INFORMATION PRACTICES OF DISASTER RESPONSE PROFESSIONALS: THE PREPAREDNESS PHASE

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Abstract

Objectives: This study describes the information practices of the various professions such as emergency management, public health, health and medicine, and public safety, involved in regional disaster preparedness groups. A thorough understanding of the similarities and differences between the professions in information seeking, use, and sharing, will further the development of high-quality information sources and information-sharing channels acceptable to all professions on the team. *Methods:* A qualitative descriptive study was undertaken. Twelve participants in the Pennsylvania Preparedness Leadership Institute (PPLI), a multi-disciplinary training program attended by members of the Pennsylvania Regional Task Forces, were recruited and interviewed. Open-ended individual interviews were conducted at PPLI trainings and in participant workplaces. Interviews focused on information practice in the workplace, including preferences for information seeking and sharing, and barriers and facilitators to information access in the workplace. Analysis used Taylor's Information Use Environments model as an organizing framework. *Findings:* As Taylor's model states, information practice is shaped by the educational and training requirements for entry into each profession. Factors not included by Taylor but important to this study include volunteer experience in related fields, and overlap between personal and professional information practice on the Internet. Participants report heavy use of the Internet and email, but not of Web 2.0 social media. They value face-to-face meetings for building the social networks critical to disaster response. Only public health and

medical professionals use peer-reviewed literature. All would like tools to filter incoming information, and more access to the "lessons learned" reports of other agencies engaged in similar work. *Conclusions:* There are differences between professions in information practice, but also commonalities that can be exploited to further information use in preparedness. Librarians can make a significant contribution to preparedness efforts by incorporating these findings into the design of information services and resources for disaster professionals.

Public health significance: Improving information gathering and sharing practices for all disciplines on the disaster planning team is critical to reducing the impact of manmade and natural disasters on the health of the general public.

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PREFACE

This research project would not have been possible without the advice and encouragement of Dr. Jeanette Trauth, Dr. Maggie Potter, Dr. Ellen Detlefsen, Dr. Russell Schuh, and Mr. Gerald Barron. Their willingness to advise me as a novice researcher creating a fellowship research proposal was key to obtaining the fellowship from the National Library of Medicine that made this project possible. Their continued support saw me through to the completion of the research. Special thanks to Dr. Trauth for her keen editorial eye and ability to set priorities and keep me on task.

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1.0   INTRODUCTION

This is a study of the information practices of professionals and agencies involved in contemporary disaster planning and response. It focuses on disaster planning, or the preparedness phase of the disaster cycle. There are many extant studies focused on the response phase, and how information flow is distorted or destroyed because of human behavior and technical failure. These well-documented problems are influenced by what goes on prior to the disaster, in the preparedness phase of the disaster cycle. It is during preparedness planning that responsible agencies gain understanding of the hazards in the environment and have the opportunity to reduce the risk. It is also the time when they can most advantageously meet their fellow disaster planners and responders in other agencies and form effective working relationships, or social networks. A preexisting relationship builds trust. Meeting at the height of the disaster is not conducive to building rapport and cooperative behavior.

Why focus on information practices of disaster professionals? The quality of information attended to, collected, and shared during preparedness planning can make or break active disaster response results, directly affecting the health of people in the disaster zone. Information practice during preparedness planning has not been studied as closely as information practice during an active disaster. Yet information collection and evaluation is intense during preparedness planning. (Perry & Lindell, 2003) It deserves closer scrutiny. Effective planning involves collaboration among agencies such as emergency management, public safety, public health,

hospitals and pre-hospital emergency medical care organizations, relief organizations such as the Red Cross; at all geographic levels from local to national. Taylor's 1991 publication on information use environments (IUE) of professionals reported that differences in information behavior by profession are discernable. Currie's 2006 study of information behavior of interdisciplinary working groups showed that professional boundaries inhibit communication and agreement on the meaning of information. During preparedness planning, there are boundaries to be crossed between organizational entities, professional groups, and levels of government. Each boundary is a potential inhibitor of the flow of valuable information. Each group may value and interpret information differently. Understanding the practices of individuals from the various groups may increase recognition of the barriers to information sharing. Once recognized, and understood, these differences may be addressed more effectively. Possible uses for the findings of this thesis are creating effective information sources to support preparedness work, choosing channels to convey that information, user-centered information technology and communication design, and construction of curricula to meet inter-organizational training needs and foster information sharing.

The main research questions addressed by this thesis are:

1. How do individuals engaged in disaster preparedness conceptualize information needs?

2. How do they act on their information needs?

3. How does the larger context that they work in influence information practice?

4. What are their practices and preferences for sharing information between agencies?

In reviewing the current literature on disasters and information I was struck by the number of articles that begin with some variation on "after 9/11." The events of that day and the following months were a watershed in America's thinking about disasters. Before, natural disasters such as floods, or unintentional man-made disasters such as toxic releases predominated in the public's conception of disasters. In 2001 terrorism and bioterrorism came to the fore in a way that they had not since the end of the Cold War, and brought public health into the disaster response consciousness. (Fee & Brown, 2001) Along with Hurricane Katrina it led to a complete restructuring of disaster planning and response in the United States. Federal agencies were combined and restructured. The new agencies changed the regulatory environment, and new requirements for collaborative planning were passed down to the state and local levels. Many of these changes were driven by a need for better information, shared with the right people at the right time.

