Preface

In what is commonly received to be a defining moment for the field of information behavior an article by Dervin and Nilan (1986) crystallized what has become known as a user-based approach to the study of information needs, seeking and use. During the 1980s and throughout much of the 1990s user studies were almost exclusively focused on the information needs, seeking, and uses of the individual user. During the mid-to-late 1990s society witnessed the large-scale diffusion and take-up of the World Wide Web, and the emergence of a digital infrastructure that acts as a platform for widespread data and information sharing, electronic communications and transactions. These developments led in turn to an interest in what can be called collaborative information behavior. Collaborative information behavior can be defined as the study of collaboration with, through, and in relation to information; along with the systems and practices that support this. Collaboration can be explicit (e.g. in the purposive sharing and generating of information in support of work or learning activity); or implicit (e.g. exploiting the traces of the informational activity of others); or automated (e.g. recommender systems). Collaboration can also involve and lead to the co-production of information goods or services (e.g. Wikipedia). Collaborative information behavior can occur in face-to-face settings where language plays a preeminent role in the interaction, or in settings in which technology acts to mediate the interaction across space and time. Collaboration also involves, although not exclusively, an intensification of the relations between peers. A situation brought about latterly by the sharing of a common communications medium, i.e. the Internet, and the emergence of a technologically networked society. Studying collaboration with, through, and in relation to information is not the exclusive preserve of researchers in information studies. The sheer pervasiveness and relevance of information and communication networks to professional and everyday life make it a topic of interest to at least the following fields and beyond: computer-supported cooperative work, human-computer interaction, Internet research, and new media.

The structure of the book is as follows. Although it is not an absolute distinction, a difference of scale is made between the collaborative information behavior of large and small groups. In large groups the relations between the individual members tends to be weaker than in small groups. As a consequence knowledge in large groups will tend to be more widely dispersed than in small group; and as a result the mechanisms used to aggregate the knowledge of a large group, and coordinates its activities, may receive greater attention than in a small group. The first section on collaborative information behavior in large groups contains chapters on for example collaborative network organizations, communities, and collaborative data processing; while the second section on collaborative information behavior in small groups contains chapters on information sharing in work teams and learning groups for example. A final section contains chapters focusing on one of the primary tools used to aggregate the knowledge of a group and coordinate its activities: language and communication. This section contains one chapter on computer-mediated communication; and three chapters that take language and communication as a starting-point for their investigations in collaborative information behavior.

In a chapter that pays homage to James Surowiecki's influential book *The Wisdom of Crowds*, Richter Bray and Dutton define the concept of a collaborative network organization (CNO). A CNO is a socio-technical form of organization defined by its members' engagement in one or more of these activities: information sharing, content generation, or collaboration in the co-creation of a product or service. Using a case study approach a framework is developed in which three types of CNOs are identified and characterized. CNO 1.0: sharing, in which a network (e.g. the WWW) enables the transmission and linking of objects in a distributed context; CNO 2.0: contributing, in which group and social networking applications (e.g. social news websites) reshape the information and communications shared among its contributors; and CNO 3.0: co-creating, in which the network functions to facilitate cooperative work among its members in the service of a shared goal. The framework is illustrated by case studies of users who display medium to high engagement in a CNO. These are: *Sermo* (CNO 2.0) which is a platform that enables a community of medical practitioners to share their knowledge and expertise via conversations and social networking applications; and *A Swarm of Angels* (CNO 3.0), which is an open source feature film and participatory filmmaking community consisting of an online discussion forum, wiki platform, and web-based polling system. In discussing these cases Richter, Bray and Dutton also address their governance structures, decision-making processes, models for collecting and distributing resources, and legal frameworks. The chapter concludes by arguing that among other conditions a key ingredient in the effectiveness of CNOs is an ethos of cultivation rather than of management.

Mobile communications are, besides the Internet, one of the primary means by which people search for and communicate information. Wong presents a group of case studies that illustrate the collective process by which the mobile phone is appropriated and used by the poor in Bangladesh. Wong argues that because the information available to the poor is often neither comprehensive nor actionable, the processes of information seeking and use consequently become problematical. In response to this problematical situation, Wong describes how a form of collective information behavior arises where the use made of mobile communications is embedded in a collective process of peer learning, sharing, and experimenting. Three case examples of mobile communications sharing are presented that act as a starting-point for understanding and learning how the poor can be connected to a digitally networked world, and what the effective means are for doing this; and common aspects of the cases lead to the development of the learning, sharing, and experimenting model-a form of behavior that contributes to cost savings and risk reduction on the part of the poor and functions to domesticate mobile communications into their lives.

