Communications of the Association for Information Systems

Volume 26 Article 16

3-2010

Supporting Better Communication in Academic Communities of Practice: An Empirical Study of AIS/ISWORLD

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Abstract:

The AIS/ISWorld Mailing List is the premier global communication tool for academics in the information systems area. This paper employs content analysis of archival data to report on an exploratory study of the usage of ISWorld over a four-year period between 2002 and 2006. We develop a coding scheme based on two theoretically distinct levels of communication and examine how ISWorld community members use the mailing list for the purposes of information dissemination, knowledge exchange, and knowledge creation. Our analysis yields important insights regarding the evolution of the ISWorld Mailing List, user characteristics and communication patterns, as well as the alignment between the community's stated organizational goals and the design of the communication tool. Our findings show that the ISWorld Mailing List offers a highly efficient communication tool for knowledge dissemination to the IS community but also that its usage has been shifting more strongly towards information broadcasting and away from interactive knowledge exchange and creation. The paper concludes with some design and governance related recommendations for making ISWorld a more effective communication tool for the IS community.

Keywords: Association for Information Systems (AIS), ISWorld, mailing list, interactive communication, online collaboration, knowledge management, knowledge sharing, knowledge construction, content analysis, professional online community, communities of practice (CoP).

Volume 26, Article 16, pp. 305-328, March 2010

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I. INTRODUCTION

A community of practice (CoP) refers to a group of people who hold similar domain knowledge or expertise, who communicate informally with one another, and who share knowledge on an ongoing basis [Lave and Wenger, 1991; Wenger et al., 2002]. Innovations in Internet and other information technologies have enabled the development of online communities of practice in which individuals can share knowledge and express opinions about topics of interest and deepen their understanding and expertise through interactive electronic communication [Preece, 2000; Schoberth et al., 2003]. Professional online communities can help organizations and individuals build social contacts and relationships and acquire critical knowledge to answer questions and solve problems [Wenger, 1998; Jones and Rafaeli, 2004].

In the academic area, researchers and educators participate in various virtual communities to pursue and share useful professional, social, and research-related information [Matzat, 2004]. In the Information Systems (IS) area, the Association for Information Systems (AIS) organization and its members constitute the most important community of practice. Their virtual offspring, aisnet.org, offers a number of features and resources for the community, including the widely adopted ISWorld Mailing List. The mailing list is the most dynamic communication tool the AIS has made available for the IS community. Used along with other computer-mediated tools, ISWorld is critical to the fulfillment of the AIS's stated organizational mission and objectives.

In the present study, we investigate the ISWorld Mailing List at both the macro and micro levels. At the macro level, we examine the alignment between the observed performance of the mailing list and the key objectives of the AIS organization, as well as the evolution of the list's communication activities over time. At the micro level, we attempt to profile users' involvement at different communication levels based on their characteristics, such as gender and nationality, and explore the relationships between user characteristics and communication patterns. The main aim of the study is to identify the role ISWorld plays in practice, in terms of helping to fulfill the AIS's objectives. While we find that the list is a very efficient tool for dissemination of knowledge, we also find that the list is gradually moving away from supporting more interactive knowledge construction and exchange. We do believe that the IS World mailing list performs a valuable service in helping disseminate information to the IS academic community, but we hope that the reduced interactivity in the mailing list is compensated for by other tools that could support interactive knowledge exchange. Based on data concerning these aspects, we suggest some guidelines for design-, management-, and governance-related enhancements of ISWorld and related tools in order to improve overall communication effectiveness and to achieve better alignment with the organizational objectives of the AIS.

The paper is organized as follows. In the next section, we briefly introduce the Association for Information Systems, describe the ISWorld Mailing List and highlight the institution's organizational mission. In Section III, we discuss the theoretical foundation and the coding scheme we use in the content analysis of our data. In Section IV, we report on the data collection and content analysis process. In Section V, we present the results of our analysis. In Section VI, we discuss some implications of our study and conclude with suggestions for the AIS on how to better use the ISWorld list and other communication tools on its web site.

II. AIS, AISWORLD NET, AND THE ISWORLD MAILING LIST

AIS and AISWorld Net

The Association for Information Systems was founded in 1994 and is considered the premier global organization for academicians in Information Systems[1]. The AIS has been recognized for taking a leadership role among the various IS research communities [Loebbecke et al., 2003]. Fostering a professional community for IS educators, researchers, and professionals is one of its primary missions. The AIS hosts international conferences, promotes IS research and education, publishes books and journals, and cooperates with other organizations that share similar purposes. Special interest groups have been established for a number of important, specific research areas in the Information Systems discipline. More than twenty local chapters are located in different countries and regions throughout the world.

[1] Association for Information Systems; http://home.aisnet.org/.

Content on the AIS website is organized by categories such as "Today's ISWorld," "Research and Scholarship," "Teaching," "Professional Activities," and "Country and Language Group Pages." The first category, "Today's ISWorld", gives an overview of AISWorld Net and and provides access to various knowledge repositories, such as JAIS, CAIS, eLists, eLibrary, and Directory. JAIS and CAIS are two IS journals sponsored by AIS. The eLibrary offers online access to conference proceedings and journal articles. The website also contains a link to a directory of professional affiliations and contact information of individual AIS community members. The link to the eLists section connects its members to three mailing lists, including the subject of our study: the ISWorld Mailing List.

According to the community's mission statement, the website was designed and is maintained to:

> *"… provide information management scholars and practitioners with a single entry point to resources related to information systems technology and promote the development of an international information infrastructure that will dramatically improve the world's ability to use information systems for creating, disseminating, and applying knowledge"* [http://www.aisnet .org[2], emphasis added].

It further lists twelve specific objectives, which we have abstracted, for the purpose of this study, into four general and larger online community goals: knowledge management, social networking and professional development, community development, and universal access (cf. Table 1).

Table 1: AIS Online Community Goals and Objectives

General Community Goals	Original Specific Objectives from the Mission Statement
Knowledge Management	**Knowledge Repository:** Providing access to information related to research, teaching, and our professional activities. **A Learning Organization:** Learning through immediate worldwide availability of examples and summaries of phenomena. **Theory Development:** Seeking to find or formulate theories that will permit the generalization of our experiences and research.
Social Networking and Professional Development	**Linked to Practice and Policy:** Bringing universities, governments, and the private sector more closely together. **Builders of the Future:** Being at the forefront of the design of a networked global world through action research. (Helping to build a networked world requires that we help create that world.) **Recognizers of Accomplishment:** Creating designs that capture and disseminate the contributions of individuals and institutions. **Distribution Channel:** Controlling (i.e., pulling versus pushing) access to the information systems academic marketplace throughout the world.
Community Development	**Evaluating the Enterprise:** Testing through use and experimentation the systems and knowledge repositories we design and build. **Open in Operations:** Maintaining open access to information about and governance of ISWorld Net. **Distributed in Management:** Providing common goals, structure, and tools while leaving implementation in the hands of individuals or institutions.
Universal Access	**Committed to Freedom:** Embracing the democracy of unfettered access to information. **Advocates for Universal Access:** Striving for equal access to information.

The ISWorld Mailing List

The ISWorld Mailing List is one of the major online communication channels for members in the IS community. In addition to online communication, various academic conferences and workshops serve as forums in which the ISWorld users may interact in more traditional face-to-face contexts. The ISWorld Mailing List is unique in that it provides global online connections for all IS academic professionals across different regions and specific interests.

[2] Retrieved on February 29, 2008.

Therefore, participation in the ISWorld listserv in the form of either receiving or sending e-mails is considered a leading indicator of member involvement in the AIS community [Te'eni and Schwarz, 2004]. The typical subscribers to ISWorld Net are IS researchers and educators. ISWorld introduces itself as follows [ISWorld Net Webpage,2006].

> *"We believe that our worldwide community consists of approximately 5,000 [people] of whom many are accessible through our faculty directory. Approximately 2,500 of them also monitor ISWorld, our discussion list."*

The inaugural ISWorld message was posted on November 14, 1994. From the list's archive, users can retrieve messages from 1994/11/14 to 1998/11/30 and again from 2002/04/01 to the present day. Unfortunately, however, because of technical problems that occurred when the list migrated to a new host system, some messages posted during the period 1994/11/14 through 1998/11/30 were lost. Thus, in this study we take our sample only from the continuous data—that is, the messages posted from 2002/04/01 through 2006/04/30. Since September 2001, list activities have been governed by a set of strict rules (cf. Appendix 1). For example, administrators have enacted a policy of banning advertisements, file attachments, and duplicate postings in order to reduce irrelevant postings and information overload. List members can post any question related to research, teaching, or academic administration on the ISWorld listserv. Readers are encouraged to respond directly to the information-seeker off-list, instead of broadcasting back to the entire community. The information-seeker is then urged, once he or she has collected sufficient responses to the question, to post a summary of such responses to the list. ISWorld discourages off-topic postings and permits discussion only of that which is "directly IS-related and of significant importance to a large majority of ISWorld subscribers [ISWorld Net Webpage, 2006]. These list policies and norms are typical practice in many online professional communities with a large number of subscribers. They help establish focus and relevance, control information overload, and avoid redundancy.

III. THEORETICAL PERSPECTIVE

In order to analyze list performance and evolving communication patterns, we draw on previous research in the communication studies literature. In particular, we use the construct *interactivity* as a theoretical concept with which to examine the communication patterns of the ISWorld users over a four-year period. We distinguish two levels of communication—one-way communication and two-way communication—to develop the code scheme we used to analyze the observed data. It is important to point out that two-way communication is theoretically linked to two key aspects of knowledge management: (1) knowledge exchange and reuse and (2) knowledge creation and construction.