To study the similarities and differences in the information practices of various professions engaged in disaster preparedness after 9/11, scholars in the Pennsylvania Preparedness Leadership Institute (PPLI) were chosen as an available group with representatives of most disaster disciplines in their ranks. Scholars are drawn from local organizations and government agencies with a disaster response obligation who participate in Pennsylvania Regional Task Forces. All Pennsylvania counties are assigned to one of nine task forces with a mandate from the state legislature for disaster planning, training, and response. Interesting to note, the Task Forces were called "Regional Counter-Terrorism Task Forces" under the 2002 enabling legislation, evidence that terrorist events spurred the move from voluntary mutual aid agreements between counties to required planning and response entities. (Tomlinson, 2002)

Since then the name has been shortened to Regional Task Forces, perhaps reflecting an emphasis on the all-hazards preparedness goals of the groups.

The beginnings of PPLI have been reported in the journal literature. (Potter, Burns, Barron, Grofebert, & Bednarz, 2005) In early 2002 the Centers for Disease Control and Prevention (CDC) provided initial funding to the Pennsylvania Department of Health (PA-DOH) and the University of Pittsburgh Center for Public Health Preparedness (UPCPHP) for interdisciplinary leadership training. The year-long curriculum, focused on leadership development and emergency preparedness, was developed in consultation with the St. Louis University Preparedness Center. Over time PPLI evolved into three training options: Regional, Advanced, and Executive. Between 2003 and 2010 387 scholars were trained. They came from all nine task forces, from urban and rural areas, and represented all disciplines participating in the task forces, including emergency management, emergency medical personnel, hospital management, law enforcement and public safety, and public health.

As part of the program scholars were organized into regional teams, and tasked with choosing and implementing a team project addressing a regional preparedness need. Participants reported that many of their team projects, such a special needs assessments, asthma "Grab and Go" emergency kit development, regional equipment inventories, animal response team creation, and Strategic National Stockpile distribution planning, have had tangible impacts on the quality of their work and been adopted in their agency or Task Force. Participants recognized PPLI as an excellent networking and team building opportunity. As one scholar said: " [PPLI] Provided a forum to facilitate the growth of relationships with many of our external partners and stakeholders outside of our Regional Task force, especially with our state and federal government partners." (Barron, 2009) PPLI's multidisciplinary participation and spirit of

cooperative leadership made it an ideal vehicle for the recruitment of preparedness professionals for this thesis research.

1.1   INFORMATION STUDIES: AN INTERDISCIPLINARY AREA

This study is interdisciplinary in many ways. It is written by a public health librarian working in an academic health sciences library, collaborating regularly with public health academicians and practitioners. The study moved out of the academic environment and into emergency operations centers, the home territory of public safety and emergency management professionals. In casting about for models and theories appropriate to the study, articles from the disciplines of sociology, communications, information and library sciences, public administration, organizational management, and of course emergency management were reviewed. In the end, the study is about information use in collaborative environments, and all of these disciplines have something valid to say about the subject, but they say it in different ways and publish it in different places. This study draws on as many relevant disciplines as possible. In order to make this study as accessible as possible to the various disciplines, and to practice-oriented information professionals, plain language has been used instead of discipline-specific language whenever possible.

While the topic is of interest to many disciplines, my main interest is in supporting the current efforts of library and information science professionals to create and promote information sources and services for the disaster response community. As this is being written, the 2010 Haiti earthquake has just happened, and librarians on the Disaster Information Outreach email list (National Library of Medicine. Disaster Information Management Research Center, 2009)

are sharing resources with other librarians, disseminating information on efforts to support the

information needs of medical personnel and disaster relief workers in Haiti. The 2007 formation

of the Disaster Information Management Research Center (DIMRC) at the National Library of

Medicine (NLM), with the mission "to provide access to quality disaster health information to

the nation at all stages of preparation, response, mitigation and recovery" (National Library of

Medicine., 2010) is evidence of the national level support for librarians to become more deeply

involved in provision of information to support disaster professionals, and of the potential utility

of this study.

2.0   LITERATURE REVIEW

This review proceeds as follows. First, a description of disaster preparedness planning with an emphasis on information-related tasks, and the challenges of sharing information in a multidisciplinary setting is provided. This is followed by a review of the history of NLM initiatives to spur libraries to develop resources for and provide services to public health and disaster response professionals in community settings. Prior to discussion of the existing information studies related to disaster planning, some key principles from the Information Needs, Seeking and Use (INSU) research needed to set the stage for reviewing the studies are presented. The knowledge gaps this study addresses are described. Finally, the choice of Taylor's IUE model as a framework for data analysis is justified, and its components summarized.

2.1   DISASTER PLANNING, AN INFORMATION INTENSIVE ACTIVITY

Modern disaster planning started in the 1950s when sociologists began studying how people and organizations plan for and react to disasters. (Quantarelli, 1985) Academic centers of disaster research formed, most notably the Disaster Research Center (DRC) which started in 1965 and is currently housed at the University of Delaware. Through the E.L. Quantarelli Resource Collection, the DRC provides online access to over 550 research reports and houses a substantial print collection, providing a valuable window into the development of disaster management and

its ongoing practice. (http://www.udel.edu/DRC/) Quantarelli, for whom the Resource Collection is named, codified the principles of disaster planning in the 1980s that are still recommended today. (Perry & Lindell, 2003; Tierney, 1993) These principles illustrate that disaster planning is an inter-organizational effort with intensive information gathering and evaluation requirements. Among the most information intensive preparedness activities associated with these principles are:

- Continually assess the quality of the disaster plan based on its influence on the outcome of training exercises and real disaster responses.

