms of how well they support knowledge conversion. The matrix will also help organizations identify redundancies and gaps in their collaboration technologies.

Modes of Knowledge Conversion	Potential Supporting functions – Web conferencing	Potential Supporting functions – Enterprise Information Portal
Socialization	Function example	Potential gap
Externalization	Function example	Function example
Combination	Potential gap	Function example
Internalization	Function example	Potential gap

Table 3: Knowledge Conversion Modes and Potential Electronic Tool Support

CHAPTER IV – ANALYSIS OF DATA

This chapter details the process used to conduct the content analysis. As defined in the data analysis section of **Chapter III – Methods**, the systematic process starts with the organization of the data. Then it transitions into perusal, followed by classification. The driving factor of this analysis is to identify key themes and concepts found in the records collected on Web conferencing and EIPs.

Organization

As identified by Leedy and Ormrod (2001) data analysis begins with a method to collect and then reduce the text into manageable units. Each article in PDF form requires manipulation before information is loaded into an Excel spreadsheet for the next step of analysis. Manipulation of articles proceeds with the use of TextPad®, a text editing software product for Windows, in the following manner.

- Articles are separated into two initial categories – Web conferencing or EIPs
- Each PDF is saved as a 'text' file
- Then, using 'Join Lines' edit feature of TextPad®, lines of text are joined together as the conversion from PDF to text results in the text being broken into individuals line seen within the PDF
- Lines of text, in the form of sentences, are then reviewed for information to answer research questions

- Sentences not containing information to answer research questions are deleted

Upon completion of the review and deletion of irrelevant sentences, the sentences are copied into an Excel spreadsheet with each sentence representing a cell within the worksheet. Two worksheets are used -- one to record the data for Web conferencing and another for EIPs data.

While this is a very time consuming and iterative activity, it is considered a critical part of the analysis. This process provides the researcher with the ability to conduct reflexive analysis of data. Reflexive analysis of data as described by O'Leary (2004), keeps the research close to the data, providing a process to: manage, organize, code, and "interpret meaning" to "discover findings" so that the analyst can draw "relevant conclusions" (p. 184-185).

Appendix A - Organization contains three lists. **List 1- Articles for Content Analysis** includes an alphabetized list of citation records of each article chosen for analysis as well as the number of lines of raw data each document contributes for analysis in this study. **List 2-Web Conferencing Verbatims** and **List 3-Enterprise Information Portal Verbatims** are two lists that provide the complete set of sentences comprising the raw data deemed to contain information to answer research questions. Line numbers within each list are for identification and organizational reference only and to aid in the tracking of the original data.

Perusal

Several key words and phrases become apparent while reviewing each cell containing the individual sentences identified in the organization phase. A sample of the key phrases suggesting possible categories for Web conferencing are:

- audio between phones and PC microphones
- documents to application sharing
- combine media streams
- exchange data

Key phrase samples suggesting possible categories for EIPs are:

- provides companywide access to "an ocean of data"
- single point of access multiple resources
- lower transaction costs
- collaborating across organizational boundaries aids in creating knowledge
- align processes
- integrate

Additional lines of text considered irrelevant are deleted during this stage of the data analysis spiral (Writing@CSU, 2004). Outcomes from this stage are further analyzed in the classification stage.

Classification

Key phrases are further reviewed to identify patterns that might suggest what the data mean. At this stage, the goal is to establish key themes to answer

the two research questions: (1) what are the functions of Web conferencing and EIPs, (2) how are these tools used for collaboration. Applying a clustering technique to the data, similar units of analysis are grouped together. (Krippendorff, 2004). This technique is chosen to represent the identified patterns and key themes discovered in the data (Krippendorff, 2004). As outlined by Krippendorff (2004), clustering is "based on intuitively meaningful similarities among units of analysis", preserving what matters most from the data, while omitting "insignificant details from original data." (p. 208 – 210).

Appendix B – Classification contains two lists. **List 1** represents the results of clustering on Web Conferencing data. **List 2** represents the results of clustering on Enterprise Information Portals data. Both lists identify the themes assigned to the key words and phrases from the perusal stage of data analysis and the frequency of occurrences found is noted. These lists are instrumental to support the findings of this study as discussed in the synthesis stage of the data spiral.

Synthesis

Summation and discussion of the key themes of the data analysis spiral is presented within this section of the study (Leedy & Ormond, 2001). The discussion of the results culminates in the presentation of the table identifying relevant functions of Web conferencing and EIPs (outcome 1). Also, other benefits identified during the classification stage of data analysis on Web conferencing and EIPs are presented here. These benefits include cost savings,

increased service to internal and external customers, automated processes, and the ability to find information more efficiently.

Web Conferencing Functions

Key themes identified for knowledge conversion, as provided by Web conferencing, are ***interaction, manageability, sharing and reporting/archiving***. The most frequently identified function in this study is interaction. Thirty-four percent of the text sampled lead to interaction. Interaction is not limited to people, but includes the interaction of communication tools, applications, and media types. This interaction utilizes various tools in the communication process. Instant messaging, audio conferencing, VoIP, whiteboards, files, presentations, desktop sharing, and video are some of the tools available. Physical meetings can also utilize the interaction tools offered by Web conferencing technologies.

Manageability of the Web conferencing technology is accomplished through a common interface from which to launch and manage meetings. Uploading files, inviting attendees, establishing rights and permissions give the meeting organizer the tools to schedule, plan and conduct meetings.

Sharing is another key function of Web conferencing technology. This function allows a meeting participant, for example, to create or edit documents. Participants can visually illustrate ideas, concepts, and models using the whiteboard feature. This sharing feature is idea for training or product demonstrations. Another feature is the ability to view and control desktops remotely.

By reporting on and archiving meetings conducted with the Web conferencing tool, organizations may be able to capture the tacit knowledge shared during a meeting in explicit form. Features that support polling and surveying attendees help in quantifying consensus among the participants. For participants who miss a meeting, the archive is available for playback. Reporting also details who participated and provides logs of conversations

Enterprise Information Portals Functions

Key themes identified for EIPs are ***access***, ***integration***, ***manageability***, ***collaboration*** and ***search/browse functionality***. Access is a key function of EIPs, as demonstrated by the fact that it is referred to in some way within 46% of the text sampled. Access is not limited to members of just one organization, but allows others such as customers, suppliers, and consultants to access information within the EIP. According to the data, access extends beyond structured content in multiple data sources of various formats. Applications, other devices, business processes, as well as collaboration services are mentioned within the sample. A single-sign on point and security are important features of access. Users, whether in-house or external, can easily create, modify, and share information within the EIP. Most EIP infrastructures allow users to customize their experience and organize documents, applications, and other sources.

Integration is the second key theme of EIPs. Aggregation and integration of content and multiple sources highlight this theme. Integration includes data

exchange between applications. Integration is important for the ability to search and browse those information sources available to the organization. Integration allows users, applications and various devices to connect, thus enabling joint creation of knowledge.