Interactivity

Interactivity is a useful construct for mapping out computer-mediated communication [Rafaeli, 1988; Lowry et al., 2009]. It is a process-related construct that is independent of the communication medium. It can vary in intensity depending on the particular task and communication process. The specific implementation of a communication process strongly impacts the level of interactivity that the communication tool can effectively support. People have a need for interaction and a certain level of interactivity during communication can satisfy that specific need as well as motivate people to communicate with others more actively [Rafaeli and Sudweek, 1997]. Theoretically, the interactivity construct is strongly related to various outcomes in communication settings such as acceptance and satisfaction, engagement, performance quality, learning, openness, and sociability [Rafaeli, 1988]. In particular, Lowry et al. [2009] have proposed a computer-mediated communication interactivity model and shown that interactivity improves communication quality and increases process satisfaction among the members of a work group who have participated in the communication process. However, research in human-computer interaction (HCI) has also shown that too much interactivity can cause fragmentation of knowledge work processes, create disruptions, increase cognitive complexity, and thus negatively impact the overall performance of knowledge workers. This applies in particular to knowledge tasks that are well-structured and well understood so that they can be successfully completed at lower levels of interactivity [Gillie and Broadbent, 1989; Reder and Schwab, 1990; Mark, Venolia and Neustaedter, 2003; Gonzales, and Harris, 2005,]. Hence, it is crucial for designers to choose the right level of interactivity when modeling knowledge work processes and implementing communication tools. Knowledge work tasks with different underlying communication processes may require different levels of interactivity to achieve task-efficient performance and user satisfaction (Bailey and Konstan, 2006).

Researchers take different perspectives—related to feature, process, or perception—to define interactivity [McMillan and Hwang, 2002]. It can refer to system features in communication software like search engines or instant-messaging applications. In the process perspective, on the other hand, researchers use interactivity to indicate communication activity. Finally, in the perception perspective, interactivity describes communication that users qualitatively characterize as interactive without any real measures. These three perspectives are neither independent of one another nor mutually exclusive; on the contrary, they are strongly interdependent. The features

of communication media and tools will shape user behavior in terms of different levels of interactivity. Both media features and users' communication activities will affect users' perceptions [McMillan et al., 2003]. But because our study focuses on user activity, we adopt the process perspective as the most appropriate of the three when applying the interactivity construct to develop our framework for content coding and analysis.

Following Rafaeli and Sudweek [1997], and as depicted in Figure 1, we view interactivity as a continuum in which one-way communications represent the lower end of the spectrum and two-way communications the higher end. One-way communication refers to messages that originate from a sender who communicates declarative information to an audience that can comprise a single person or groups of various sizes. The information flow in one-way communication is largely in one direction only, from the sender to the audience, with little or no opportunity for the recipients to provide feedback. Figure 1 illustrates a one-way communication as a process where user U1 is sending a single message (M1) to the intended audience (online community). Examples of one-way communication processes include announcements, broadcasts, and monologues. Two-way communication, on the other hand, refers to message exchanges that start with a message from an original sender to the audience but then allow recipients to respond to the original message. The information flow in two-way communication is bi-directional. The complexity of two-way forms of communications can vary substantially, depending on the specific structure of the underlying communication process. Differently structured two-way communication processes trade-off level of communication complexity with interactivity.

For example, Figure 1 shows a simple two-way communication process (which Rafaeli also calls reactive two-way communication) where the original sender (U1) sends out message M1 to the entire community and some recipients (e.g., U2, U3, U4) react by sending messages (M2, M3, M4) that respond to M1 back to U1, who in turn may or may not decide to send out a follow-up message responding to the feedback she received (e.g., commenting on or summarizing M2, M3, M4). In this case interactivity is supported, but interactivity is limited in that users U2, U3, and U4 cannot interact directly with each other. For example, user U2 will not be able to see the response messages M3 or M4 that were sent by other users and relies on the original sender U1 to act as an intermediary and relay relevant information back to the community. While this specific, reactive, and sequential structure limits interactivity in the communication processes, it gives the original sender control which she can exercise to keep the communication focused and goal-oriented. This kind of reactive two-way communication can be an efficient way of designing tools to support well-structured information-seeking tasks like, for example, query-response exchanges.

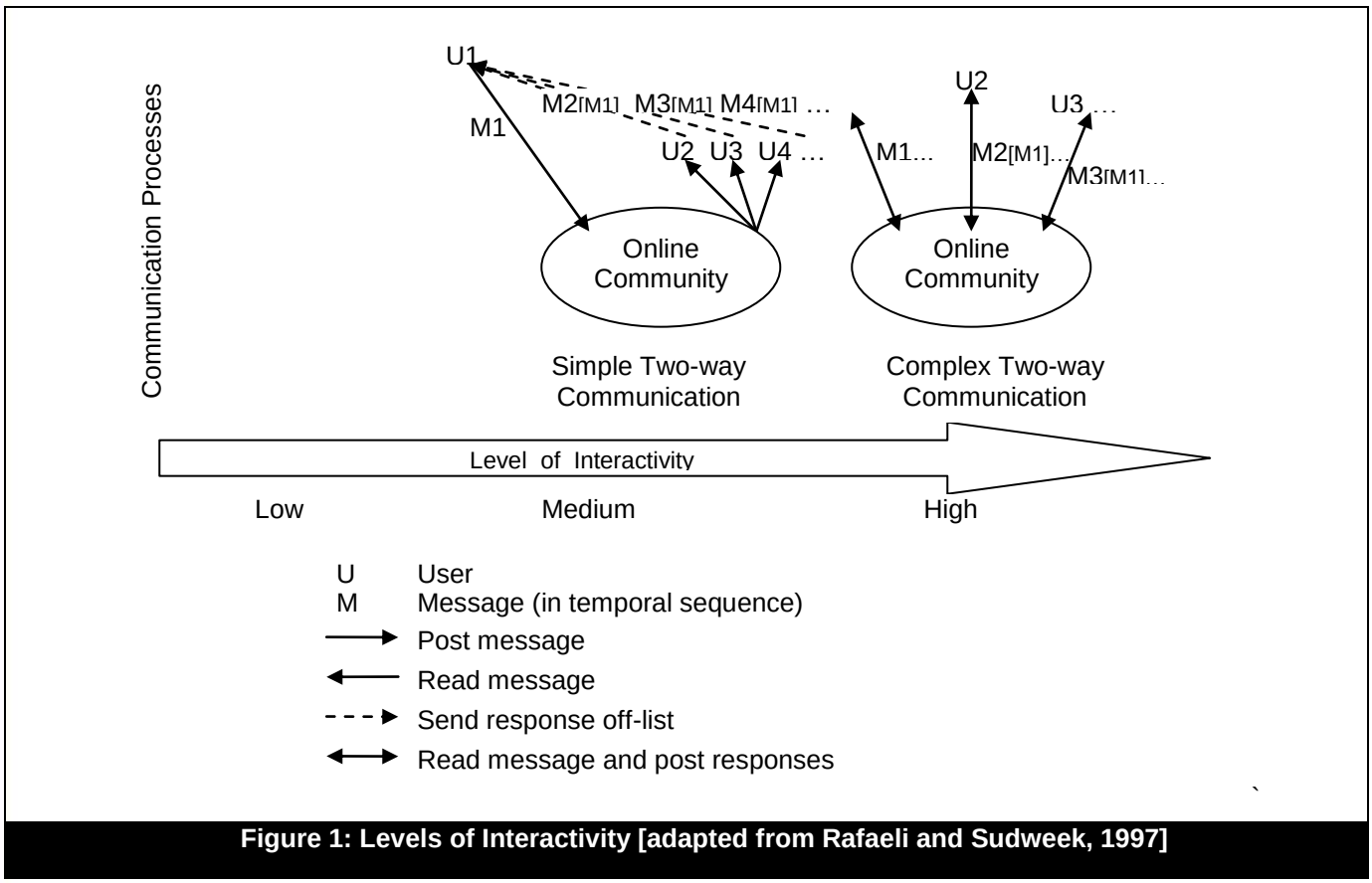

Figure 1: Levels of Interactivity [adapted from Rafaeli and Sudweek, 1997]

Finally, Figure 1 also shows a depiction of a complex (or fully interactive) communication process in which any user can jump into a discussion in any sequence and send new messages to the community that respond to both the content of previous messages on the current topic, as well as to the process of the previous message exchange. This structure is highly interactive, promotes the sharing of ideas, recommendations, and opinions from multiple perspectives, and is particularly suited for unstructured knowledge tasks and exploration of novel problems. In this case, the originator of the discussion retains very little control over the process, which can easily move in different directions with unanticipated outcomes and undefined closure. An open-discussion forum would be an example of a complex communication process that is characterized by high levels of interactivity.

It has been theorized that the higher the level of interactivity of a particular medium, the more it can satisfy people's need for interaction [Rafaeli and Sudweek, 1997] and increase user performance and process-outcome quality [e.g., Sicilia et al., 2005]. Empirical studies also indicate that the presence of high levels of interactivity may not only positively influence user satisfaction with respect to the communication media, but may also positively impact active user participation in the media [Ghose and Dou, 1998; Coyle and Thorson, 2001; Teo et al., 2003]. The literature on communities of practice suggests that community development requires its members to conduct interactive communications regularly on the issues that are relevant to their knowledge domain [Wenger et al., 2002].

Interactivity and Knowledge Management

The different levels of interactivity presented in Figure 1 are all present in the ISWorld Mailing List. People routinely broadcast messages containing information and knowledge through one-way communication channels to the entire ISWorld user community. To that extent, one-way communication processes are the preferred method to support information dissemination. For other purposes, such as exchanging existing knowledge and creating new knowledge, members of the list use two-way communication processes. A simple two-way communication in the form of a query-collection-resubmission process, supports knowledge exchange and reuse in the community. Following standard list practice, members ask specific questions (query) on the list, then collect responses from the community off-list through personal e-mail, and finally post a summary of the received feedback to the list so that not only the original knowledge seeker but also the community in general can benefit from the knowledge sharing activity. Complex two-way communication takes place on ISWorld as well. It is mainly used to engage in open-ended discussions that generate new knowledge, as well as raise novel questions or controversial issues. In these cases, message threads pertaining to a focal issue evolve over time and contain multiple responses, opinions, judgments, and sometimes eventual solutions to problems and debates. In short, ISWorld uses forms of two-way communication that enable higher levels of interactivity to support tasks that require dynamic communication, which are primarily related to knowledge exchange, reuse, and creation. Table 2 summarizes how these two levels of communication support different knowledge-management functions in the ISWorld community.