- Identify the disasters most likely to occur in the geographic region. Once identified, prioritize most likely disasters for more intensive preparation.

- Use "valid knowledge" of the hazards in the environment, human behavior, and what human resources and equipment are needed to respond to the hazards in the environment as a basis for planning.

- Educate everyone with a role in the plan.

Broadly speaking, categories of information needed to support the planning process include factual information; instrumental, or how-to information; problem understanding; big picture knowledge, and projections of probable future events. Useful information sources to support this work include an eclectic mix of existing published and unpublished information, such as research reports on human behavior in disasters; information on the physical environment that may be contained in maps, records of past emergencies, building and community planning documents; government laws and regulations; after action reports of emergencies in the community and other communities; emergency planning documents of the individual agencies involved; current developments in equipment; inventories of people with

appropriate skills and training; missions and services of agencies in the community and key personnel; information on principles of adult education and training.

This information is in widely scattered locations, and requires effort and persistence to locate. Disaster preparedness professionals report feeling they are in information overload. They perceive that most of the information they need is not in libraries, but in the grey literature; in after action reports, planning documents, lessons learned, and other practically oriented materials. (Turoff & Hiltz, 2008) To navigate this welter of information, they would like some guidance, and some have suggested that information systems with expert filtering of the material and user-contributed tagging and rating could aid in the process. (Turoff & Hiltz, 2008)

A key concept in disaster planning is that it is more about getting the disparate entities involved working together and in continual contact than it is about creating a written plan. (Perry & Lindell, 2003; Trainor, Aguirre, & Barnshaw, 2008) Drabek (2003) noted that there is a direct relationship between the size and variety of people in an emergency manager's professional network, the frequency of contact with network members, and the success of emergency responses. The planning process naturally provides networking opportunities and is an ideal forum for building participants' knowledge of other professionals in disaster preparedness and the capabilities and culture of the agencies they work for. For example, emergency managers and public safety professionals may have an incomplete understanding of the role of public health agencies in the community because they may not have routine contact with public health professionals in everyday work. (Landesman, 2005) Public health professionals have their own knowledge gaps about emergency management. Most were not familiar with the Incident Command System (ICS) prior to 9/11, while emergency management agencies have been operating under ICS for many years. At a more hidden level, agencies may

be unaware that they are operating under different baseline assumptions ingrained in their particular disciplines that inhibit inter-professional communication.

2.2   BARRIERS TO COLLABORATIVE WORK

Regionalization of preparedness planning builds inter-organizational networks and has the "capacity to enable diverse organizations and groups to collaborate around a shared vision and purpose to bring about positive impact." (Kapucu, 2005) Before that shared vision can be realized, two types of barriers must be overcome; inter-professional barriers and inter-organizational barriers. Both inhibit the flow of information and bring with them differences in how information is interpreted. Some sociologists have studied this phenomenon through the framework of institutional theory. Broadly speaking, institutional theory provides ways to think about how differences between groups are formed and impact interaction between groups. Not surprisingly, it concludes that the more groups are similar, the easier collaborative work will be. Three major constructs of institutional theory: regulatory, normative, and cultural-cognitive; help to explain organizational behavior, especially in the context of disaster preparedness.

Regulatory influences are experienced by organizations as "external pressure." (Currie & Suhomlinova, 2006; Scott, 2008) This pressure is exerted through power and hierarchical relationships, such as the ability of the federal government to require actions by state governments. While Kapucu (2005) contends that networks form when organizations realize they can't do the job at hand without the resources of another group, regulatory pressures from outside are powerful motivators of network formation. For example, Federal requirements for coordinated inter-agency planning for Strategic National Stockpile (SNS) distribution at the

regional level exerts a regulatory effect promoting formation of regional task force groups. (U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2005) An example of a regulatory barrier to regional inter-agency cooperation would be reporting to different state level agencies with different rules and regulations. Pennsylvania regional task forces include agencies reporting to the PA-DOH and the Pennsylvania Emergency Management Agency (PEMA).

Normative influences are expectations about usual roles, responsibilities, values, and rules. (Currie & Suhomlinova, 2006; Scott, 2008) These influences affect the organization, such as the normative responsibility of public health to monitor disease in the community, or they can influence professional behavior, such as assigning the monitoring function to epidemiologists. Professionals absorb the normative values of their profession through training, education, and on-the-job experiences. The efforts of professions to set standards for induction and advancement in the profession explicitly codify norms. Norms are partially external, a property of a group, and partially internal, as when a person feels pride on meeting normative expectations or shame at violating them. Normative influences have less coercive power than regulatory influences.

Cultural-cognitive influences are the internalized meanings an individual forms from being part of a group. As the person interacts with the group, they attach meanings to words and actions, as a sort of interpretive layer between the outside world and the inner world. These meanings then shape the responses of the person to the world. As explained by Scott in the 3rd edition of *Institutions and Organizations,* (2008) these cultural cognitive-factors strongly influence information practices:

"Extensive research by psychologists over the past three decades has shown that cognitive frames enter into the full range of information-processing activities, from determining what information will receive attention, how it will be encoded, how it will be retained, retrieved, and organized into memory, to how it will be interpreted, just affecting evaluations, judgments, predictions, and inferences." (Scott, 2008, p. 57)

Thus, if the cultural-cognitive influences cause a law enforcement officer to interpret the scene of a terrorist bombing primarily as a crime scene and an emergency medical technician to interpret it primarily as a place where people need emergency medical care, they will approach the scene differently and interpret and manage the information inherent in the scene differently.