While a shared communications environment is one condition for effective collaborative information behavior, a further is the active and sustained engagement of users. Beamish presents the findings of a survey conducted to understand the contribution rates and obstacles to participation within an online community. Known obstacles to information sharing e.g. medium, content, individual social-cultural factors are reviewed first; before the data collection and data collection methods for the study are described. Data were collected via site activity reports, and a web-based survey organized into sections on demographics, participation, contribution, information seeking, and overall satisfaction with the online community. Findings relate to who contributes to the site and where they contribute; and any reasons members give for not contributing. These findings are also cross-tabulated with the demographic data. In respect of who contributes findings are comparable with typical participation patterns in other online communities, i.e. intense (by staff), active (by a core group of members), and peripheral (by the majority). In respect of where members contribute, an imbalance was found in the contributions posted to private vs. public areas of the site, with the former attracting more contributions than the latter. In respect to obstacles to participation and reasons for lurking, a combination of individual factors (e.g. time, interest

only in reading/browsing) and social-cultural factors (e.g. a lack of active encouragement, the large size and public nature of the site) were the most prominent. The chapter concludes by highlighting some of the conditions that would enable more active participation in the online community and greater user engagement with its resources; including reminders, interaction, functionality, and content.

Large-scale data sets are one of the major resources that are currently being published on the Internet; for use both by the general public and by specialized communities. The types of resources that are being made available include data repositories, open online databases, open source projects and open access journals; as well collaborative data analysis sites and public datasets. Although the open availability of these resources is a necessary step towards widespread collaborative data processing, Noel and Lemire argue that it is not a sufficient one, if the resources are to be fully exploited; and the chapter therefore investigates some of the promise and current limits of large-scale collaborative data processing. Current tools available to handle and interact with structured data are reviewed first, e.g. databases, spreadsheets, and visualization tools; before the findings of a survey evaluating current collaborative data analysis tools are discussed. The survey's main conclusion is that current collaborative data analysis tools can be deemed collaborative to the extent that more prolific users tend to contribute only half of the content. This implies that such tools attract a broader base of participation than situations where the majority of the contributions are made by a minority of users. The chapter concludes with examining some of the conditions that need to be addressed if greater engagement with these types of resources is to occur e.g. motivation; credit; data sharing; flexible semantics; task specialization; usability; concurrent access and asynchronicity; along with further developments in data visualization tools.

The second section is on collaborative information behavior in small groups. These are groups where relations between the individual members tends to be stronger than in large groups; and where two or more members of the group engage in one or more of the following tasks: creating, identifying, seeking, retrieving, organizing, distributing or using information in support of the group's activity.

Reddy, Jansen and Spence review the research they have conducted into collaboration and coordination during information seeking and retrieval. Conceptual and technical perspectives on collaborative information behavior are reviewed first before the methods used in and findings from their research are presented. The methods used to collect have been primarily those associated with ethnographic fieldwork, with data analyses informed by a grounded theory approach. Findings relate to the collaborative information behavior of patient care teams in the Surgical Intensive Care Unit of a large urban teaching hospital, and of personnel in the Emergency Department of a small rural non-teaching hospital. They discuss how collaborative information behavior occurs when there are breakdowns in information flow that trigger a need for information (e.g. unavailability of anticipated information, incorrect or incomplete information, or information delivered to the wrong person). The reasons for why people collaborate in responding to this need include: the complexity of the need, a lack of immediately accessible information, a lack of domain expertise, and fragmented information resources. The roles of communication and of technological support in collaborative information behavior are also highlighted. A collaborative information behavior model is presented, and an evaluation of a prototype collaborative information retrieval system discussed. The chapter concludes with outlining the lessons learnt from their research.