An additional key theme is manageability. Processes dictated by business rules enable the control of access to and uses of content, and other resources such as collaboration tools. The document management feature enables a centralized place for storage and distribution of documents created, discussed, edited, and shared with others among an organization.

Collaboration is another key theme of EIPs. An enterprise information portal allows anyone, anywhere within the system to participate in the creation and sharing of information. This ability to collaborate through the EIP saves time and costs enabling individuals and organizations to work more effectively and efficiently.

The last key theme for EIPs is search/browse functionality. While not a frequently noted item in the sample data, this functionality is important for finding the information needed among the vast amounts available.

As described throughout the study, the outcome from this stage of content analysis is to present in a tabular form the relevant functions of Web conferencing and EIPs. Table 4 (outcome 1) summarizes the results that answer the first research question framing this study -- What are the functions of Web conferencing and EIPs?

Collaboration Tool Functions	
Web conferencing	Interaction Manageability Sharing Reporting/archiving
EIPs	Access Integration Manageability Collaboration Search/browse

Table 4: Collaboration Tool Functions

CHAPTER V – CONCLUSION

An important result of this study is the linkage of the functions of Web conferencing and EIPs to the "outside variables" (Spencer, Ritchie, & O'Connor, 2003). The outside variables for this study are the four modes of knowledge conversion as outlined by Takeuchi and Nonaka (2004): socialization, externalization, internalization, and combination. As shown in Figure 1, the process is continuous as knowledge is transformed from tacit to tacit, tacit to explicit, explicit to explicit, and explicit to tacit. Results from content analysis on Web Conferencing and EIPs are used to answer the research question - How can Web conferencing and EIPs potentially support modes of knowledge conversion within an organization? Each collaboration tool is discussed within the context of the four modes of knowledge conversion followed by the matrix (outcome 2) which displays the alignment of the potential use of Web conferencing and EIPs in the support of the four modes of knowledge conversion. The study closes with the discussion of the implications of this study.

Socialization

Takeuchi and Nonaka (2004) describe the collaborative mode of socialization as the sharing and creation of tacit knowledge through direct experience. When choosing collaboration tools for socialization, organizations need to provide a place for sharing of tacit knowledge (Iles & Yolles, 2002). As Lee, Chae and Suh discussed, this usually occurs through face-to-face interactions

between individuals or groups (2004). Results from the analysis of Web conferencing identify interaction and sharing as key functions of the tool to support socialization. Interaction and sharing can occur regardless of the size of the group meeting, whether within or beyond organizational boundaries. While face-to-face interactions were specified within the literature on the four modes of knowledge conversion, the data suggest virtual meetings can substitute for face-to-face ones. Specific features of Web conferencing tools such as whiteboards, desktop sharing, video, and audio are mentioned in the data**.** Sharing, as found in the data, enables participants to create and edit documents together. Ideas, concepts, and models can be visually shared using a Web conferencing tool. Based on the results of the analysis, EIPs do not offer a function to support socialization and so a key mode of knowledge conversion would be lost with this tool.

Externalization

Takeuchi and Nonaka (2004) describe the collaborative mode of externalization as the articulation of tacit knowledge through dialogue and reflection. Tacit knowledge becomes more specific during externalization (Lee, Chae & Suh, 2004). Externalization is achieved using databases and other technology repositories (Lee, Chae & Suh, 2004). Based on this content analysis, reporting/archiving is an important feature of Web conferencing in the support of this mode of knowledge conversion. Knowledge gained through a meeting conducted with the Web conferencing tool can be captured through recording

and quantification for others to view later. EIPs offer the broadest coverage for this mode, according to the results of the analysis of text for this study. Access and search/browse are two functions available to support externalization. The results of data analysis support EIPs as a repository providing a single point of access to content, and applications. Finding information within the repository is important therefore, the search/browse function of EIPs is important for this mode of knowledge conversion as well. Based on results from this study, Web conferencing and EIPs offers good functionality in support of this mode.

Combination

Takeuchi and Nonaka (2004) describe the collaborative mode of combination as the application of explicit knowledge and information. The combination mode expands explicit knowledge through the "adding, combing and categorizing knowledge" (Iles & Yolles, 2002, p.39), and passed along to others through "documents, meetings, conversations and computer networks" (Lee, Chae & Suh, 2004, p.285). This mode is supported by the sharing function of Web Conferencing as it allows participants to create and edit documents together as meetings progress. Integration function from EIPs also supports this mode of knowledge conversion as it enhances the ability to assess knowledge in various applications and databases. Results for this mode suggest both collaboration technologies offer a solution to the combination of knowledge within an organization.

Internalization

Takeuchi and Nonaka (2004) describe the collaborative mode of internalization as acquiring new tacit knowledge through practice. Internalization involves taking the 'new' knowledge created in the combination mode and using it in a new way. According to Sabheral and Becerra-Fernandez (2003), this learning process, takes place in face-to-face meetings and by observation. The data suggest collaboration offered by enterprise information portals could potentially support this mode of knowledge conversion. According to the results, this function of EIPs allows anyone, anywhere to participate in the creation and sharing of information -- both important processes in learning new knowledge in practice (Takeuchi & Nonaka, 2004). Functions of Web conferencing important in the socialization mode are also effective in this mode as well.

The matrix, Table 5 (outcome 2), gives a quick overview of the four modes of knowledge conversion as described by Takeuchi and Nonaka (2004) and the supporting functions of Web Conferencing and EIPs.

Modes of Knowledge Conversion	**Knowledge Conversion Support Functions**	
	Web Conferencing	**Enterprise Information Portal**
Socialization	Interaction Sharing	None
Externalization	Reporting/Archival	Access Search/Browse
Combination	Sharing	Integration
Internalization	Interaction Sharing	Collaboration

Table 5: Knowledge Conversion Modes and Electronic Tool Support

Implications of Study

The purpose of this paper was to examine the potential ways in which two specific collaborative technologies can support selected goals of knowledge conversion. As organizations continue to look at collaboration technologies to support knowledge management (Glasser, 1998/1999) they must analyze their current and prospective solutions in regards to whether or not a solution duplicates a mode of knowledge conversion or fulfills a gap identified. This analysis does not guarantee success, but lends itself to further investigation. Further investigation in the form of an organizational survey may be an appropriate step as a way to gauge before and after implementation of a specific collaboration technology used in support of knowledge conversion.