Different schools of sociology have chosen to give these three factors different amounts of attention and weight in analyzing organizational behavior. (Scott, 2008) For purposes of this study, they provide multiple ways to think about the origins of differences between organizations that impact information practice in the multi-organizational work setting. Over time, as the regional organizations develop more shared understandings and norms they may come to resemble each other more closely, reducing the barriers to information flow.

2.3   PLACE OF LIBRARIES IN THE PREPAREDNESS MIX

Libraries have traditionally been repositories of information created to promote the discovery and use of that information. People outside of library science are sometimes surprised to learn of the variety of specialized libraries devoted to serving particular populations of people or institutions. Librarians are frequently surprised to learn that a particular group of people does

not have a library-like institution to serve them. When they find an underserved group, they may attempt an information outreach project to that group. Medical librarians, through NLM and the Medical Library Association (MLA) have a history of outreach to underserved professional groups and individuals, most notably for this study, to public health practitioners and to the disaster response community.

NLM-led outreach to the public health practice community is chronicled in published articles aimed at library and public health audiences. (Cahn et al., 2007; Cogdill, Ruffin, & Stavri, 2007; Humphreys, Ruffin, Cahn, & Rambo, 1999; Humphreys, 2007; Rambo et al., 2001) Early projects focused on: building information infrastructure when needs assessments showed that public health practitioners often lacked computing resources and reliable Internet access, and creating public health information resources and providing training in their use. In a 2001 forum of librarians who ran outreach projects from 1998 to 2001, an important lesson learned was that the resources that medical librarians are most comfortable using and providing training on, such as PubMed, are not usually the first choice of public health practitioners for meeting their information needs. (Rambo et al., 2001) This is an example of the normative influences of the librarianship not aligning with those of the target population. Recognition of the misalignment opens up the possibility of future projects of more relevance to public health practitioners.

NLM's outreach efforts were contemporaneous with the Oklahoma City bombing, the sarin gas attack in Tokyo, and 9/11. As the outreach efforts evolved, so did public health's responsibilities in the field of disaster preparedness. NLM recognized a need for more formal support of disaster preparedness efforts. (Cogdill et al., 2007) The 2006-2016 NLM Long Range Plan includes the formation of the DIMRC at NLM. (National Library of Medicine (U.S.). Board of Regents, 2006)

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Since NLM provides leadership and funding opportunities to medical libraries in the United States, it is natural that this regulatory influence will lead to a closer involvement of librarians with the multi-disciplinary work of disaster preparedness. For this work to be accepted as useful, librarians must understand the information practices of the various disciplines they seek to serve and be cognizant of the organizational and professional barriers to communication and adoption of their programs.

2.4   INFORMATION PRACTICE IN DISASTER PROFESSIONS

A broad literature search was done in 2007 to support the initial research proposal to NLM that funded this research. That search did not produce any reports on information practice across the range of disaster preparedness professions. Over the next two years, articles on information practice were continually gathered using autoalerts in Scopus and PubMed to track both topic searches and citation of key articles. Over that period no articles exactly matching the scope of this study were discovered. The closest matches for the population of interest were a bioterrorism training needs assessment in Nevada that included a large number of professional groups in the study (Clements-Nolle, Ballard-Reisch, Todd, & Jenkins, 2005) and Turoff and Hiltz's (2008) report for NLM on the information needs of the emergency preparedness community. The most relevant findings from the Nevada study were that in a disaster the preferred first choice of information would be the media, and that both disaster professionals and the general public wanted one state-sponsored website with reliable information to go to. The professionals wanted a secure site with information to support their response as well as an open public site in the same source.

Turoff and Hiltz's (2008) study was much closer to the current study in purpose, although their population was somewhat different. Ten of their 34 respondents were academics or librarians, the rest were emergency and health practitioners. They asked the participants, sampled by a snowball method, to respond by email with the answers to three questions about the emergency preparedness and management community:

• "What sources of information are most valuable to this community of practice?"

• "What kinds of information do they need that they are unable to find now?"

• "What kinds of information systems features do they want to support their needs?"

This elicited a very large number of specific resources used by respondents, as the email collection method allowed time for deep reflection on the topic. Of most importance, the respondents reported a general state of information overload, and desired some human-mediated technology tools to filter and classify the information to make access less time consuming. In general, they did not use libraries as much as the Internet, and prized practical, readable information, especially if it was endorsed by their peers. (Turoff & Hiltz, 2008)

Tangential studies were found on information failures leading to disasters such as industrial accidents, (Macintosh-Murray & Choo, 2002) the design of information technology systems based on studies of information flow in past disasters, (Sagun, Bouchlaghem, & Anumba, 2009) and studies discussing, some aspect of information needs of a particular profession in disaster preparedness. (Jalba et al., 2010; Lurie, Wasserman, & Nelson, 2006; Marincioni, 2007; Rebmann, Carrico, & English, 2008; Sauer, McCarthy, Knebel, & Brewster, 2009; Van Fleet-Green, Chen, & House, 2008) A common theme of most of the studies was the utility of joint training and drills or exercises for facilitating better working relationships between organizational entities. (Jalba et al., 2010; Lurie et al., 2006; Rebmann et al., 2008; Sauer et al.,

2009; Van Fleet-Green et al., 2008) Of these studies, the Marincioni study had the most to say that is pertinent to this study.