Table 2: Levels of Interactivity and Knowledge Management in ISWorld

Type of communication process	Level of interactivity	KM support role
One-way communication	Low	Information dissemination
Two-way communication (simple, complex)	Medium to high	Knowledge exchange, knowledge reuse, and knowledge construction

According to social constructivist theory, interactive communication processes provide participants with an opportunity to engage in collaborative knowledge construction [Jonassen et al., 1995]. Interactive communication asks participants to explain, clarify, elaborate, and defend their contributions, yielding sense and knowledge construction through cognitive processes such as integrating, elaborating, and structuring ideas [Brown and Palinscar, 1989]. Providing effective knowledge sharing and creation platforms and inviting members to join knowledge-creating collaborations can be a strong motivator to members to contribute to developing a participatory community, especially in the context of communities of practice that are concerned with knowledge-intensive work. User involvement within and across task categories indicates how well the domain inspires and motivates member participation [Wenger et al., 2002].

Applying to the specific case of the ISWorld Mailing List the theoretical and empirical findings on the relationship of interactivity on communication quality in terms of both process satisfaction and process outcome as well as its relation to functions of knowledge management in the general context of computer-mediated communication processes that we have discussed in this section, we can put forth some design principles that leverage the potential benefits of interactivity in order to achieve its stated goal to "*promote the development of an international information infrastructure … for creating, disseminating, and applying knowledge.*" [http://www.aisnet.org; see also, p. 4].

First, we have established that the ISWorld Mailing List is both an example of a computer-mediated communication system (an online community with a discussion forum in form of a mailing list) and an example of a knowledge management tool for the AIS community of practice in the sense that ISWorld has been deployed specifically to aid core knowledge management functions (knowledge dissemination, knowledge reuse and application, and knowledge creation). Second, we recognize that effectively supporting different knowledge management functions requires different levels of interactivity. Third, the specific communication processes that are implemented should incorporate the appropriate level of interactivity for the different communication tasks and knowledge management functions.

In the next two sections of the paper, we will empirically examine the communication patterns of the ISWorld Mailing List and identify the specific communication tasks and knowledge management functions that the list supports and determine the level of interactivity that is present in the observed communication processes. We will then conclude the paper with discussing implications of our findings and offering some suggestions for improvement.

IV. CONTENT ANALYSIS

Data Collection

The data we used for this study came from three basic sources: (1) the ISWorld listserv, (2) the AIS faculty directory, and (3) the World Wide Web. We used web searches occasionally to clarify the background of members whose list postings contained ambiguous information or to identify members whose records in the faculty directory were incomplete. All messages used in the study were collected from the ISWorld listserv archive. In most cases we were able to obtain member information related to the ISWorld community from the faculty directory on the AIS website, but in some cases we had to search their own personal web pages to find the data we needed.

Because of a system modification that occurred in the ISWorld archive in 2002, we faced some problems in retrieving e-mail messages before April 2002. Hence, we limited our data set to messages sent after April 2002, for which the data is continuous, and collected all e-mail messages (8353 pieces) posted in the forty-nine months from April 2002 through April 2006. Each message used included its author's name, date of posting, subject heading, and the body of the message itself.

Software to Aid Content Analysis

The auto-coding function of ATLAS.ti 5.0 was used in the early stage of data coding. This function helped us organize information such as author name and e-mail address, date of posting, and subject heading into a unified spreadsheet. For the purposes of further analysis, we used MS Excel for sorting specific information fields and retrieving them from the data records. We then used SPSS to perform frequency counts of users and messages across different categories.

Development of the Coding Manual

The coding manual we developed has two parts. The first contains information about users while the second defines the codes for message content based on topical categories. Messages were organized along the interactivity dimension, grouped by levels of interactivity in the underlying communication process.

Coding Manual Part I: Information about the User

Given the inherent limitations of secondary data analysis, we constrained collecting user characteristics to information easily accessible in faculty directories and on the World Wide Web. This secondary source was used only if the directory information were incomplete or ambiguous. This included information about gender, occupation (academic or nonacademic), academic position (if applicable), affiliation, and geographic location. While extracting most of this was straightforward (albeit time-consuming), identifying a user's geographic location could not be reliably deduced from the top-level-domain name of the corresponding e-mail address, and, therefore, geographic data was not used in the present analysis[3]. Coding Manual Part I (Table 3) shows the codes and resources used to collect user information.

[3] However, the available geographic data was analyzed separately from this paper, in Yu et al. [2009], to determine geographic factors and national culture differences of ISWorld users.

Table 3: Coding Manual Part I: User Information		
Code	**User Information**	**Source of Information**
i.	**Gender of User** Male (M); Female (F); Unknown (U).	World Wide Web.
ii.	**Occupation** Academic (1); Non-Academic (2); Unknown (3).	AIS faculty directory; World Wide Web.
iii.	**Academic Rank (if applicable)** Student (1); Post-Doc/Research Associate (2); Assistant Professor/Lecturer (3); Associate Professor/Professor/Senior Lecturer/Reader (4).	AIS faculty directory; World Wide Web.

Coding Manual Part II: Message Content Coding Scheme

The coding scheme shown in Table 4 is structured based on the aforementioned framework of interactivity theory. At Level 1, we include eight one-way communication tasks and supporting processes that are characterized by low levels of interactivity (represented by Codes 1 through 7). At Level 2, there are four two-way communication tasks that are supported with communication processes with higher levels of interactivity (Codes 8 to 11). The first three of them are highly structured query processes and present examples of simple two-way communications. The last process (Code 11), however, refers to open forum discussions which represent instances of highly interactive, complex two-way communications. The unit of analysis used in this study is the message (posting), assuming that each message has a specific purpose that can be discerned and content-coded. A content analysis was performed on a subset of the messages posted on ISWorld in order to identify the salient communication tasks and processes that were supported by the list. The coding scheme was developed based on the following procedure.

Step 1: All three authors of the paper read and analyzed messages taken randomly from one of the forty-nine relevant months. After several meetings and rounds of discussion, we created a first draft of the coding scheme to be used later on.

Step 2: We then sampled 300 messages and conducted a pilot test. We compared and analyzed the coded results and discussed all conflicting coding decisions until agreement was reached. As a result, codes with similar meaning were combined while the definitions of some other codes were revised. This process resulted in the coding scheme presented in Table 4. This scheme satisfied the requirements of typical quantitative content analysis research methods [Bryman and Bell, 2004; Krippendorff, 1980]. Importantly, the thirteen defined codes are discrete, exhaustive, and mutually exclusive categories with clear coding instructions [Bryman and Bell, 2004; p. 205]. While the categories themselves are mutually exclusive, some messages did not fit into just one dominant category and, therefore, were treated as "compound category" messages, bearing more than one category of content within the one message.

Step 3: To validate the coding scheme, we conducted two further rounds of pilot tests. In each test, we randomly sampled 200 messages from the data set of 8353 messages. Then each of the three researchers coded the data independently. We calculated Cohen's Kappa to measure inter-rater reliability following [Fleiss, 1981, p. 225]. The Cohen's Kappa values for the two pilot tests are 0.8120 and 0.8492, respectively. Both inter-rater reliabilities are higher than the recommended threshold of 0.75.

The topical categories that emerged from the data represent the knowledge tasks and communication processes that define the usage of the list by the ISWorld community.

Data Coding

After validating the coding scheme, one of the researchers coded the remaining data independently. Typically, the coder was able to code a message by inspecting the subject line alone. Occasionally, however, the subject line alone was inconclusive and the coder was unable to discern a definite primary cue in it and had to examine the body of the message for a secondary cue in order to classify the message. Of the 8353 messages, 117 were double-coded and treated like two messages delivered in one envelope, and, therefore, counted twice, yielding a total of 8470 messages.

Table 4: Coding Manual Part II: Message Content Coding Scheme		
Code	**Knowledge Task and Communication Process**	**Task-Process Description and Examples**
0	Ads	Spam, e.g., "Burn fat faster" and "Don't be a fuddy-duddy."
	Level 1:	**One-Way Communication (low levels of interactivity)**
1	Conference Announcements	Conference (workshop, consortium, symposiums) announcements, call for a paper, call for participation
2a	Journal CFPs	Journal call for paper, e.g., "Special Issue of Decision Support Systems"
2b	Journal TOCs	Journal table of contents, e.g., "TOC: MIS Quarterly 26 (2) June 2002"
3	Book Announcements	Call for chapter, e.g., "Call for SA&D Volume Chapters"
4	Job Positions	Announcement of a faculty position, post-doc position, Ph.D. position, e.g., "Job Opening: Associate Professor."
5	Administrative Announcements	Announcement of change in editorship, call for nominees, AIS announcements, conference location selection, e.g., "AIS 2002 Election Results"
6	People	Obituaries and awards, e.g., "Dr. Peter Chen to Receive IEEE-CS Goode Award."
7	Miscellaneous	Social networking newsletters and bulletins, e.g., "SIG ES meeting at AMCIS"
	Level 2:	**Two-Way Communication (medium to high levels of interactivity)**
8	Teaching Queries	Requests for course materials, textbooks, group project coordination, e.g., "Course Material"
9	Research Queries	Request for research-related assistance, e.g., "Request for Reference"
10	Administrative Queries	Request about managerial issues, e.g., "Developing a Computer/Information Security Curriculum"
11	Open Discussions	Discussing open questions and debating controversial issues, e.g., "Please comment: Is our community headed in the wrong direction?"
	Double-Coding Instances	e.g., "ISOneWorld2005-hosted by Bob Galliers" coded as 1&6 e.g., "EM-13(3) New Issue TOC & Reminder CfPs" coded as 2a&2b

V. DATA ANALYSIS AND RESULTS

General Characteristics of the ISWorld Mailing List

After eliminating advertisements, spam, and other irrelevant messages, we extracted 8390 usable messages posted by 1678 unique users during the study's time period. Figure 2 shows the distribution of users by level of activeness (i.e., number of messages posted). The shape of the curve in Figure 2 largely follows a power law distribution, commonly found to describe participation in online communities [Shirky, 2008, pp. 123–130]. Starting from its highest point, where 582 users contributed a single message to the list during the period in question, the curve drops sharply and reaches its elbow point, depicting 52 users who posted six messages during the time period under analysis. After the elbow point, the curve flattens out and gradually approaches zero around point 50, indicating that only very few users posted 50 or more messages during the relevant period.