APPENDIX A – ORGANIZATION

List 1 **Articles for Content Analysis**	
Citation Record	**Lines of text for Analysis**
[Anonymous]. (2004, February). Selecting a Web-Conferencing Provider. *T+D*. Vol. 58 Issue 2. Retrieved January 29, 2005, from Business Source Premier (AN 12206670)	10
Caton, M. (2004, November, 15). Web-based conferencing: Listen up. *eWeek*. Vol. 21 Issue 46. Retrieved February 6, 2005, from Business Source Premier (AN 15080352)	50
Dawson, R., & Clements K. (2004, December). Virtual Collaboration with Clients. *Consulting To Management*. Vol. 15 No. 4. Retrieved January 29, 2005 from Business Source Premier (AN 15291366*)*	37
Field, A. M. (2004, October, 25). A Window on Transportation Data. *Journal of Commerce*. Retrieved January 29, 2005 from Business Source Premier (AN14836787*)*	21
Greenfield, D. (2004, September). Web Conferencing Comes Together. *Network Magazine*. Vol. 19 Issue 9. Retrieved February 6, 2005, from Business Source Premier (AN 14399700)	38
Kaplan-Leiserson, E. (2004, November). The Future of Meetings. *T+D*. Vol. 58 Issue 11. Retrieved January 29, 2005, from Business Source Premier (AN 15006406)	11
Ohlhorst, F. (2004, November, 22). Atinav Makes Multifeatured, Intgrated Conferencing Easy to Use. *CRN*. Issue 1122. Retrieved February 8, 2005, from Business Source Premier (AN 15148259)	15
Rupley, S. (2005, January). Making Virtual Meetings. *PC Magazine*. Vol. 24 Issue 1. Retrieved February 6, 2005 from Business Source Premier (AN 15414323)	10
Smith, M. A. (2004, October). Portals: Toward an Application Framework for Interoperability. *Communications of the ACM*. Vol. 47 Issue 10. Retrieved January 29, 2005 from Business Source Premier (AN 14523203)	31
Will, R., Ramaswamy, S., & Schaeck, T. (2004). WebSphere Portal: Unified User Access to Content Applications and Services. *IBM Systems Journal*. Vol. 43 Issue 2. Retrieved January 29, 2005 from Business Source Premier (AN 13431059)	58

List 2 **Web Conferencing Verbatims**	
Line #	**Verbatims**
1	Web-conferencing services to accommodate online component of it training
2	Ability to record and archive
3	Manage calls from the desktop
4	Provides a webpage that integrates audio control into Web conferencing
5	Enables conference call hosts to manage, monitor, and control costs
6	Broadcast presentations over the Internet and archive those presentations
7	Provides reports indicating who has participated in the calls
8	We ask for feedback at the end of each presentation
9	An alternative to the time, cost, and lost opportunities associated with travel
10	The webcasts are to our classroom training
11	Physical meeting spaces are gaining the features of online solutions, while online meetings are advancing way beyond two-dimensional, small-screen displays
12	Records meetings with multi-channel audio and video, tracking each in-person participant as well as recording computer input
13	That lets some participants attend physically and others remotely, as well as creates meeting archives that can be browsed for specific content
14	Create tools to analyze meeting structure and summarize its content
15	Microsoft is developing similar technology to blend in-person and remote meetings

16	A "Ringcam" in the center of a meeting table gives a 360-degree view to remote participants, focusing on each person as he or she speaks
17	Tablet PCs feeding into a virtual whiteboard help share and archive notes
18	With Smart- Meeting's 3D technology, you attend meetings and interact with people in virtual three dimensional spaces using an avatar
19	Users can walk through meeting and breakout rooms, communicate with gestures and voice, and interact with objects in the rooms
20	The nTag electronic name tag brings elements of online social network analysis to the physical world
21	The tag uses infrared and radio frequency identification (RFID) to exchange data between wearers
22	As more IT managers turn to Web conferencing to reduce travel expenditures, they're eschewing the ongoing costs of Web conferencing services in favor of servers that sit on the corporate network
23	Pricing, security, and integration are proving to be critical factors for going with a server-based approach
24	On the other hand, there are many good reasons to integrate Web conferencing into the VoIP infrastructure
25	For example, users have an easier time learning how to use the conferencing technology, and network managers can create centralized logs for both Web and audio conversations
26	Web Conferencing servers play into the larger vision of VoIP
27	They can aid in the creation of a tightly coupled, realtime communications infrastructure, allowing network managers to smoothly transition between various conferencing technologies and use presence to locate the right individuals at any given moment
28	Under this view, two people might start communicating via IM, but click on a button to escalate to voice

29	If a point needs illustrating, they can launch a whiteboarding application
30	If a file needs to be edited, they can launch a shared application
31	If a third person needs to be involved, they can check the presence status of that individual and bring him or her into the call
32	The point is that all this can be done from a common interface (see screenshot)
33	Ultimately, the integration of these media types allows real-time events to trigger conferences
34	With a converged setup, however, the communications system could check the presence status of each individual and their calendars, compare that information against previously configured policy data, identify members who are available, and determine backups for those who aren't
35	The system could then trigger a group conference to each of those individuals using the most appropriate communications tool, ensuring that they have the right resources to reach a critical decision
36	Converged conferencing simplifies communication, allowing users in a conference to call one another, and share files from a common application
37	To reach convergence nirvana, the various conferencing capabilities within an enterprise must be tied together
38	Of course, there's audio conferencing - by far the most popular - and videoconferencing
39	There's also desktop sharing, which allows end users to view and control one another's desktop remotely;
40	Whiteboarding, which provides a screen on which users can draw;
41	Text messaging, which provides near real-time communications among users;
42	And chat, which is a form of text messaging that's integrated into an application

43	These media types run across four network elements
44	Might consist of videoconferencing or Web conferencing software to provide video, andio, text, and so on, and additional hardware such as a video camera or speakerphone
45	Polycom's WehOffice, for example, integrates Web conferencing, chat, and desktop sharing with its videoconferencing system, eDial delivers voice
46	Web conferencing, chat, and desktop sharing, Nortel's MCS allows voice and chat
47	Cisco's MeetingPlace offers voice and Web conferencing
48	The client software communicates back to a conferencing server that controls the overall conference and is responsible for maintaining client sessions,
49	Conferences are often referenced through a Uniform Resource Indicator (URI) or some other tag on the server
50	Calls can be initiated from or transferred to this URI
51	Rights and permissions in the conference are guided by a membership policy that resides in a policy server
52	Floor control defines who has the ability to manipulate a shared resource or a group of resources during a conference
53	This could be the speaker of the conference, or the person who controls the whiteboard pointer, for example
54	The conferencing server also needs to ensure that each participant obtains all the media for a given conference
55	These combine the media streams making up a conference into one or more output streams that are distributed to recipients
56	Web conferencing will become as simple as clicking on a name in an application and launching into a conference, much like how Microsoft Office supports IM today