Marincioni was interested in factors influencing the adoption of information technology (IT) for sharing of disaster knowledge by emergency managers in the United States and Italy. Most (64%) of US emergency managers in his study said they read professional literature, with 1/3 saying they read academic and technical literature. Even more (93%) made daily use of the Internet for disaster mitigation and/or preparedness use. This indicates that among emergency managers the Internet has widely been adopted for filling information and communication needs. His list of the factors influencing information exchange is similar to those in institutional theory. It included "professional culture and context. He said professional culture was highly influenced by educational background, conception of the job of emergency management, and conception of what constitutes disaster knowledge. He primarily defines context as hazards in the environment of public concern that command emergency management resources, causing more information exchange and planning.

2.5   INFORMATION NEEDS, SEEKING, AND USE PARADIGMS

There is a substantial body of literature reporting studies and theories of information needs, seeking and use (INSU). INSU is but one of the terms that have been used to name the study of people's interactions with information. There is a desire for models that encompass all possible human/information relationships that has made studies of "information seeking," "information use," or "searching," seem too narrow in focus. For the present study, the term "information

practice" will be used as an umbrella term, for all the ways a person can passively or actively acquire information, and how they interact with it.

Information researchers have noted that many studies of information practices of user groups are descriptive but not explanatory, and count that as a weakness in the field. (Courtright, 2007; Wilson, 1994) While acknowledging the importance of explanatory works, I assert that descriptive studies have merit. They are needed to support the practical, applied work of addressing the information needs of information users in disaster preparedness fields. They are more accessible to practitioners than densely written theoretical articles. A thoughtfully-presented description of actual information practices can assist practitioners in choosing interventions most likely to improve information environments. As Case put it:

"..to read some of today's information seeking research it would seem that we have now reached the point where the scholarliness of the studies correlates with their degree of *uselessness* for institutional purposes. Certainly we could say that information behavior research has become more "scholarly," but perhaps also more pointless as well." (Case, 2007 p. 323)

This is not an inevitable state of affairs. Ideally, new studies could combine a solid theoretical base with the production of a report that library science practitioners can read, understand, and apply. This thesis strives for that goal.

The goal of this study is not to construct a new theory. Therefore, a descriptive report is offered. It uses Taylor's IUE model as a framework for thinking about the data. It falls under the category of INSU studies that assert there are differences in people's information practices

that can be attributed to their professional identity. A valid argument could be made that professional identity does not account for all information practice differences. Especially since the rise of the Internet, it is quite possible to bring everyday information practices into the workplace and use them. However, the process of training for a profession and practicing it is a powerful influence on the shaping of culture, and culture shapes information practice.

2.5.1 Taylor's Information Use Environments Model

Taylor's IUE model provides a "landmark model of context" (Courtright, 2007) for studying group information cultures. It is especially appropriate for this study as it was based on studies of information use in professional settings. Taylor (1991) defined an IUE as: "the set of those elements that (a) affect the flow and use of information messages into, within, and out of any definable entity; and (b) determine the criteria by which the value of information messages will be judged." Within a given IUE, people engage in information behaviors that are qualitatively different from the information behaviors in other IUEs. Taylor defined information behavior as "the sum of activities through which information becomes useful." This broad definition encompasses a wide variety of informal and formal methods of gathering, understanding, and sharing information. According to Taylor's original model, four factors in the IUE influence information behavior:

- Sets of People: "assumptions… made by a defined set of people concerning the nature of their work."

- Problems: "Kinds and structure of the problems deemed important and typical by this set of people."

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- Setting: "Constraints and opportunities of typical environments within which any group or subgroup of this set of people operates and works."

- Problem Resolutions: "Conscious, and perhaps unconscious, assumptions made as to what constitutes a solution, or, better said, a resolution of problems, and what makes information useful and valuable in their contexts." (Taylor, 1991)

Taylor said that people in a profession develop commonly-held information practices through the influence of their training experience. Standards for entry into the profession such as licensure, degrees, or certifications are also influential. Through these influences professionals learn norms such as the problems their profession attends to and ignores. They learn how to address problems using the commonly accepted approaches. Patterns of thinking, such as attending to or ignoring information about a problem, are developed as are ideas about where to search for information. Norms of how to share information with colleagues are also developed in training.

Norms of information sharing are related to how information is stored and distributed, and may vary from profession to profession. Information can be either codified, or recorded; or tacit, unrecorded. Cowan defined knowledge codification as "the process of conversion of knowledge into messages which can be then processed as information." (Cowan & Foray, 1997) Further, knowledge can be diffused, available to a wide audience, or undiffused, held closely. The four possible resultant combinations are summarized in Table 1. Sylves (2008) states that emergency management is largely learned through acculturation and acquisition of diffuse tacit knowledge through working in an emergency management agency (EMA) at any level of government. Further, he claims that at the national level the Federal Emergency Management Agency (FEMA) has no "history divisions" with a mission to codify and preserve the collective

knowledge and experience of the agency. Without a substantial body of codified professional

information, practitioners must rely more heavily on personal contacts and networking to find

needed information.