Previously, in Section III, we theorized that the communication processes that are governing the ISWorld list can be grouped into two categories, one-way and two-communication. We further argued that one-way communication describes unidirectional message exchanges while two-way communication refers to structured and unstructured bidirectional message exchanges. In this section, we will present empirical data in accordance to our theoretical conceptualization of communication processes, that is, we will aggregate the data, where appropriate, over the individual message categories that were defined in Table 4 and compare the aggregate one-way and two-way communications. In our theoretical discussion, we also made a subtle distinction within the two-way communication category and called sequentially structured message exchanges simple two-way communication and unstructured message exchanges complex two-way communications (cf. Figure 1). However, when we analyzed the data set, we found the pattern of communication between the two subcategories to be similar for ISWorld. Hence, unless when specifically noted, we will simply show two-way communications as one aggregate data category, and not show simple and complex two-way communications separately. This aggregation of subcategories helps the paper present the comparison between one-way and two-way communication more effectively.

Figure 2 shows the distribution of the active list members, i.e., those who posted at least one message during the relevant period. The approximately 1400 silent users who posted no message at all were not included in the graph. Moreover, we cut off the chart's long flat tail, which represented eight additional users who contributed more than 60 messages each. These eight highly active users account for only about one-half percent of the total 1678 users but contributed 8.7 percent of the total posted messages. (The single most active user posted 184 messages alone.)

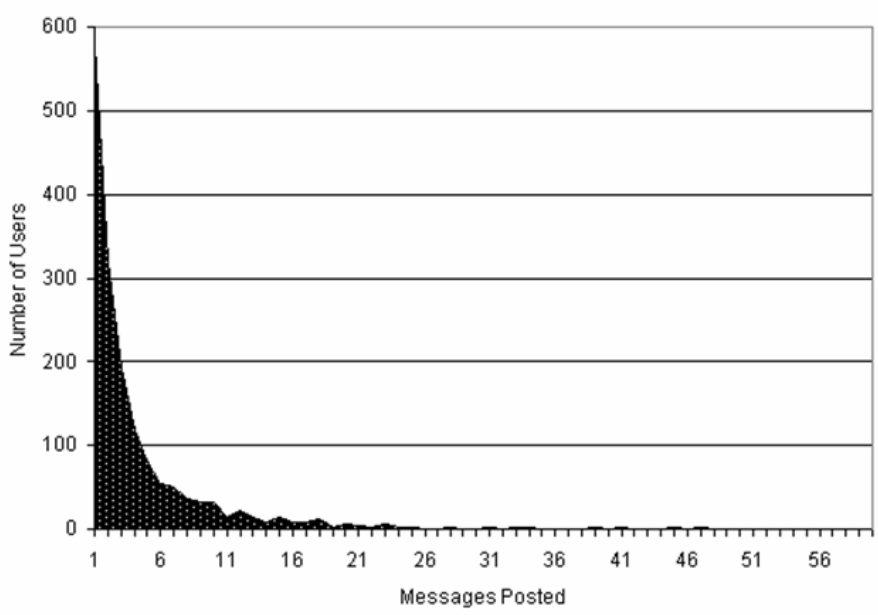

Figure 2 Distribution of Users by Level of Activity

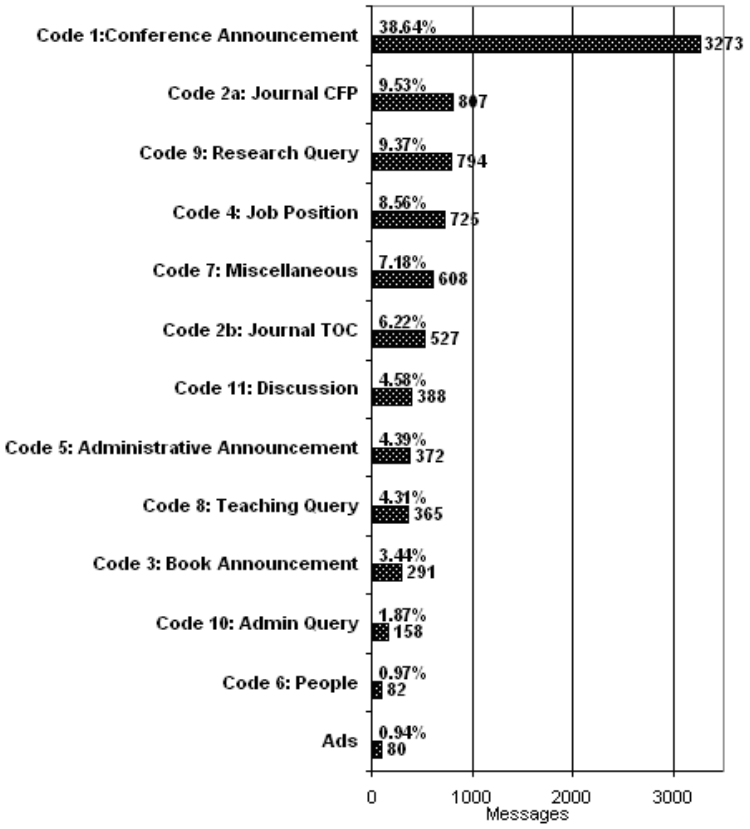

Figure 3 Messages Posted by Task Categories

Figure 3 displays a summary of the observed communication activities. Among the twelve topical categories, conference announcements, with 3273 messages, accounts for 38.64 percent of the total 8470 contributions. This pattern is consistent with Te'eni and Schwarz's findings [2004], in which conference attendance ranked first among community members' reasons for assessing their level of involvement. Following conference announcements, calls for journal papers, research queries, and job positions account for 9.53 percent, 9.37 percent, and 8.56 percent of the total messages, respectively. Interestingly, there are only 388 messages in the open discussion task category, which represents less than 5 percent of the total messages. It should be noted that posters use the list for their own personal, professional interests but also to post on behalf of their institution or in some other service role. The roles can overlap and are often inseparable. Not surprisingly, a significant number of messages in task categories 1, 2a, 2b, 3, 4, and 5 were primarily institutional messages. However, since all messages were posted by individual community members for the purpose of communicating with the IS community, we treat them like person-to-person communications.

Alignment Between the ISWorld Design and Community Objectives

As a major communication channel on ISWorld.org, the ISWorld Mailing List is designed to support the mission of the larger AIS online community. One-way communication processes account for most messages (78.9 percent), while two-way communication accounts for 20.1 percent of the total messages (the remaining 1 percent was considered spam). Table 5, which extends Table 2 from Section II, indicates that during the observed period the less interactive forms of communication dominated the list's activities. Table 5 also indicates the extent to which the specific communication tasks and processes that take place on ISWorld support the chief knowledge management functions.

Next, we can explore the usage of the ISWorld and identify the role of the communication tool with regard to its effectiveness in achieving the community's four larger goals and objectives (as shown in Table 1 in Section II). Table 6, which is an extension of Table 1, shows that all communication processes that support the community objectives concerning knowledge management (Goal I) were two-way communications supporting tasks related to knowledge exchange, reuse, and construction. About 20 percent of the messages posted on ISWorld were related to knowledge management. Similarly, Goal II, social networking and professional development, was supported with communication processes from the categories of information dissemination processes which combined accounted for 74.5 percent of all messages. A relatively small portion (4.4 percent) of the messages, administrative announcements, supported the objective of community development and administration (Goal III). Our content analysis did not include a task category that related specifically to universal access, which we listed as the fourth community goal. Universal access is, however, supported by aisnet.org by promoting listserv subscription to all community members. Subscribing to the list is easy to do for IS educators and researchers and free of charge.

Table 5: ISWorld Communication Process Type and Knowledge-Management Support

Communication Process	KM Support Role	Code	Messages	Share
One-way communication	Information dissemination	1, 2a, 2b, 3, 4, 5, 6, 7	6685	78.9%
Two-way communication	Knowledge exchange, knowledge reuse and knowledge Construction	8, 9, 10,11	1705	20.1%

Our archival analysis shows that there are more messages about professional development and social networking than there are directly related to knowledge management. These results are largely consistent with previous survey findings by Te'eni and Schwarz [2004]. But while Te'eni and Schwarz's study relied on perceptions based on survey data, ours uses actual postings. Moreover, the present study differs in terms of how the actual postings on the ISWorld Mailing List support the functions of knowledge management. The functions of knowledge exchange and knowledge construction both are supported at a much lower level (at 15.5 percent and 4.6 percent, respectively) than were similarly construed functions in the results self-reported in Te'eni and Schwarz (66 percent and 9 percent, respectively) [2004][4].

We conclude that ISWorld serves as a highly efficient tool for dissemination of knowledge that has been widely adopted by the community to effectively support social networking and professional development, thus playing a major role in fulfilling one of the strategic goals from the AIS mission statement (Goal II in Table 6). There is also

[4] In addition to self-attribution bias, self-selection bias may also have contributed to the higher numbers reported in the survey.

some limited support for knowledge management objectives (Goal I) by taking advantage of the interactive capabilities of the ISWorld list, although the list was not necessarily designed originally to specifically address that objective as well. The above data analysis also shows a strong link between the online community aisnet.org and its offline parent, the AIS organization. Most of the information disseminated among the online community (pertaining, e.g., to conference administration, employment opportunities, and people's individual professional development) is directly related to community building and cultivation that takes place off-list in the real world (Goal III).