57	Clients that want to participate in a conference will need to run SIP or be connected via a gateway that supports SIP
58	Web conferencing is just one tool that can have a big impact on the distributed workgroup if used properly
59	For example, viewing a file jointly can often be done more easily and less expensively by sending the file to the necessary parties
60	For this review, eWeek Labs tested products that offer fully integrated audio conferencing in their Web conferencing application and have been updated recently
61	Our tests show that all four services—Genesys Meeting Center, Interwise ECP Connect, Netspoke Conferencing Hub and Raindance Meeting Center—share core capabilities and generally deliver a good set of collaboration tools
62	However, cost—and pricing flexibility—can differ substantially
63	All the services we reviewed support Internet Explorer and Netscape Navigator on Windows
64	Attendees of Netspoke conferences can also participate from Linux-, Unix- and Macintosh OSbased systems
65	Genesys Meeting Center genesys meeting center does a good job of integrating core collaborative features in a moderately easy-to-use application while delivering a good set of management tools
66	Interwise's iMeeting (bottom) is straightforward and integrates well with the company's audio conferencing services
67	When it came to scheduling and running a Web conference
68	The Meeting Center tool set for driving meetings essentially mirrors the competitors'— but with better hooks into voice conferencing via Genesys' teleconferencing services
69	As with Interwoven Inc's and WebEx's offerings, Genesys has separate tools for managing and running a conference

70	We liked the way Conference Center organizes task oriented features, such as polling, as both menu items and subcomponents of the broader Web-conference-creation task
71	Building surveys, quizzes and polls takes a little longer and a few more steps than we would like, but Genesys makes it easy to repurpose such content
72	Conference Center does a good job of managing reports around individual Web conferences, collecting meeting, quiz and survey data from each session
73	We could also record and play back meetings via a downloadable playback client
74	Genesys Meeting Center Genesys Meeting Center from Genesys Communications offers a full complement of Web conferencing features, along with good content management tools
75	However, the Web conferencing application has user interface shortcomings
76	Good content management tools; makes it easy to conduct ad hoc meetings; Web conferencing and audio costs are consolidated into a single, per-minute price
77	Interface problems can make this service more difficult to use than competitors'; documents must be loaded in advance of a meeting
78	The well-designed voiceover- Internet and telephony features in the Web conferencing application can help companies save on teleconferencing costs
79	Well-integrated voice features; easy to use; available as service or software; nice customization capabilities; good management tools
80	With excellent content management features and reporting capabilities, as well as tight integration of key Web conferencing features, Netspoke Conferencing Hub earns our Analyst's Choice award
81	While the service lacks the polished appearance of competitors, the underlying system provides great value and flexibility

82	Excellent content management tools; relatively easy to use; good reporting tools; fast performance when starting ad hoc meetings
83	The well executed emphasis on user-to- user interaction sets the service apart from its competitors
84	The tools used to drive meetings also work well
85	Great user-to-user information features; starting ad hoc meetings is fast; flexible pricing; fine level of control over features
86	However, Interwise's ability to integrate voice over Internet with telephony-based voice conferencing gives companies an easy way to cut conferencing costs
87	The iMeeting participant application does a good job of integrating voice in a simple, effective manner
88	ECP Connect's audio conferencing features give users good options for connecting to conferences and work surprisingly well, even in situations when attendees may need to switch phones at midmeeting
89	ECP Connect supports full duplex audio between phones and PC microphones, so, during tests, we could converse with a minimal amount of choppiness when participants spoke over one another
90	This gives companies the ability to easily stream the audio portion of a call when participants are in a listen-only mode
91	Polling is handled through a simple yes/no response button in the application
92	For companies that want a single system for organizing Web conference content and delivering it efficiently, Netspoke Conferencing Hub is a great choice
93	These core features, combined with good reporting tools, netted Netspoke an Analyst's Choice in this review
94	During tests, it was fastest at uploading and converting files and fastest at

	launching ad hoc meetings and getting attendees on board
95	Conferencing Hub's tools work well enough for most collaborative applications
96	Bar across the top of the application with floating applets that manage features such as chat, audio conferencing and polling
97	The Netspoke Conferencing Hub's content management system and reporting capabilities set the Netspoke service apart from the others in this review
98	Netspoke has done a good job of simplifying the management of content rights and permissions, and it was easy during tests to manage file sharing so that we could push files to other participants as needed
99	On the reporting side, Netspoke was the only system we tested that let us build our own reports and export them in xls or csv format
100	Netspoke also allowed us to sign up our own users
101	Raindance Meeting Center raindance differs from the other services we reviewed by providing a single application for both managing a meeting space and hosting Web conferences
102	The sword that cuts both ways for this product is file management
103	On the other hand, this makes it much more difficult to create, share and control presentations for groups such as sales teams
104	We could point Raindance to a mapped drive, so companies could share presentations from the network, but good reporting on presentation usage will be disconnected from information on Raindance usage
105	For companies that want tight control of documents, Netspoke is the best option
106	We did like Raindance's focus on making the most of user-to-user interaction

107	For example, we could share vCard information with attendees, who could grab that data by clicking on a presenter's name
108	In addition, the pane along the bottom of Raindance's user interface can be used (at the participants' discretion) to display images of meeting presenters and attendees, as well as slide thumbnails (see screen, right)
109	This private work-space pane organizes nearly every function of the application, from documents to application sharing
110	Shrinking budgets and the hassles associated with contacting traveling workers has made integrated conferencing solutions a must- have for most businesses, VARs looking for desktop collaboration tools should add Atinav's aveComm to their repertoire
111	AveComm version 32 combines a hosted service with desktop collaboration, VoIP communications, digital whiteboard and multi-session capabilities in an easy-to-use package
112	The product is quite easy to use, however, and initial setup consists of no more than defining a user account and downloading the associated Java plug-ins to make the interface function
113	AveComm will work with most browsers, including Internet Explorer
114	CRN Test Center engineers used Mozilla's Firefox browser and did not encounter any compatibility issues
115	Uers are presented with an easy- to-use interface
116	The aveComm user interface allows users to start a session, schedule a meeting, review any previously scheduled meetings, view helpdesk requests and log in to or out of the system
117	Starting a session offers users the ability to use VoIP, share applications, use instant messaging, use a digital whiteboard and perform file transfers
118	These features are a necessity for any desktop collaboration user, and each can he combined or used individually to meet the specific needs of a user or group

119	Solution providers can also choose to install the product locally to support internal and branch-to-branch conferencing chores
120	Integrators also have the option to become a host for the product and use it to offer desktop conferencing services to their customers
121	Solution providers have an excellent opportunity to increase their revenue by selling associated desktop conferencing
122	AveComm proves ideal for remote training, remote support and product demonstrations, since the product excels at creating a virtual conference room for users
123	Atinav also offers versions of aveComm that include a complete software development kit and can he rolled into existing applications
124	Solution providers can leverage this functionality to create customized collaboration tool for even the most specialized of vertical markets
125	The good news is that secure, simple Web-meeting applications abound, and (Clitrix Online's GoToMeeting 10 is one of the most reasonably priced and easiest to use
126	GoToMeeting focuses on sharing applications and presentations
127	It does not compete directly with more feature-rich online conferencing solutions such as WebEx, which includes videoconferencing and whiteboarding in addition to basic presentation functions
128	You pay just $49 a month (or $468 per year) and can launch as many meetings as you want, of any duration, without incurring further costs
129	Launching a meeting and inviting attendees is simple in GoToMeeting
130	You can launch meetings from Outlook nr by sending instant messages to attendees, who click on an embedded link to join the group
131	In addition, you can store and distribute upcoming meeting notices to Outlook calendars, with details on how to join
132	Once a meeting begins, attendees see the presenter's desktop and all the actions

	performed there—from viewing Web pages to stepping through a presentation
133	The presenter controls what's being shown on the screen to remote viewers, and he or she can hand control to any participant by clicking on a button
134	There is a chat window for instant messaging among participants, and in typical scenarios, the attendees are connected to a phone conference call, which GoToMeeting can set up when you launch a meeting