Table 1. Four States of Knowledge

	Codified knowledge	Tacit knowledge
Diffused	Written and available to audiences outside of the agency producing it	Oral tradition, not written, knowledge held by people gained through experience, shared through social networking beyond agency borders
Undiffused	Written but only available within the producing agency or a subsection of the agency	Oral tradition, not written, knowledge of people gained through experience, held and not shared

Taylor (1991) suggested four dimensions of problems, not as exhaustively describing

problems, but as being most pertinent to information behavior. Are the problems (1) well-

structured or ill-structured; (2) complex or simple? Are the (3) assumptions about the problem

agreed upon or not agreed upon? Do the problems have (4) familiar or new patterns? A well-

structured problem can be solved by applying logical thought to it, while an ill-structured

problem may prompt a search for further information to improve understanding of the problem's

components and how they interact. Complex problems have more variables that simple ones.

Addressing them would require amassing and organizing a larger body of information. People

may or may not be aware if their assumptions about a problem are the same. If they are

unaware, they may work at cross purposes in addressing the problem, gathering different types of

information and sharing it ineffectively. As they become aware of the misaligned assumptions,

they will have to spend a lot of time and energy in understanding the various assumptions and coming to consensus on how to proceed. This is especially pertinent to the functioning of groups such as the Pennsylvania Regional Task Forces. Problems can have familiar patterns with a preexisting response format available, or may present as new patterns requiring a novel response.

Taylor's concept of setting is the organization in which the professional practices. Aspects of setting that influence information practice in the model include the work domain, such as health care, public health, or emergency management; the organization's style, its reward system; the physical environment and the information resources within the environment; and connections to outside sources and organizations. Within each setting there will be more than one type of profession operating, such as in an emergency management agency that employs an emergency manager, a financial administrator, and training expert. They will bring the information practices of their professions to the setting. Taylor thought that the profession of the people would a stronger influence than the setting.

Problem resolutions are usually not based on exhaustive searches for information, but rather "satisficing." Satisficing is defined as cutting off the search for information when enough information is found to craft a satisfactory but not perfect solution. (Case, 2007, p. 336) This is a normal and usually useful way to end an information seeking episode, which could otherwise continue past the point of adequate information gathering and into delaying of decision making and taking action. In proposing his eight subcategories of problem resolutions Taylor was influenced by Dervin's Sense-Making methodology (Dervin, Foreman-Wernet, & Lauterbach, 2003) They are meant to describe what the person can do at the satisfactory conclusion of a problem. The information practices applied to resolving each may be different. The eight

problem resolution types are briefly defined in Table 1 with definitions simplified from Taylor's

(1991) text.

Table 2. Eight Types of Problem Resolutions Proposed by Taylor

Resolution Type	Definition
Enlightenment	An understanding of the big picture, the context of a problem, its origins, history, relevance to current decisions
Problem understanding	The answer to a more specific question than sought in enlightenment that can then be used to move forward with addressing a problem, often stated as a "why" question
Instrumental	These are usual "how" problems, addressed with instructions, skills, or procedural knowledge.
Factual	Problem is resolved by gathering data that accurately describes reality; often "what" questions
Confirmational	Verification of known information
Projective	"What if" questions with answers that may be in terms of probable outcomes to a course of action
Motivational	Information spurs actor on to keep going, or increase efforts
Personal or political	Understanding of relationships and situational conditions that impact what the actor feels and does within the setting

3.0   METHODS

3.1   INTERVIEW SCHEDULE DEVELOPMENT

An open-ended interview guide as described by Patton (Patton, 2002, p. 343) was constructed to achieve the goal of allowing the participant to tell their story in their own words and in whatever order evolved while still keeping the interviewer aware of the topics to be covered. This choice allows the interviewer to guide the conversation without dictating its details. Bate's (2004) suggestion to start the interview with questions on definitions was used. The first question asked participants how they define information. The answer to the question was not as important as its function as a device to activate the participants thoughts around information as a topic. This was followed by asking participants to describe their jobs. Questions related to the main research questions of the study were added to the schedule as a memory aid, to ensure that if a topic didn't naturally unfold as the participant described their work, it would be asked. Topics addressed in the interview schedule included preferred channels for receiving information, critical incident recall of information needs at experiences at work, barriers in the workplace to information access, personal and organizational methods of information organization, storage and retrieval, networking and information sharing with colleagues, and current awareness strategies.

The interview schedule was checked for library and information science jargon, and reviewed by non-librarian faculty and staff affiliated with the Center for Public Health Practice.

The interview schedule appears in Appendix B. This study protocol was approved as an exempt study by University of Pittsburgh IRB (approval number PRO07010051). See Appendix A for a copy of the recruitment materials.

3.2   PARTICIPANT RECRUITMENT AND SAMPLING GOALS

Purposive sampling was used to meet the goal of maximum variation. Maximum variation is desirable in order to get as many divergent viewpoints as possible represented in the sample. (Patton, 2002)   All major professional groups participating in PPLI were sought, as were representatives of all three PEMA regions in the state, rural and urban geographic areas. Most participants were recruited by email in advance of PPLI trainings held between February and November 2008. During that period 45 people attended PPLI training sessions. The email was sent by Gerald Barron, the PPLI director, in advance of a scheduled PPLI workshop, inviting attendees to participate in an interview. On the day of the workshop, I was given 10 minutes to explain the project and encourage participation. Most PPLI participants are men.   After nine interviews no women had volunteered to participate, so they were targeted for recruitment to increase variability and two volunteered. Nine (20%) of the PPLI scholars enrolled in 2008 participated in the study.   An additional three PPLI graduates working at an Emergency Operations Center (EOC) agreed to be interviewed while I was participating in a practicum at their EOC in summer 2008. In total 12 participants were recruited and interviewed. Table 3 summarizes the demographic characteristics of the participants.