Table 6: AIS Community Goals and Communication Task and Process Types

General AIS Goals	Specific Community Objectives	Communication Type	Number of Messages
I: Knowledge Management	Knowledge Repository: Providing access to information related to research, teaching, and our professional activities Learning Organization: Learning through immediate worldwide availability of examples and summaries of phenomena Theory Development: Seeking to find or formulate theories that will permit the generalization of our experiences and research	**Code 8:** (365) Teaching Query **Code 9:** (794) Research Query **Code 10:** (158) Managerial Query **Code 11:** (388) Discussion	1705 (20.1%)
II: Social Networking and Professional Development	**Linked to Practice and Policy:** Drawing universities, governments, and the private sector more closely together **Builders of the Future:** Being at the forefront of the design of a networked global world through action research (Helping to build a networked world requires that we help create that world.) **Recognizers of Accomplishment:** Creating designs that capture and disseminate the contributions of individuals and institutions **Distribution Channel:** Controlling (i.e., pulling versus pushing) access to the information systems academic marketplace throughout the world	**Code 1:** (3273) Conference Announcement **Code 2a:** (807) Journal CFP **Code 2b:** (527) Journal TOC **Code 3:** (291) Book Announce-ment **Code 4:** (725) Job Position **Code 6:** (82) People **Code 7:** (608) Miscellaneous	6313 (74.5%)
III: Community Development and Administration	**Evaluating the Enterprise:** Testing (through use and experimentation the systems) and knowledge repositories we design and build **Open in Operations:** Maintaining open access to information about and governance of ISWorld Net **Distributed in Management:** Providing common goals, structure, and tools while leaving implementation in the hands of individuals or institutions	**Code 5:** (372) Administrative Announcement	372 (4.4%)
IV: Universal Access	**Committed to Freedom:** Embracing the importance of democracy of unfettered access to information **Advocates for Universal Access:** Striving for equal access to information	N/A	N/A

Evolution of the ISWorld Mailing List Over Time

In this section we present a trend analysis of posting behavior on ISWorld and in order to allow us to compute quarterly and yearly figures, using only the first forty-eight months of our data set. We investigated the yearly data to study different communication-activity trends and also analyzed quarterly data to account for potential seasonal patterns.

Figure 4 displays the trends of the two broad types of communication processes compared with the evolution of the whole mailing list. Overall, the list grew 38.9 percent in terms of annual message volume over the four years considered. Of the two types of communications, one-way communication went up steadily over the observation period and contributed disproportionately to the overall trend by growing in message volume by 72 percent from 2002–2003 to 2005–2006—thus increasing its share from 69.8 percent to 86.6 percent. Clearly, the bulk of communication was in the form of message broadcasts and institutional announcements—and increasingly so. At the same time, two-way communication decreased steadily in terms of both absolute volume and share. In this category, the number of messages (231) contributed in the fourth year halved when compared to those of the first year (460), resulting in a substantial loss in communication share from 25.8 percent in 2002–2003 down to just 9.3 percent in 2005–2006. This result clearly indicates that the ISWorld Mailing List has been very effectively used by its community to achieve community objectives related to information dissemination. Other objectives, those linked to knowledge-management support functions like knowledge sharing, reuse, and the construction of new knowledge, are also addressed by the list, but to a lesser degree.

Figures 5, 6, and 7 show the yearly trend for all twelve types of communication activities observed over the four-year time period. Among the eight specific types of one-way communication activities (Figures 5 and 6), conference announcement (Code #1), journal call for paper (Code #2a), journal table of contents (Code #2b), call for book chapters (Code #3), and people (Code #6) are steadily going up over time, while administrative announcement (Code #5) and miscellaneous (Code #7) show a mixed trend over time. The overall increasing trend of all of these communication activities is likely amplified by the growth of the population of ISWorld listserv subscribers over the four years. However, job position postings (Code #4) largely went down. The reverse trend of job postings was likely affected by the external environment of the IS job market and may reflect a weakening of the market for IS faculty openings from 2002 to 2006 rather than a fundamental switch to other, non-mailing list recruitment tools in the IS community.

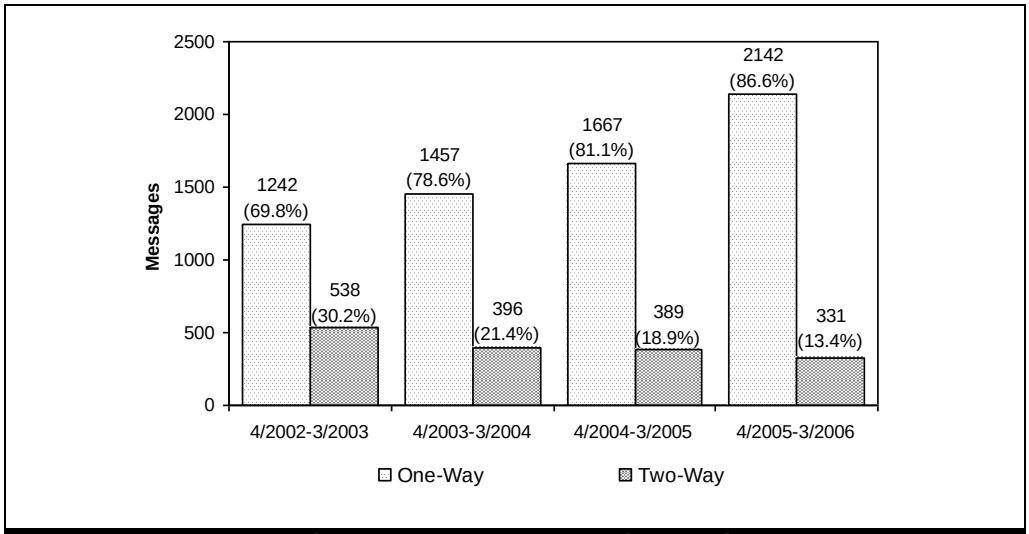

Figure 4 Messages Posted Over Time

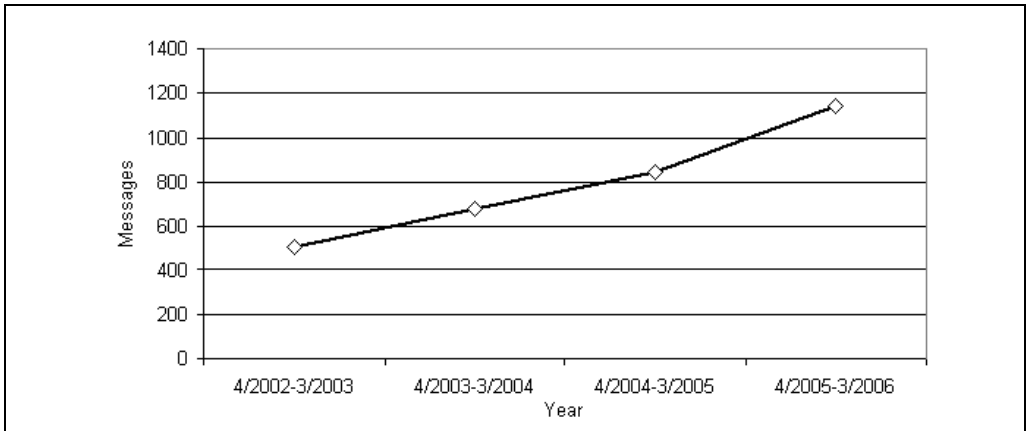

Figure 5 Conference Announcements Over Time

Communications of the Association for Information Systems

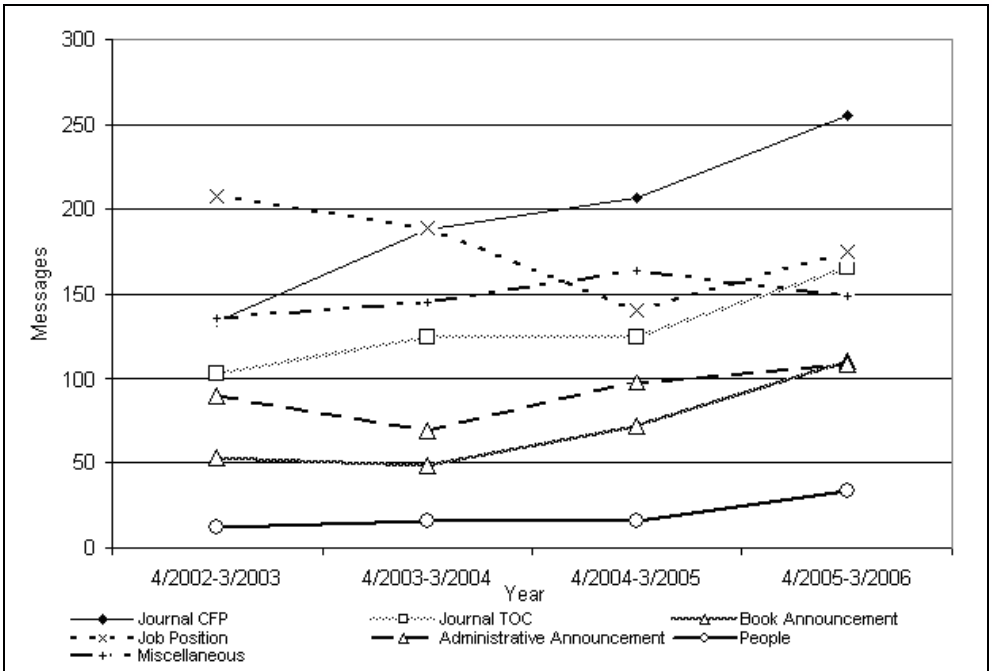

Figure 6 Other Announcements Over Time

Under closer scrutiny, two of the eight specific types of announcements, conference and job position announcements, also show some seasonal patterns in each academic year (cf. Appendix 2, Figures 9 and 10). Specifically, the trend lines of conference announcements and job opening announcements show strong seasonal effects, consistent with regular academic routines for each academic year.