Information sharing is deemed a positive feature of an organization's information culture. Reference to information sharing is often rhetorical however. Ikeya, Awamura and Sakai's chapter provides a detailed empirical example of how a work practice can be first investigated and then transformed by re-designing the methods used to share information. Collaborative in relation to information can often lie hidden, embedded and unobserved in broader activities and tasks. Adopting a naturalistic approach

informed by ethnomethodology, the authors describe, model, and transform the task-based information sharing activities of a group of IT product hardware designers. Data for the study were collected from transcripts of the group's weekly meetings. The authors first describe the management-designed and initiated model of information sharing that they encountered, which they called a document-based individual task management model. This model was found to be ineffective in a number of ways including insufficient embedding of information sharing in the work practices of the team's members; its occurrence within the context of a reporting relationship between worker and group leader; and an individualized method of task status updating that was problematic for coordinating information sharing at the weekly meetings. The authors describe how users were engaged in the re-design of their work practice and the implementation of a collaborative task management model. This included the utilization of communication sharing tools such as whiteboards and self-adhesive paper sheets for public display; a shift from reporting information to actively seeking and eliciting information from other participants; and a change in meeting style from an individual task management model to a sharing-and-coordinating-the-plan-of-the-day style. Through seeing information sharing from the team members' point of view and by engaging users in the re-design of their work practice the authors demonstrate how more effective information sharing can result.

Teams can operate of course in both face-to-face and online environments. Goggins and Erdelez address the information practices of completely online groups (COGs). In doing so they differentiate COGs from other types of groups, e.g. face-to-face groups FOSS groups and Wikipedia groups, hypothesizing that the opportunities for exchanging social information will be more constrained; that differences will exist in what coordination information is used; and that their often dispersed membership will mean that it is likely that different social networks and different sets of information sources will be accessed. The authors describe a study of collaborative information behavior during an online graduate student course on Computer Supported Collaborative Learning that utilized the Sakai collaboration and learning environment. Participants were forty-two students in eight groups and the methodology was informed by Information Horizons theory. Data for the study was collected via a combination of serial and critical incident interviews; and students were asked to describe their main sources of information and their experiences of finding information within and outside the course management system. On the basis of these interviews a taxonomy of information resources was drawn up that underpinned a further survey that participants to rank the significance of the information sources. Four collaborative information behavior themes were identified from their analysis: (i) groups as information resources in COGs (ii) tools to control collaboration (iii) rapid tool changes diffuse collaborative information behavior (iv) tools to constrain and focus collaboration. Goggins and Erdelez discuss their findings in relation to the collaborative information behavior of each and all groups; with the most commonly used resources ranked. The chapter concludes with identifying areas for future research into collaborative information behavior in COGs.

The investigation of collaboration and information in an educational context continues with Scown, who reports on a classroom innovation in which learners and tutor collaborate on the production of a video podcast. In doing so students also collaborate implicitly with other students in the generation and re-use of a digital educational library of learning objects. The topics of blended learning and podcast production are reviewed first, before some features of the broader university educational context relevant to the initiative (e.g. technologies, assessment, student competencies) are discussed. An innovative assignment that enables students to engage in the production of a video podcast is then introduced. Students were required to produce an original, focused, podcast of five to ten minutes in duration. Assumed

benefits of the innovation included increased engagement with the subject; higher achievement; and a digital library of re-usable learning objects that is accessible by future cohorts of students. In evaluating the intervention, the reported benefits include a higher mean grade for those undertaking the podcast assignment compared to other assignments on the module; along with student feedback that indicated greater interest and engagement with the material, and increased an awareness of the communication possibilities when using podcasts. The chapter concludes with considering future research directions, and how the formation of a digital library can act as the basis for a learning community.

The chapter by Shah provides a review of concepts, design guidelines and tools relevant to developing systems that can support collaborative information seeking. Drawing on literature in computer-supported cooperative work, he proceeds to develop design guidelines for collaborative information seeking systems that are based on the notions of space-time, control, communication, and awareness. The costs and challenges of collaborative information seeking and their implications for systems designers are also discussed. Shah argues that a shift from individual to collaborative information seeking entails addressing not only some of the issues that previous research has identified in the design of groupware systems but also issues relating to collaborative costs, cognitive load, adaptation and learning. Criteria for evaluating collaborative information seeking are presented; and current systems implementations are reviewed e.g. *Ariadne*, *SearchTogether*, and *Coagmento*. The chapter concludes with identifying future challenges and research directions in the design of systems to support collaborative information seeking.