Table 3. Demographic Characteristics of Participants

Demographic Characteristic	Number (*n*=12)
Gender	
Male	10
Female	2
Age (Years)	
Unknown	2
31-40	2
41-50	4
51-60	3
60 And Up	1
Highest Education Level	
Undergraduate	7
Masters	3
Doctorate	2

Of the three demographic variables noted in Table 3, only gender is available on non-participants. During 2008 27 (60%) of all PPLI scholars were male, while 10 (83.3%) of the study participants were male.

3.3   INTERVIEW ADMINISTRATION

Interviews of the current PPLI scholars were done on the same day as a PPLI training session, and in the same building. Locations included an emergency operations center, a hotel, and a public safety training center. In each location a quiet but public area such as a meeting room or little-used lobby was used for the interview. The PPLI graduates' interviews were conducted in their offices at their EOC. This also provided me the opportunity to observe the organization of information in their offices and the information technology present. Basic demographic data on

participants was collected using the PPLI registration form. (See Table 3) Interviews were between 30 and 45 minutes in length. They were audio recorded and transcribed by a professional transcription service, and checked for accuracy against the recording by me. All recordings and transcriptions are kept on a password protected computer for participant privacy protection.

3.4 ANALYSIS

After each set of interviews was completed, memos were written summarizing aspects of the interview that seemed important and information that is not captured on the audio tape. In the ideal world, a rigorous constant-comparison coding method of analysis, with each interview being initially reviewed and coded before the next took place would have been used. However, the intermittent PPLI training sessions afforded the opportunity to interview several participants at each session in a manner that was convenient to the participants. Typically two to three interviews would be conducted back to back with no time for reflection. A second analysis delay was caused by a considerable wait for the transcribed interviews.

Once transcriptions were received and checked for accuracy, open coding was done, coding instances of concepts from Taylor's IUE model. On a second pass more detailed codes were developed that fit under Taylor's concepts in a hierarchical model. This process continued for the first six transcriptions analyzed. At that point, the generation of new codes dropped off, and the coding scheme was not modified further. Coding was done initially on paper copies of transcripts, then transferred to Atlas.ti. software. (ATLAS.ti. Scientific Software Development GmbH, 2009) The next six interviews were coded at a broader thematic level. Summary cover

memos were written for all twelve participants. Tables were created to aid analysis based on the

model of Miles and Huberman (1994).   One set of tables summarized each participant's

responses related to the major concepts in the IUE model. Then concept tables were created to

bring together data on each concept across all participants.

4.0   FINDINGS

The study achieved its goal of interviewing people from a diverse set of professions and places of employment, as shown in Table 4. A substantial minority of participants mentioned past experience in the military and past or present fire fighting that may also influence their information practices. This information is also included in Table 4. All levels of government from county to national are represented. Table 5 summarizes data on gender, profession, and place of employment for all 2008 PPLI scholars and compares study participants to non-participants. There are several differences between the 2008 PPLI scholar group and those that participated in the study that may have biased the sample. First, the overall group is 40% women, while the study group is 16.7% women. Second, employees of emergency management agencies are overrepresented in the study while public health is underrepresented compared to the entire 2008 PPLI scholar group. These two findings are related, as shown in Table 6. In the PPLI scholar group for 2008 the ratio of men to women in the emergency management agencies is 7:1 while the ratio in public health agencies is 4:13. It is possible that a sample higher in women and public health professionals would have revealed different aspects of information practice.

Table 4. Participants' Professions, Work Setting, and Other Relevant Experiences

Work Setting	Profession (n=12)	Related Experience
County government		
Mental health mental retardation	Social work	F, E
Emergency management agency	Emergency management	F, E
	Emergency management	F
	Public administration	
Regional government		
Public health agency	Nursing	
	Nursing	
State government		
Emergency management agency	Information technology	M
Public health agency	Health administration	V
Federal government		
Emergency management agency	Emergency management	F
Hospital		
State run	Environmental health	F
Private	Information technology	M
	Medicine	M

NOTE: M= military experience; F= firefighting experience; E= emergency medicine services experience; V= disaster volunteer experience