The data analysis about communication activities over time offers us some interesting insights on several levels. For one, the trend analysis of the different communication activities we observed on the ISWorld Mailing List provides us with a detailed account of the online community life over the four-year period of 2002–2006. Also noteworthy is that two-way communication has not been keeping up with one-way communication activities as the community has grown and matured. The opposing trends—that is, the growth of one-way communication and the decline of two-way communication—–show that users tend to increasingly use the ISWorld Mailing List more as an information-dissemination tool, and primarily for institutional purposes, rather than as a personal knowledge-exchange and construction tool. The steady increase in announcements (as seen in Figures 4, 5, and 6) reflects the efficiency and effectiveness of the list as a communication tool for the community, but also indicates the growth and maturity of the AIS on the whole.

This finding raises the question of whether the community achieves its full potential value from ISWorld. One may suggest that the list's original design and its current policies support basic information dissemination very effectively, but that the design could possibly be revisited in order to better support the fostering and sharing of individual member knowledge and stimulating construction of new knowledge and ad-hoc collaborations as well. Alternatively, ISWorld could also be redesigned to become a dedicated, focused information broadcasting service delivering community news and updates, if there are other viable alternatives to foster interactive communication and discussion online. Later, in Section VI, we will return to this point and briefly discuss some possibilities of applying some new media technologies to design new communication features that specifically support interactive member communication as complements to the mailing list.

User Characteristics and Communication Patterns

To investigate further the communication patterns of different types of users, we looked at three more aspects. First, we counted the overall number of users and postings. This gave us an overview of participants' backgrounds and their levels of involvement in different sets of activities. Second, we counted the number of postings in each coding category for different users and calculated the concentration[5] of the different types of users and specific communication activities. This construct serves as a scale-free measurement across different users by which we can

[5] Here, concentration denotes the percentage of a particular type of message among all messages posted by a user. This measure indicates the specific needs and interests of individual users and can help explain why someone participates in list activities.

see the percentage of effort given to a specific communication activity. This analysis helped us to better understand why people use the list and how they behave across specific communication activities. Third, we aggregated the communication activities within the level of communication interactivity and compared the posting activity concentrations.

Users and Level of Activity

In accordance with the definitions established by Butler et al. [2002] and Te'eni and Schwarz [2004], we use the term *lead user* to represent top contributors to the ISWorld Mailing List, *silent users* to indicate users who may read but never post messages, and *active users* to represent those users who posted at least one message. In this study, *lead user* refers specifically to an individual who posted more than twenty messages during the observation period. *Active users* are those who posted between one and twenty messages, while *silent users*, as in most other studies, are list subscribers who did not post anything. To further differentiate our analysis in terms of participation levels, we distinguished among light, moderate, and heavy (active) usage. Accordingly, we split active users into three subgroups of equal size[6] in which *light active users* refers to people who posted from one to five messages, *moderate active users* from six to ten, and *heavy active users* from eleven to twenty. We determined the number of lead users and active users using the data within the forty-nine-month observation period and estimated the percentage of various types of users using the total number of ISWorld listserv subscribers (3084) as the potential size of the online community (Table 7)[7]. Table 7 shows that the relatively few heavy active users and lead users play a critical role in the active usage of the mailing list.

Table 7: Silent, Active, and Lead Users

	Silent Users (0 messages)	**Light Active Users** (1 through 5 messages)	**Moderate Active Users** (6 through 10 messages)	**Heavy Active Users** (11 through 20 messages)	**Lead Users** (>20 messages)
Users (3084)	1404 (45.55%)	1297 (42.08%)	207 (6.72%)	115 (3.73%)	59 (1.91%)
Messages (8390)	0 (0%)	2689 (32.1%)	1594 (19.0%)	1671 (19.9%)	2436 (29.0%)

In analyzing the concentration of users at different levels of activity (Tables 8 and 9), we found that the more active a user is, the less likely he or she is to concentrate on two-way communication. From light active users to lead users, the concentration on teaching and research related postings go down steadily, while the concentrations on conference announcements and journal TOC-related postings go up steadily. In other words, our findings indicate that while some community members take leadership on list activities linked with information dissemination, leaders have not (yet) emerged to spearhead list discussions or ad-hoc collaborations that require higher levels of interactivity.

Table 8: Messages and Concentrations by Topic and User Activeness

Users		**1**	**2a**	**2b**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Total**
Light Active Users	**Messages**	921	191	35	125	437	77	17	143	176	388	61	118	2689
	Concentration (%)	**34.25**	7.10	**1.30**	4.65	16.25	2.86	0.63	5.32	**6.55**	**14.43**	2.27	4.39	
Moderate Active Users	**Messages**	668	145	54	43	140	75	16	121	69	160	34	69	1594
	Concentration (%)	**41.91**	9.10	**3.39**	2.70	8.78	4.71	1.00	7.59	**4.33**	**10.04**	2.13	4.33	
Heavy Active Users	**Messages**	712	209	156	57	93	68	8	83	51	122	32	80	1671
	Concentration (%)	**42.61**	12.51	**9.34**	3.41	5.57	4.07	0.48	4.97	**3.05**	**7.30**	1.92	4.79	
Lead Users	**Messages**	972	262	282	66	55	152	41	261	69	124	31	121	2436
	Concentration (%)	**39.90**	10.76	**11.58**	2.71	2.26	6.24	1.68	10.71	**2.83**	**5.09**	1.27	4.97	

[6] Active users were ordered according to their contribution level and grouped into 3-quantiles. Contributors in the top 3-quantile were considered the list's heavy users, those in the middle 3-quantile were moderate, and those in the bottom 3-quantile were light.

[7] This number is an upper bound, as the true size of list members (lead, active, and silent users) was likely to be smaller because of dead accounts.

Table 9: Messages and User Concentration by Interactivity and User Activeness				
		One-Way	Two-Way	Total
Light Active Users	Messages	1946	743	2689
	Concentration	72.37%	**27.63%**	
Moderate Active Users	Messages	1262	332	1594
	Concentration	79.17%	20.83%	
Heavy Active Users	Messages	1386	285	1671
	Concentration	82.94%	17.06%	
Lead Users	Messages	2091	345	2436
	Concentration	85.84%	14.16%	

Gender Differences

Among the 1678 community members who posted messages, 1270 men posted 6792 messages and 376 women posted 1523 messages (Table 10). An additional fifty messages were posted using the names of organizations; no gender was attributed to these. For another twenty-two users responsible for a total of twenty-five messages, we were not able to determine the senders' gender.

Table 10: Gender and Messages Posted			
	Users	**Messages Posted**	**Average Messages**
Male	1270	6792	5.34
Female	376	1523	4.05
Unknown	32	75	2.34
Total	1678	8390	

Regarding involvement in various message categories, there are no significant gender differences in the twelve communication categories (Tables 11 and 12)—with the important exception of open discussions (code 11), which interestingly represents the only complex two-way communication category. On average, 5.09 percent of total postings by men were contributed to open discussion, while only about half that percentage (2.59 percent) of total postings by women went to this category. This finding suggests that men tend to dominate open-discussion threads on ISWorld wherein participants state and defend opinions, argue positions, and propose solutions to open questions.

Table 11: Messages and User Concentration by Topic and Gender														
		1	**2a**	**2b**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Total**
Female	**Messages**	622	120	77	34	135	88	21	166	46	153	22	39	1523
	Concentration (%)	40.84	7.88	5.06	2.23	8.86	5.78	1.38	10.90	3.02	10.05	1.44	**2.56**	
Male	**Messages**	2612	680	446	257	585	282	61	437	316	635	135	346	6792
	Concentration (%)	38.46	10.01	6.57	3.78	8.61	4.15	0.90	6.43	4.65	9.35	1.99	**5.09**	

Table 12: Messages and User Concentration by Interactivity and Gender				
		One-Way	**Two-Way**	**Total**
Female	**Messages**	1263	260	1523
	Concentration	**82.93%**	17.07%	100.00%
Male	**Messages**	5360	1432	6792
	Concentration	78.92%	21.08%	100.00%

Academic Rank and Communication Patterns

The vast majority (91.5 percent) of the 1678 users who posted messages were academic users. They posted 7505 messages, which account for 89.5 percent of the total postings (Figure 7). We further categorized academic users into four groups based on their position and rank: (1) students, (2) post-docs and research associates, (3) junior faculty, and (4) senior faculty.

The majority (56.2 percent) of active academic users are senior faculty while post-doctoral students or research associates account for only about one percent of all active academic users (Table 13). This is partially because IS departments are usually housed in business schools (in Northern America and most of Europe, at least), which typically employ few post-docs or other non-faculty research associates. Among active academic users, senior faculty members proved more active than junior faculty or students. On average, every active senior faculty member posted 6.12 messages, while an active junior faculty member and active student posted only 3.58 and 2.69 messages, respectively. Although it is arguable that junior faculty would benefit the most from participation in list discussions as they develop their research skills and teaching portfolios, they are in fact less active list users than their more experienced senior colleagues.