List 3

Enterprise Information Portal Verbatims

Line #	Verbatims
1	Portals provide end users with unified access to content, applications, and collaboration services in a highly personalized manner
2	WebSphere Portal provides a middleware framework and tools for building and managing portals using component applications called portlets
3	A Web portal, or simply a portal, is a Web site that offers a broad array of resources and services typically targeted towards specific categories of user populations
4	Portals are rapidly gaining popularity and widespread adoption because they provide end users with unified access to applications, content, and collaboration services
5	Portals help corporate information technology (IT) staff by allowing them to integrate independently developed applications in a very cost-effective way
6	Portals also help site owners by allowing them to provide a consistent, branded experience to their user population while retaining control over individual user experience
7	Early portals were built using homegrown frameworks and technologies and were targeted at users that required a single entry point to the Web

8	They allowed users to explicitly search for information or to browse a catalog
9	In recent years, many enterprises have recognized the value of portals for streamlining and increasing the efficiency of their interactions with their constituencies
10	It provides customers with the wide range of tools and runtime capabilities required to implement advanced portal solutions
11	It provides access to applications, content, and collaboration services from a variety of devices
12	it integrates and automates business processes,
13	it builds, connects, and manages applications
14	Portal is the user-facing component of the platform,
15	Making WebSphere-hosted applications, services, and processes broadly accessible to any user on any device
16	In addition, WebSphere Portal can leverage IBM s Lotus*, Tivoli*, and data management products in order to provide the breadth and depth of services necessary for creating full-featured portal solutions
17	Lotus collaboration services can be used to provide portal users with the ability to collaborate in various ways,
18	Tivoli security services can be used to secure and manage the portal,
19	and data management products can be used to provide the various types of storage facilities required by the portal
20	WebSphere Portal operates by aggregating and integrating presentation from individual units of user experience (portlets) to create a unified experience for end users
21	The framework s value lies in making the process of creating and managing the

	unified experience simple and yet extremely flexible
22	WebSphere Portal's self-service features allow end-users to personalize and organize their own view of applications, to manage their own profiles, to share documents, and to collaborate with their colleagues
23	A portlet is an application that underlies a window within a portalWeb page
24	The portal model includes a scheme for the aggregation and integration of a set of portlets into a unified portal experience
25	Portlets can work together to help users accomplish a given task, and that portlets can be properly rendered for a variety of user devices
26	The portal provides a set of administrative functions that allow authorized users to collaboratively define the portal model, including the content hierarchy (pages, peer pages, nested pages, etc), the content layout for each page, and the binding of portlets to specific sections of the page
27	As each page is defined, and a portlet is incorporated into the page, the administrator may identify the users who can view and modify the page and may specify the settings for the portlet
28	For example, the administrator may specify that only users in the Managers group can see the Personnel page or that only users in the Human Resources group can see the Hiring Projections portlet within the Personnel page
29	In this way, a company can centralize control of the content of some pages or parts of a page, while delegating control of the content of other pages to regional administrators within the company
30	Portals allow end users to customize pages or parts of pages according to their own preferences
31	Aside from providing access to applications, access to content remains an important function of portals
32	WebSphere Portal provides a Web content management capability that allows users to easily create structured content for their portal

33	WebSphere Portal s content publishing function allows portal users to contribute structured content by filling in forms and submitting the content
34	This content is then stored in a relational database or DB2* Content Manager5 and is displayed in one or more portlets
35	WebSphere Portal provides a great deal of flexibility as to the content that shows up in a portlet
36	Typically each portlet implementation can use a set of business rules to determine what content to show within a given instance
37	Portal provides advanced business rules that allow fine-grained content targeting
38	In addition to typical Web content, WebSphere Portal also provides a portal document management capability
39	Portal document management provides the foundation for portal users to collaborate on the production and use of documents of various types
40	Simple document editors for popular document types (such as rich text, spreadsheets, and presentations) are also included with WebSphere Portal
41	These editors provide convenient access to basic functions and are not meant to replace the more sophisticated stand-alone products
42	Another important content-related capability in any portal is the ability to search for relevant information
43	WebSphere Portal provides advanced search capabilities, including automatic categorization and summarization of portal content and documents
44	It also allows for the integration of other search technologies in order to enable federated searches
45	The single sign-on support allows the user, after logging on, access to all applications within the realm of the portal
46	For applications outside the single sign-on support, Web-Sphere Portal includes a credential vault that can be used to store user sign-on information

47	The authorization component determines the permissible actions within the portal for an authenticated portal user
48	It is the single control point within the portal that controls access to all parts of the portal model, such as pages or portlets
49	The authorization component is used by various other portal components - they allow actions on specific resources only if these actions are allowed by the authorization component
50	Virtual portals enable on demand computing by facilitating the addition and removal of portals
51	Portal users by providing support for carrying out tasks assigned to them
52	Users will be alerted when there are tasks waiting for their action via the most appropriate means to ensure prompt attention
53	Users have access to a consolidated list of tasks that are appropriately prioritized
54	On selecting a task, the portal automatically navigates to the designated page for performing that task, and users are able to launch and deal with multiple tasks simultaneously
55	The portal can be the single point of interaction for users so they can seamlessly initiate, monitor, and work with the business processes for a given enterprise
56	When performing nontrivial tasks, a user will often require additional input to make decisions This includes input not only from other systems but also from other human beings
57	Because the portal is designed to be the single point of access to either of these resources, it presents an ideal environment for users to perform process-related tasks
58	Provides users with a seamless and customized experience when accessing applications and content from a wide and disparate set of sources