The final section contains chapters that explicitly address the role of language and communication in collaborative information behavior. In each chapter language and communication plays a preeminent role in the interaction; and is the main means through which collaboration and information sharing takes place. Hendrickson's chapter presents a case study of the use of computer-mediated communication in web-based journalism. Perspectives from organization theory, newsroom sociology, and new media are combined to provide a multi-theoretical approach to the values and interpersonal dynamics of a 'virtual newsroom'. Data for the study were gathered via observations, interviews, memos, and instant messages sent between editorial staff. Hendrickson reports how a move towards a virtual newsroom entails a shift in the way information is gathered for news stories, and how the informal use of instant messaging can promote greater creativity and community among journalists. She also recognizes that while some organizational routines are carried over from place-based to virtual newsrooms (e.g. accountability for stories, and deadlines), there appears to be greater scope for the promotion of personal values in the latter than in the former. A greater sense of flexibility and ethical norms also appears to be in play; factors that appear to derive more from the prior collective experience of the editors involved than any formal organizational structures. In sum, her chapter illustrates how a cross-disciplinary approach can be utilized to analyze the culture and communication relevant to coordinating the work of a virtual newsroom.

The chapter by Chalfen and Rich is one of two contributions relating to information sharing in the medical domain. As the authors explain the ideal collaboration between patient and doctor is one that leads to a common understanding of illness and shared responsibility for treatment plans and outcomes; a form of collaboration that is underpinned among other conditions by mutual requests for sharing information. The current state of medical economics and informatics is tipping the balance however towards a different mode of information gathering; one that improves the collection of medical data but sacrifices the gathering of important psychological and socio-cultural information that can also play a role in a patient's treatment plan and outcomes. The authors review previous collaborative and participative approaches to the use of media and its implementation in the medical domain. They then describe the protocols and methods of a collaborative approach to medical diagnosis and treatment called Video

Intervention/Prevention Assessment (VIA). In VIA the patient uses a video camera to record a personal narrative that acts as a window onto the patient's subjective experience of their illness, treatment, and wellbeing. While in non-participative methods the patient acts as a passive supplicant; in VIA the patient acts as a co-producer of a symbolic world of information shared by both patient and doctor. Evaluations of the VIA methodology from patient, carer, and doctor perspectives are also provided. The chapter concludes with demonstrating how VIA can inform the development of a more collaborative, and less paternalistic, relationship between doctor and patient-a relationship that benefits both parties as they work together to co-create a strategy for wellness.

Mckenzie's chapter provides a further contribution to understanding practices of information sharing within the medical domain. The chapter introduces the notion of interactional traces defined as "direct and indirect reference to people, organizations or interests outside the confines of the here-and-now clinical interaction". Mckenzie explains how these interactional traces serve a dual purpose; acting as resources for participants and as evidence for researchers to analyze the institutionally mandated 'whats' and interactional 'hows' of collaborative informing within a clinical setting. She then proceeds to demonstrate the value of an interpretive approach called 'analytic bracketing' that allows the researcher to draw simultaneously on a range of analytic strategies. The approach is illustrated by the use of analytic bracketing applied to practical examples taken from a data set of audio-recordings of the interactions of 40 midwife-client pairs. A multi-perspectival analysis of the interactional traces that occur in clinical talk results; one that oscillates between and plays off the different analytic strategies. The chapter concludes with future research directions in analyzing the whats and hows of institutionally mandated informing.

The systematic development of a coding schema consisting of a set of categories and codes that can be assigned to empirical examples of talk is a pivotal activity in the analysis of any study of language and communication. In doing so the researcher is able to generalize from empirical patterns and develop theoretical propositions. Foster discusses the development of a coding guide used for analyzing talk that occurs during educational information seeking. The chapter is organized around the steps of a structuring content analysis conducted in order to analysis the functions and forms of talk that occurred as learners discussed information sought and retrieved as part of cooperative learning activity called group investigation. These steps include the determination of materials, the application and characterization main and individual content-related categories; the construction of definitions, root examples and coding rules; empirical coding; if appropriate revision and amendment of the category system in the light of the empirical data; paraphrasing and summarization. The categories and characteristics of a language-based theory of learning, along with the types of collaborative talk that occurred, are described. The chapter contains empirical examples of each theoretically informed category relevant to a sequential analysis of the talk that occurs during educational information seeking. The coding guide therefore functions to enable the precise and reliable assignment of codes and categories for any future analyses. The chapter concludes with considering the implications of the guide for research in educational information seeking.

In summary, the reader will find that the chapters in the book explore a number of themes relevant to collaboration with, through, and in relation to information; and the systems and practices that support this. Key conditions for collaborative information behavior to occur include the sharing of a common information and communications environment and increasing levels of user engagement in information processes and production. Understanding how these conditions contribute to the collaborative information behavior that occurs in particular contexts is what the individual chapters now address.

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