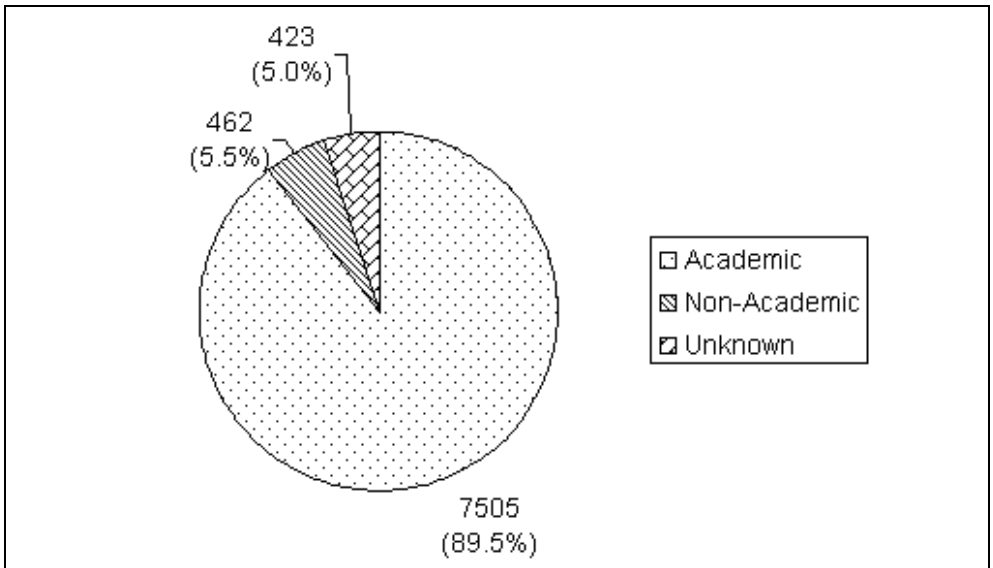

Figure 7 Messages by User Rank

Table 13: Academic Rank and Messages

	Active Users	Messages Posted	Average Posting
Student	**177**	477	2.69
Post-Doc/Research Associate	16	34	2.13
Junior	**480**	1718	3.58
Senior	862	5276	**6.12**
Total	1535	7505	

Table 14 shows that academic rank corresponds with different types of communication patterns. While users of different rank exhibit similar concentrations on conference announcements, they have different concentrations in the other categories. Different concentration patterns show how ISWorld meets individual users' needs differently. The main purpose of active participation in the ISWorld listserv for PhD students is to help them solve research-related problems. Junior faculty typically have some administrative and/or editorial obligations, but for the majority of them research and teaching are their priorities. Senior faculty members, on the other hand, tend to take on more professional and institutional service responsibilities beyond basic research and teaching. The communication pattern shows that academic users' concentrations shift from two-way communication to one-way communication as their rank increases (Table 15). Concentrations on two-way communications went down from 48.64 percent to 16.45 percent as rank climbed from graduate student to senior faculty. However, the concentration of one-way communication went up from 51.36 percent to 83.55 percent. In other words, it seems senior faculty members find ISWorld an effective communication tool to inform the community about their own specific professional activities as well as to promote events they are involved with, and they often use it on behalf of their institutions and service functions. By contrast, junior faculty and Ph.D. students, who tend to be primarily concerned with producing research papers and developing teaching skills and methods, use the list in a more personal and interactive fashion, to try to solve specific problems or access and share experiences with the community.

Table 14: Messages and Concentration by Topic and Rank														
Rank		**1**	**2a**	**2b**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Total**
Student	**Messages**	189	11		5	9	10		21	20	181	8	23	477
	Concentration (%)	39.62	2.31	0.00	1.05	1.89	2.10	0.00	4.40	4.19	37.95	1.68	4.82	
Post-Doc /Research Associate	**Messages**	15	3		2	3	0		2	1	8	0	0	34
	Concentration (%)	44.12	8.82	0.00	5.88	8.82	0.00	0.00	5.88	2.94	23.53	0.00	0.00	
Junior	**Messages**	747	164	29	63	145	70	8	95	123	160	39	75	1718
	Concentration (%)	43.48	9.55	1.69	3.67	8.44	4.07	0.47	5.53	7.16	9.31	2.27	4.37	
Senior	**Messages**	2058	570	409	189	541	228	60	353	192	341	104	231	5276
	Concentration (%)	39.01	10.80	7.75	3.58	10.25	4.32	1.14	6.69	3.64	6.46	1.97	4.38	

Table 15: Messages and Concentration by Interactivity and Rank				
Rank		**One-Way**	**Two-Way**	**Total**
Student	**Messages**	245	232	477
	Concentration	**51.36%**	**48.64%**	100.00%
Post-Doc/ Research Associate	**Messages**	25	9	34
	Concentration	73.53%	26.47%	100.00%
Junior Faculty	**Messages**	1321	397	1718
	Concentration	76.89%	23.11%	100.00%
Senior Faculty	**Messages**	4408	868	5276
	Concentration	**83.55%**	**16.45%**	100.00%

Limitations

The study has two major limitations. First, given the constraints of archival data, some user characteristics could not be identified accurately. Fortunately, the missing values represent only a small percentage of the entire data setting. Second, archival data provide a lot of information about the relationships between communication patterns and individual user differences, but they cannot show us user perceptions, which might convey additional information about user motivation and satisfaction with respect to participating in this online community.

VI. CONCLUSION

This study reported on an exploratory investigation about how the ISWorld Mailing List has been used historically. Archival data created over forty-nine months were coded and analyzed. The data analysis presented in Section V supplied both macro- and micro-level perspectives of the observable usage of the ISWorld Mailing List over a four-year period. At the macro level, the analysis demonstrates the list's major functions and trends over time. At the micro level, the analysis shows different users' communication patterns.

The four major organizational goals of the AIS online community are to support professional development, knowledge management, community development and administration, and universal access. The observed use of the mailing list is largely consistent with these four objectives, although the mailing list primarily serves the professional-development-related functions. Analysis concerning the evolution of the ISWorld Mailing List shows that the list on the whole has been growing and maturing over time, but growth across different levels of interactive communication activities is unbalanced. On the one hand, one-way communication (e.g., announcement broadcasts) showed steady growth, which reflects a healthy development and cultivation of the AIS community. On the other hand, some of the higher levels of interactive communication activities, especially research-related exchanges, declined or stagnated during the period under observation. We believe it is important to acknowledge the possibility that if the overall trend toward list usage with low levels of interactivity continues, it may in the long term reduce members' motivation to use the ISWorld list for serious discussions and eventually marginalize two-way communication.

Our data analysis of the user characteristics and communication patterns shows that users with different characteristics tend to use it for different purposes and in different ways. For example, senior male members of the academic community from North America dominate the mailing list; their specific characteristics appear related to their preference for certain forms of communication. Most community members do not actively participate frequently and post very few messages. Those users who do use the list's more interactive communication features are mostly junior-level members.

Although the archival data from the ISWorld Mailing List show us only the tip of the AIS iceberg, several interesting insights emerge from our study. Our findings indicate that the ISWorld Mailing List generally shows healthy growth over time. It has become an increasingly valued communication platform used by its community members for various purposes. As of April 2006, its reach had extended to include at least fifty-seven countries or regions. (It must be noted, however, that some of this observed growth may be due to the parallel growth of AIS in absolute terms, rather than the increased relative usage of ISWorld.) We found that while the list supports various activities of community cultivation and professional development, the results were mixed in terms of supporting knowledge management functions. While communication activities at low levels of interactivity (i.e., knowledge dissemination using one-way communication) flourish, there appears to be a decline in using higher-level forms of interactive communication to also support knowledge sharing and knowledge construction. However, it might not be necessarily effective for the list to address all three objectives. Rather, one possibility may be to redesign the list by capitalizing on its current strength, that is to focus even more on the role it plays in terms of knowledge dissemination, and to complement the list with new two-way communication features and tools that are more specifically designed to address the knowledge sharing and knowledge construction objectives.

The vast majority of users exhibits mostly passive behavior on the list. Most users go to the list primarily to obtain information, not so much to actively communicate with others. A healthy community should be able to stimulate activity at a broader level. Another problem concerns user stratification. While universal access is one of the stated major objectives for ISWorld, it attracts more users with certain attributes than others. Male users and users with senior academic status tend to be the major players. This suggests that the list does not meet the needs of its community members equally. It is also a concern that the majority of potential members do not actively use the list—or, worse, do not even sign up for it. For example, Ph.D. students arguably could be the most active users in terms of knowledge-seeking and exchange communications, but the use of the list is not geared toward offering these students a conducive platform. Finally, we would like to add also that Yu et al. [2009] interestingly found in another study that ISWorld has not yet been successful in stimulating extensive discussions from places beyond the English-speaking world, despite the AIS's strategic goal to evolve into a truly global community. These are some of the current limitations that we found in the list usage. They all present opportunities for the AIS to launch new tools, perhaps taking advantage of new media technologies, that would address these limitations.

We conclude this paper by proposing some possible ways to address the problems we have identified. Modifying list policies, governance structure, and the technological design of the user interface and the features and tools offered to the community are potentially fruitful ways to improve ISWorld's effectiveness.

One possibility is to provide customized filters and relax list policy in order to encourage more interactive communications. Using technology to help users navigate a more complex communication space will be critical for allowing people to partake more easily in conversations they find relevant and useful for their specific needs, while also protecting them from unnecessary information that may otherwise overwhelm and deter them from participating actively in list activities. ISWorld could allow users to manage their personal accounts by providing filter options that categorize e-mail messages by content, purpose, and communication types. The codes we use in this paper could provide a useful starting point in constructing such categorization. In this model, since users would receive only e-mail messages that interest them, information overload would be considerably reduced.

Another possibility is to split the ISWorld Mailing List into two or three sub-lists based either on types of communication process or user (including prospective user) attributes. If based on communication types, two basic sub-lists might be an "information dissemination" listserv (one-way communication tool) and an "interactive communication" listserv (two-way communication tool), addressing user needs in two different respects. Given the current policy constraints of the ISWorld Mailing List, two separate mailing lists could serve the community better than a unified list. If based on user attributes, an additional sub-list could be set up for Ph.D. students and their mentors (and perhaps similarly for junior faculty), who might benefit most effectively from better support in the areas of professional development and knowledge sharing. Finally, we would also propose better integration with related

lists from local chapters and SIGs, so that members can use ISWorld as their main community platform while also interacting with colleagues on specific professional interests in refined sub-media[8].

To overcome some of the current technological constraints, we would suggest adopting new and more effective communication media such as social networking tools, wikis, and blogs in the ISWorld community. These tools can be used to augment the ISWorld Mailing List specifically by facilitating interactive communications. Although (in 2008) ISWorld.org launched some research wikis on its website, they have not yet drawn significant attention from community members. While these nascent efforts to facilitate knowledge construction are a welcome development, much work remains to be done to encourage both bottom-up approaches (e.g., wikis on specific research topics initiated by members) and top-down approaches (e.g., developing marketing materials to promote the IS specialization). We strongly believe that AIS should take an active role in creating and maintaining wikis on topics in an organized manner, such as creating "official" AIS wikis, while still allowing the member-driven creation of wikis on any relevant and appropriate topic (these could be known as organic but "unofficial community wikis"). Introducing social networking capabilities would offer another powerful layer to the site. All of these social media tools could provide users with better opportunities to express themselves and exchange and create knowledge with fewer boundaries. With more effective communication media harnessed to meet and perhaps even exceed the more specific needs of ISWorld's members, the traditional ISWorld Mailing List could then be used purely for its current strength: as a highly efficient tool in the dissemination of critical yet general professional community information.