59	Originally coined to describe Web-based applications that provide organized access to the resources of the Internet through search engines and lists of Web sites, the term portal has been applied to systems that differ widely in capabilities and complexity - from static Web pages providing links to resources on a given topic to interorganizational systems providing access to multiple heterogeneous data sources and applications
60	The use of such phrases as - provides access to applications, data, and people- does not distinguish a portal from a well designed desktop user interface, even if other features (such as the ability to customize) are included
61	Portals provide access not to people but to applications (such as email, calendaring, and Web-based front ends to databases)
62	Many definitions focused on the applications being provided or the intended markets, while several listed specific kinds of applications a portal would be likely to provide
63	The focus of an implementation can be conveyed using existing frameworks (such as the value chain) and competitive strategy
64	Words like Internet and Web were also frequently part of the portal definitions
65	The portal concept should not be limited to the Internet (TCP/IP) or to services using the Internet
66	Finally, though the portal definitions generally included the concept of a single point of access for users, along with personalization and better decision making, all were essentially vendor-centric
67	When discussing portals developed to meet user needs, a user-centric orientation would be useful
68	I define portal as an infrastructure providing secure, customizable, personalizable, integrated access to dynamic content from a variety of sources, in a variety of source formats, wherever it is needed
69	Except for - wherever it is needed,- these qualities are found in existing portal products

70	Most important, it does not limit a portal to a specific set of applications
71	Calls for customization and personalization in terms of content and presentation, as well as references, by a variety of partners within and outside the organization imply two features for identifying data sources and destinations:
72	Process or user profiles, individual or role-based, linked to authorization to the portal or to specific resources;
73	The ability to identify and describe resources in a way that bridges how applications are described to users and to other processes, some of which may not be owned by the user's organization
74	The ability to support aggregation of content from multiple sources and create a single point of access requires three data management capabilities:
75	Metadata-based schemata linked to profiles for describing content and presentation
76	Support the exchange of information with partners inside and outside the organization;
77	Management of interactions with multiple resources to create a single point of access;
78	The ability to exchange data in different formats (structured and unstructured including data formats
79	The ability to dynamically interact with applications, not just to display data, involves coordinating data exchange between applications
80	Although such interactions could be a property of the applications themselves, they imply the existence of a way to maintain a connection between applications so the server can be polled periodically for updates or send the updates to the client
81	Secure access by a variety of partners, both within and outside the organization, or ubiquitous access, involves two features:
82	The ability to locate and establish links with other applications

83	Since the resources accessible through the portal may not be under the direct control of a single organization, portal developers and users cannot assume they will always have the same identifier or location;
84	Security against unauthorized access from outside the portal
85	Assuming only selected parties have access, restricted access and secure transmission are desirable
86	Portals could be organized in the same way networks are organized, using models (such as the Internet and OSI Models) or formally in layers, with defined services and interfaces at each layer
87	The portal itself consists of software nodes that facilitate interaction among applications,
88	GPM would enable users to draw content from any willing provider and use it however they wish
89	For users who are members of multiple communities the model would support creation of a single point of access
90	The hospital decided to install a sophisticated, computerized, provider order-entry system that would enable physicians to order medication and services for their patients online
91	The goals of this complex project were to improve patient safety, increase provider efficiencies, and ultimately contribute to improving overall patient and family satisfaction
92	But a host of technologies - including e-mail, project management software, and shared collaboration Web portals - enabled key project team members to communicate more effectively, work more efficiently, and better track time and effort spent
93	Portals - provide even greater connectivity with each other and with information, regardless of location or computing environment
94	Business processes and work flow will just as easily happen between organizations as within an organization

95	Technologies that allow true collaboration are changing the entire nature of client relationships, including not only client communication and service delivery, but also how value is created
96	Collaboration technologies refer to a set of technologies that enable you to share information, work together remotely, and manage content
97	They may include a central Web or intranet portal that serves as a document or pricing data repository, or these collaboration systems can consist of real-time communications tools that enable coworkers to chat and share ideas for a project instantly
98	These technologies used to be incredibly expensive to implement because solutions had to be custom designed by the technology provider
99	Now there are versatile, quickly deployable solutions you can customize yourself that integrate tightly with existing technology infrastructures and are available at affordable prices for small and midsize firms
100	E-mail alone has had a dramatic impact on how professionals work internally and with clients
101	But using e-mail for project-based collaboration has limitations - for example, how to track different versions of documents as they get distributed, discussed, and updated
102	New collaboration technologies allow you to easily create customized websites that provide a single repository for documents, activities, notes, and contact information on a particular project or client
103	They also allow you to conduct meetings online in which participants can propose ideas, discuss options, and modify documents in real time, visible to all
104	The latest collaboration technologies allow information to flow easily between different computer systems
105	Extensible Markup Language (XML) is a standard for attaching descriptions to pieces of information, so any computer will know what any incoming information means and how to treat it

106	Combined with Web services that allow applications on different computers to interact and mesh together seamlessly, this means that important client information, once locked away in isolation on a mainframe, can be accessed and acted on from a desktop in the office or a handheld device across the country
107	It also means the glut of e-mail and voice mail messages, faxes, notes, documents, and online events that you and your employees face every day can be handled smartly and efficiently
108	Collaboration technologies allow work flow to be completely flexible
109	Anyone, anywhere, can participate in developing ideas and content
110	Teams can now work as effectively virtually as they can face to face - saving time, travel costs, and long-distance charges
111	Consultants may work in different regions, from home, or for other companies
112	Organizational boundaries become meaningless
113	By working transparently with clients, you can uncover entirely new ways of creating value for them that will set you apart from your competition
114	Transparent service delivery is when you allow your clients to see into your work processes and actively participate in those processes
115	Collaboration technologies let you transcend organizational boundaries and pool your capabilities - thereby creating results you couldn't achieve individually and providing your client with knowledge and value above and beyond the end result
116	Clients can align their processes with yours and more easily apply your services internally
117	You are embedded in your clients' processes
118	The fact that business processes can now be readily allocated across organizational boundaries has opened up a whole new domain for your firm to

	embed itself in your clients' work flow
119	Create Knowledge-based Client Relationships
120	The global free flow of information means products and services can easily be duplicated and then offered at a lower cost
121	The joint creation with clients of valuable knowledge and outcomes allows you to positively lock clients in
122	Collaborating across organizational boundaries aids in four key phases of creating knowledge- based relationships with your clients:
123	Adding value with knowledge
124	Organizations value knowledge-based outcomes
125	They seek to gain greater knowledge, be able to make better business decisions, and have enhanced capabilities
126	Provides a central location, allowing these tools to be leveraged across projects throughout the organization
127	To make its supply chain more efficient, DuPont needed a single place where all its departments, partners, vendors and customers could share information about transportation
128	That place will be DuPont's online portal
129	It will integrate all information from DuPont's service providers, including traffic, warehouse and import processes
130	Enabled the company to know where its shipments are
131	Longer term, he said, DuPont expects to slice three days' worth of inventory from its supply chain

132	TransOval has enabled DuPont to "find synergies across business units that had previously acted like separate silos"
133	TransOval The technology provides companywide access to "an ocean of data" about transportation
134	Two categories of smaller firms are using transportation portal services that are scaled down to meet their needs
135	The first category of users is A window on transportation data enabling software for their portals in-house, and launched it over their private networks
136	Off-the shelf software applications that leverage the Internet's low cost and high speed to "leverage the data in the silos" of their various departments
137	Benefit for portal are cost, control, service and growth
138	Lower transaction costs are a key benefit for end-users,
139	Using these portals allows a shipper to automate the control process
140	The ready availability of data also allows shippers to arrange for back charges written into their contracts for late delivery
141	Portals also make it easy for shippers to audit accessorial charges
142	The portals provide access to one Web-based location with detailed, current information about all orders and inventory throughout the supply chain
143	This makes it easier to identify which processes are working most effectively, so you can identify opportunities for process improvements"
144	The portals also promise to improve customer service by making transportation decisions more responsive to rapid changes
145	Shippers can share current information about orders with customers, no matter where shipments are in the network

146	Customers and shippers can query the system for information, or set triggers for specific updates about shipments, when they reach specific points in the network

APPENDIX B - CLASSIFICATION

List 1	Web Conferencing	
Theme	**Key Words and Phrases (identified in perusal state)**	**Frequency of occurrence**
Benefit	accommodate online component of training	1
	an alternative to time cost lost opportunities associated with travel	1
	big impact on the distributed workgroup	1
	enables conference call hosts to manage monitor and control costs	1
	increase their revenue by selling associated desktop conferencing	1
	pricing security integration critical factors	1
	reduce travel expenditures	1
	remote training remote support product demonstrations virtual conference room for users	1
	shrinking budgets hassles traveling workers	1
Benefit Total		**9**
Interaction	360-degree view to remote participants focusing on each person as he or she speaks	1
	and chat form of text messaging integrated into an application	1
	attend meetings and interact with people	1
	audio between phones and PC microphones	1
	audio conferencing	1
	audio conferencing give users good options for connecting to conferences and work	1
	blend in-person and remote meetings	1
	broadcast presentations over the Internet archive presentations	1
	collaborative applications	1

	combine media streams that are distributed to recipients	1
	combined used individually meet the specific needs of a user or group	1
	coupled real-time communications infrastructure transition between various conferencing technologies locate the right individuals at any given moment	1
	desktop collaboration VoIP communications digital whiteboard multi-session capabilities easy-to-use	1
	emphasis on user to- user interaction	1
	group conference	1
	individual and bring him or her into the call	1
	instant messaging among participants connected to a phone conference call	1
	integrate Web conferencing into the VoIP infrastructure	1
	integrated audio conferencing in their Web conferencing application	1
	integrated voice customization capabilities good management tools	1
	integrates Web conferencing chat desktop sharing videoconferencing	1
	integrates audio control	1
	integrates well with the company's audio conferencing services	1
	manage features chat audio conferencing polling	1
	participate from Linux- Unix- and Macintosh OS-based systems	1
	Physical meeting spaces features of online solutions online beyond two-dimensional small-screen displays	1
	polling	1
	presenter's desktop and all the actions performed there viewing Web pages presentation	1
	some participants attend physically others remotely meeting archives browsed for specific content	1

	support Internet Explorer and Netscape Navigator on Windows	1
	surveys quizzes polls	1
	task-oriented features polling	1
	text messaging near real-time communications among users	1
	use VoIP share applications instant messaging digital whiteboard perform file transfers	1
	Users can walk communicate with gestures and voice	1
	user-to-user interaction	1
	video audio text video camera speakerphone	1
	voice and Web conferencing	1
	voice conferencing	1
	voiceover- Internet and telephony save on teleconferencing costs	1
	Web conferencing chat desktop sharing voice chat	1
Interaction Total		**41**
Manageability	ability to manipulate a shared resource group of resources during a conference	1
	common interface	1
	control of documents	1
	controls shown on the screen control to any participant	1
	converged setup communications calendars compare that information	1
	core capabilities deliver a good set of collaboration tools	1
	customized collaboration tool	1
	easy- to-use interface	1
	file management	1
	integrate voice over Internet with telephony-based voice	1
	integrating core collaborative features easy-to-use application management tools	1
	integrating voice	1

	integration of these media types real-time events to trigger conferences	1
	launch meetings	1
	launch meetings instant messages to attendees click on an embedded link	1
	launching a meeting inviting attendees	1
	manage calls from the desktop	1
	management of content manage file sharing push files to other participants	1
	managing a meeting space	1
	overall conference control	1
	rights and permissions	1
	rolled into existing applications	1
	scheduling	1
	sign up our own users	1
	single system organizing content delivering it efficiently	1
	start a session schedule a meeting review any previously scheduled meetings	1
	tools for managing and running a conference	1
	uploading and converting files ad hoc meetings getting attendees on board	1
	user interface	1
	user-to-user information features starting ad hoc meetings is fast flexible pricing	1
Manageability Total		**30**
Reporting/Archiving	ability to record and archive	1
	analyze meeting summarize its content	1
	build our own reports and export them in xls or csv format	1
	centralized logs for both Web and audio conversations	1
	content management system reporting capabilities	1
	content management tools good reporting tools fast performance ad hoc meetings	1
	content management reporting capabilities integration of key features	1

	elements of online social network analysis	1
	good reporting tools	1
	managing reports collecting meeting quiz survey data from each session	1
	provides reports who has participated in the calls	1
	record and play back meetings downloadable playback client	1
	records meetings audio and video tracking each in-person participant recording computer input	1
	store and distribute upcoming meeting notices	1
Reporting/Archiving Total		**14**
Sharing	capabilities be tied together	1
	create share control presentations for groups	1
	desktop conferencing	1
	desktop sharing view and control one another's desktop remotely;	1
	documents must be loaded in advance of a meeting	1
	documents to application sharing	1
	each participant obtains all the media for a given conference	1
	exchange data between wearers	1
	feedback on each presentation	1
	file edited launch a shared application	1
	good content management tools	1
	good content management tools ad hoc meetings	1
	illustrating white boarding application	1
	media types	1
	Mozilla's Firefox browser	1
	share presentations from the network good reporting on presentation usage	1
	share vCard information with attendees	1
	sharing applications and presentations	1

	simplifies communication allowing users in a conference to call one another share files from a common application	1
	stream the audio	1
	training	1
	videoconferencing white boarding	1
	viewing a file jointly	1
	whiteboard	1
	whiteboard share archive notes	1
	whiteboarding which users	1
	work with most browsers including Internet Explorer	1
Sharing Total		**27**
Grand Total		**121**