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Editor's Note: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the paper on the Web, can gain direct access to these linked references. Readers are warned, however, that:

1. These links existed as of the date of publication but are not guaranteed to be working thereafter.
2. The contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced.
3. The author(s) of the Web pages, not AIS, is (are) responsible for the accuracy of their content.
4. The author(s) of this article, not AIS, is (are) responsible for the accuracy of the URL and version information.

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[8] Independent from the research we have presented in the present paper, the AIS Technology Strategy Committee decided to move the ISWorld Mailing List to a new listserv provider on December 14, 2009. The ability to dynamically create new lists to better meet the needs of the community was cited as the main reason for the move. This decision is consistent with and supported by the findings that we have reported. The authors are pleased to see the AIS implement strategic changes to their online presence that is in line with some of the recommendations that we offered based on our own analysis and we look forward to participating in a more dynamic and productive IS community.

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APPENDIX 1: MISSION STATEMENT AND LIST POLICY[9]

THE ISWORLD MAILING LIST

This page contains information about the **ISWorld Mailing List**, a mailing list designed to serve the needs of the Information Systems academic community. The list is supported and funded by the Association for Information Systems, with resources provided by University College Dublin and the Information Systems Research Center at the University of Houston.

The ISWorld List was founded in November 1994 by John Mooney at University College Dublin. The initial subscription was drawn from an amalgamation of the ICIS-L list, then maintained by Rick Watson at the University of Georgia, and the CIS-L list, then maintained by Al Bento at the University of Baltimore. In December 1994, ISWorld had 1,384 subscribers across thirty-two countries.

Policy and Intended Usage

1. The ISWorld List is primarily for use by Information Systems faculty, doctoral students, and researchers.

2. The purpose of the ISWorld List is to be a broadcast medium for IS-related information of interest to, and relevant for, members of the IS academic community.

3. AIS does **not** publish messages on the ISWorld List; AIS and the ISWorld List service providers provide facilities that enable ISWorld subscribers who originate content to publish that content on the ISWorld List.

4. Only ISWorld subscribers may distribute messages over ISWorld.

5. The ISWorld List should **not** be used as a forum for discussion unless that discussion is directly IS-related **and** is of significant importance to a large majority of ISWorld subscribers.

6. The ISWorld List should **not** be used to advertise events, items, or services that are marketed to generate profit without advance written permission of the AIS President.

7. The ISWorld List should **not** be used for personal communication (e.g., change of contact details) or self-promotion.8. The ISWorld List should **not** be used to distribute file attachments. Instead, a message containing a URL to the file may be distributed.

9. The ISWorld List should **not** be used for student exercises.

10. The ISWorld List should **not** be used for repeated distribution of the same information.

11. Organizers of non-AIS conferences that are of interest to the IS community are permitted to distribute **one** call for papers (CFP) for their conference plus **one** submission deadline reminder AND **one** message relating to registration/program information plus **one** reminder. This policy specifically denies CFP postings by individual tracks within a conference. Multi-track conferences should coordinate a single ISWorld posting containing URLs to further detailed information.

12. In order to minimize the level of superfluous postings while maintaining the dynamics of an unmoderated list, replies to messages posted on the list are by default sent only to the Sender of the original posting.

13. AIS reserves the right to edit or amend ISWorld List policy.

If you have any doubt regarding the appropriateness of your posting, feel free to contact the *Vice President of Communications of the Association for Information Systems.*

The ISWorld List is part of the ISWorld Net initiative designed to provide a single entry point to intellectual resources related to information systems technology and to promote the development of an international information infrastructure for creating, disseminating, and applying knowledge.

ISWorld List Rules

ISWorld subscribers must agree to the following Conditions of Use to confirm the distribution of a message to the ISWorld List.

Senders must confirm that they accept the List Usage Policy and Conditions:

[9] The text of this Appendix 1 has been edited for grammatical and formatting consistency with the rest of the present paper. The meaning of its content has not been changed as a result.

1. The Sender acknowledges that he or she is the publisher of the message to be distributed on the ISWorld List. AIS and the ISWorld List service providers take no responsibility for the content of any message unless it is directly disseminated by AIS.

2. The Sender acknowledges that (i) the ISWorld List is **not** moderated, (ii) all messages will be automatically distributed in unedited form to all ISWorld subscribers, (iii) the content of the messages is limited to information systems matters, and (iv) the message has a subject line that clearly reflects the content of the message.

3. The Sender warrants that the content of the message is not (i) confidential, (ii) in violation of any copyright law, (iii) defamatory, or (iv) in violation of any other law.

4. The Sender warrants that the message is not inflammatory, offensive, or political in content, tone, or implication to any member of the diverse, global, and multi-cultural ISWorld community.

5. The Sender warrants that the content distributed is in the public domain or that the Sender owns copyright in the material or has a license to publish the material.

6. The Sender warrants that information contained within the posting has not been previously distributed over ISWorld. Individuals who are uncertain whether their posting has been successfully distributed should check the online archive to verify this, rather than distributing the message a second time.

7. Individuals using ISWorld to solicit information from the ISWorld community agree to provide the community with a summary of the responses obtained, either by distributing the summary through ISWorld or by distributing a URL for the summary.

8. The Sender indemnifies AIS and the ISWorld List service providers against any liabilities that may incur as a result of any message sent by the Sender.

9. At the discretion of the President of AIS or the ISWorld List manager, AIS reserves the right to unsubscribe temporarily or permanently any ISWorld subscriber who fails to abide by these conditions and also to remove any postings from archives of the ISWorld List with or without cause.

APPENDIX 2: ADDITIONAL FIGURES

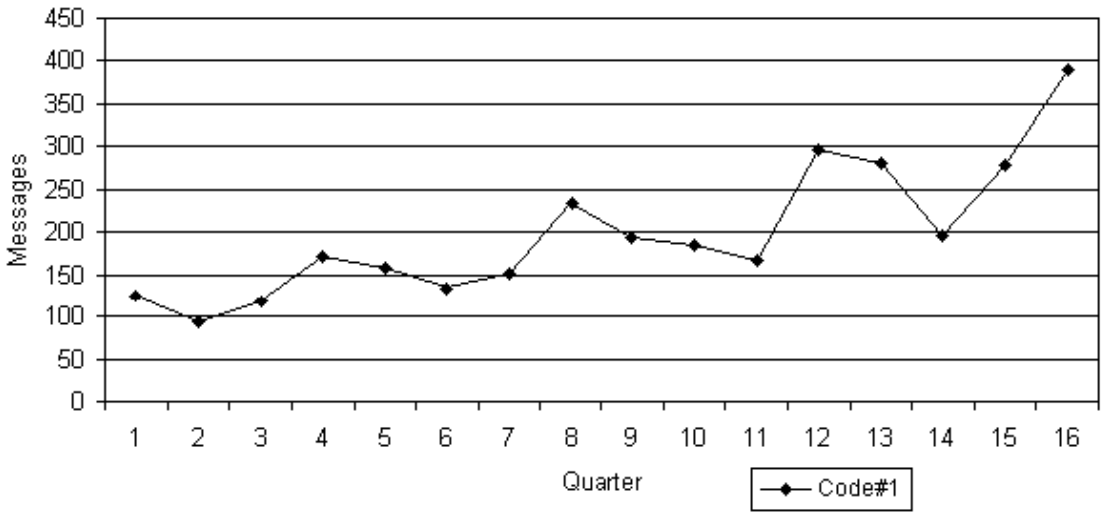

Figure 9: Conference Announcement Quaterly

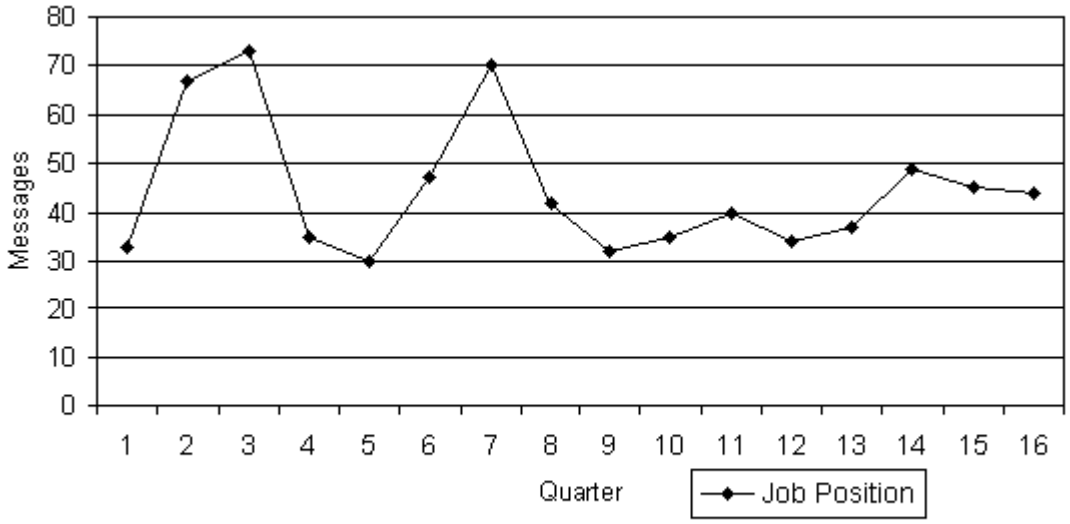

Figure 10: Job Position Announcement Quarterly

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Communications of the Association for Information Systems

ISSN: 1529-3181

Communications of the Association for Information Systems