List 2		
Theme	**Enterprise Information Portals Key Words and Phrases (identified in perusal stage)**	**Frequency of occurrence**
Access	access not to people but to applications	1
	access to specific pages by certain users	1
	access to applications content and collaboration services from a variety of devices	1
	access to Web-based location with detailed current information	1
	actions on specific resources by the authorization user	1
	allow end users to customize pages	1
	allows users to contribute structured content submitting the content	1
	allows users to easily create structured content	1
	applications services and processes accessible to any user on any device	1
	authorization component determines actions within the portal	1
	availability of data	1
	connectivity with each other and with information regardless of location or computing environment	1
	convenient access	1
	create Knowledge-based Client Relationships	1
	customers shippers query the system for information reach specific points in the network	1
	customization personalization of content and presentation by a variety of partners within and outside the organization	1
	easy for shippers	1
	enable users to draw content	1
	end users - unified access to content applications and collaboration services	1
	free flow of information	1

	help site owners - consistent experience to their user population retaining control over individual user experience	1
	identify the users who can view and modify	1
	improve customer service more responsive to changes	1
	infrastructure providing secure customizable personalizable integrated access to dynamic content from a variety of sources variety of source formats	1
	may work in different regions from home or for other companies	1
	modify documents in real time	1
	offers a broad array of resources and services targeted towards user populations	1
	online	1
	only selected parties have access restricted access secure transmission	1
	organizational boundaries become meaningless	1
	provide end users - unified access to applications content and collaboration services	1
	provide organized access to the resources interorganizational systems access to multiple data sources and applications	1
	provides access to applications data people	1
	provides companywide access to "an ocean of data"	1
	provides customers - wide range of tools	1
	provides flexibility to content	1
	provides users accessing to applications and content wide and disparate set of sources	1
	providing access to applications access to content	1
	secure access variety of partners both within and outside the organization	1
	security against unauthorized access	1

	self-service features allow end-users to personalize and organize their own view of applications to manage their own profiles to share documents collaborate with their colleagues	1
	shippers share current information	1
	simple document editors	1
	single control point	1
	single point access	1
	single point of access for users	1
	single point of access to resources ideal environment for users to perform process-related tasks	1
	single point of access multiple resources	1
	single point of access	1
	single point of interaction for users initiate monitor and work with the business processes for a given enterprise	1
	single repository for documents activities notes contact information on a particular project or client	1
	single sign-on	1
	single sign-on allows the user access to all applications	1
	targeted at users single entry point	1
	transparent service delivery	1
	user-facing	1
	users are able to launch and deal with multiple tasks simultaneously	1
	users have access to a consolidated list of tasks	1
Access Total		**58**
Benefits	ability to uncover new ways of creating value	1
	adding value with knowledge	1
	automate control process	1
	cost control service	1
	business processes can now be readily allocated across organizational boundaries	1
	enabled the company to know where its shipments are	1

	find synergies across business units	1
	improve patient safety increase provider efficiencies contribute to improving overall patient and family satisfaction	1
	lower transaction costs	1
	make supply chain more efficient single place departments partners vendors and customers could share information	1
	scaled down to meet their needs	1
	slice three days' worth of inventory from its supply chain	1
	streamlining and increasing the efficiency of their interactions with their constituencies	1
Benefits Total		**13**
Collaboration	administrative functions users to collaboratively define	1
	allows communication and service delivery	1
	anyone anywhere can participate in developing ideas and content	1
	business processes between organizations and within an organization	1
	collaborating across organizational boundaries aids in creating knowledge	1
	collaboration technologies allow work flow to be completely flexible	1
	collaboration technologies transcend organizational boundaries pool your capabilities	1
	enabled key project team members to communicate work more efficiently better track time and effort spent	1
	joint creation with clients of valuable knowledge and outcomes	1
	support the exchange of information with partners inside and outside the organization	1
	teams can now work as effectively virtually as they can face to face saving time travel costs and long-distance charges	1
	users with the ability to collaborate in various ways	1
Collaboration Total		**12**

Integration	aggregating and integrating presentation from individual units of user unified experience for end users	1
	aggregation and integration	1
	aggregation of content from multiple sources single point of access	1
	align processes	1
	allows applications on different computers to interact information can be accessed and acted on from a desktop in the office or a handheld device across the country	1
	allows for the integration of other search technologies enable federated searches	1
	allows information to flow easily between different computer systems	1
	central location allows tools to be leveraged across projects throughout the organization	1
	content stored in a relational database or DB2* Content Manager5	1
	corporate information technology (IT) staff integrate applications	1
	embedded in processes	1
	enable on demand computing	1
	exchange data in different formats (structured and unstructured including data formats	1
	facilitate interaction among applications	1
	help users accomplish a given task variety of user devices	1
	identifies which processes are working effectively	1
	integrate all information from service providers	1
	integrate with existing technology	1
	interact with applications involves coordinating data exchange between applications	1
	it integrates and automates business processes	1
	kinds of applications	1
	locate establish links with other applications	1

	maintain a connection between applications	1
Integration Total		**23**
Manageability	centralize control of the content delegating control of the content	1
	gain greater knowledge make better business decisions enhanced capabilities	1
	it builds connects and manages applications	1
	leverage data management product	1
	leverage the data in the silos various departments	1
	Organizations value knowledge-based outcomes	1
	portal document management provides portal users to collaborate production and use of documents of various types	1
	process of creating and managing flexible	1
	provides advanced business rules	1
	provides portal document management capability	1
	serves as a document repository	1
	share information manage content	1
	tools for building and managing component applications	1
	track different versions of documents as they get distributed discussed and updated	1
	transportation data over private networks	1
	uses a set of business rules to determine what content to show	1
Manageability Total		**16**
Search/browse	ability to search for relevant information	1
	search capabilities	1
	users search for information or to browse	1
Search/browse Total		**3**
Grand Total		**125**

APPENDIX C - DEFINITIONS

Collaboration – is the act of "employees working together online to solve problems faster and become more responsive to customer needs" (Kirsner, 2001).

Collaboration technologies – are electronic technologies that "facilitate working together" (Rumizen, 139).

Enterprise information portals - are Web sites with "a single gateway to a company's information and knowledge base for employees and possibly for customers, business partners, and the general public as well" (Whatis).

Explicit knowledge - is "codified" forms of knowledge from reports, policies, procedures, databases and other documents (O'Dell & Grayson, 1998).

Knowledge - encompasses what an organization has in both explicit and tacit knowledge (Rumizen, 2002).

Knowledge conversion – is the "social interaction between tacit and explicit knowledge" (Takeuchi & Nonaka, 2004, 53)

Knowledge management – are the "actions organizations take to manage their knowledge" (Rumizen, 2002,) -- knowledge management enables a business to achieve their goals by the "creation, communication, and application of knowledge" (Tiwana, 2000, 5).

Knowledge worker - individuals "whose primary task is the creation, distribution or application of knowledge" (Hammer, 2004).

Modes of knowledge conversion – are identified by Takeuchi and Nonaka as the socialization, externalization, combination, and internalization of tacit and explicit knowledge (Takeuchi & Nonaka, 2004).

Tacit knowledge – is the "uncodified" forms of knowledge that are in employees heads (O'Dell & Grayson, 1998).

Web conferencing – software that gives an organization the ability to "interact with others" as if all attendees were in the room together (Speilman & Winfield, 2003) which facilitates collaboration in real-time or recorded to playback later (Patterson, 2003).

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