Table 5. Gender, Profession, and Place of Employment, 2008 PPLI Participants

Characteristic	All 2008 PPLI Scholars (*n* = 45)		Study Non-Participants (*n* = 33)		Study Participants (*n* = 12)	
Gender						
Male	27	(60.0)	17	(51.5)	10	(83.3)
Female	18	(40.0)	16	(48.5)	2	(16.7)
Profession						
Emergency Management	6	(13.3)	3	(9.1)	3	(25.0)
Emergency Medical Services	5	(11.1)	5	(15.2)	-	-
Health Administration	4	(8.9)	3	(9.1)	1	(8.3)
Information Technology	2	(4.4)	-	-	2	(16.7)
Medicine	2	(4.4)	1	(3.0)	1	(8.3)
Nursing	12	(26.7)	10	(30.3)	2	(16.7)
Police/ Public Safety	4	(8.9)	3	(9.1)	1	(8.3)
Public Administration	1	(2.2)	-	-	1	(8.3)
Public Health	7	(15.6)	7	(21.2)	-	-
Social Work	1	(2.2)	-	-	1	(8.3)
Data Missing	1	(2.2)	1	(3.0)		
Government or Private Workplace						
County/City	8	(17.8)	4	(12.1)	4	(33.3)
Regional Office, State Agency	15	(33.3)	13	(39.4)	2	(16.7)
State Agency	6	(13.3)	3	(9.1)	3	(25)
Federal Agency	2	(4.4)	1	(3.0)	1	(8.3)
Private Employer	14	(31.1)	12	(36.4)	2	(16.7)
Work Setting						
Emergency Management Agency	8	(17.8)	3	(9.1)	5	(41.7)
Emergency Medical Services	1	(2.2)	1	(3.0)	-	-
Fire	1	(2.2)	1	(3.0)	-	-
Hospital	12	(26.7)	9	(27.3)	3	(25)
Mental Health Mental Retardation	2	(4.4)	1	(3.0)	1	(8.3)
Military	1	(2.2)	1	(3.0)	-	-
Police	2	(4.4)	2	(6.1)	-	-
Public Health	17	(37.8)	14	(42.4)	3	(25.0)
University	1	(2.2)	1	(3.0)	-	-

Table 6. Gender and Work Setting of 2008 PPLI Scholars

Work Setting	Gender				Total	
	Male (*n*=27)		Female (*n*=18)		(*n*=45)	
College or University	-	-	1	(2.2)	1	(2.2)
Emergency Management Agency	7	(15.6)	1	(2.2)	8	(17.8)
Emergency Management Services	1	(2.2)	-	-	1	(2.2)
Fire	1	(2.2)	-	-	1	(2.2)
Hospital	10	(22.2)	2	(4.4)	12	(26.6)
Mental Health Mental Retardation	1	(2.2)	1	(2.2)	2	(4.4)
Military	1	(2.2)	-	-	1	(2.2)
Police	2	(4.4)	-	-	2	(4.4)
Public Health	4	(8.9)	13	(28.9)	17	(37.8)

4.1   UTILITY OF TAYLOR'S IUE MODEL

Taylor's IUE model proved to be moderately successful as an organizational scheme for the interview data. Clearly there are some differences in information practices attributable to profession, but holding that as the only organizing scheme for the interview data requires forcing findings into less than useful divisions. The following two examples illustrate the problem.

The first example is the observation that emergency preparedness volunteer activities also influence information practice. A large number of the interviewees, 5 out of 12, have worked as professional or as volunteer firemen. For some it evolved into careers in emergency management or fire safety. For others it remains a very committed volunteer activity only tangentially related to their employment. This highly committed affiliation with volunteer firefighting, influences the organizations they look to for information, no matter what profession they practice.

The second problem is that defining professions is not clear cut. For example, two interviewees have information technology degrees. One works as an emergency management planner, and one has worked in business continuity and crisis management in several different disciplinary areas.   Should their information technology foundation be the defining characteristic, or perhaps the field in which they currently work? In another case, there are two interviewees who have held essentially the same public health job at the same governmental level, and both have a BSN degree. However, for one that is the only degree reported, while the other also has an MPH. They are clearly filling similar professional roles, but from a different educational base. Should they both be classified as nurses, or should one be classified as a nurse

and one as a public health professional, or should both be classified as public health professionals? None of the choices is completely satisfactory for organizing the presentation of the data, if Taylor's assertion that professional training is more influential on practice than the setting where it occurs.

Because of the complexity of the professional background of some interviewees, and the difficulty in classifying them, the findings are presented in two ways. Three professional groups are described using the IUE model. Information practices transcending professional boundaries are presented first, then profiles of three of the professional groups included in the study.

4.2   DEFINITIONS OF INFORMATION

At the beginning of the interview all participants were asked to define information as an orientation to the focus of the interview. These definitions should not be taken as comprehensive. However they illustrate several important differences in information conceptualization. There was no discernable pattern based on profession or work setting.

The term information may too ambiguous to be easily defined. Some participants indicated dissatisfaction with the quality of their definition. One participant in particular expressed the struggle:

I guess I never thought of defining it, but I guess it is -- information is facts. It is -- I want to say information is information. That doesn't work. It is a means to get answers to questions that you may have. It's a -- it facilitates the ability to communicate and work with other people and to get work accomplished by having the correct information for the

situation. I don't know if that's good enough, but it's kind of how I look at it. It's pieces from here and there, facts and -- I don't know. I guess I'll go with that at this time.

The most common definition of information given was a "tool for decision making." This was endorsed by five participants, using definitions such as "facts that I need to know to make a good decision," "material that I can use to help make decisions with," or "it's key to getting things done." This identifies information by utility, implying that data without utility is not information. Several individuals defined information as a higher form of data. One participant said "it's data brought together compiled, masticated, massaged and pumped out in a form that makes it useable for decision makers." Another gave a more extended explanation, relating how a librarian changed his view of what information is.

You know, and she basically smacked me upside the head and said you don't know anything about managing data. You know how to manage bits and bytes, but you don't know anything about managing information and making information from it. And it was like, you know, you're right, I don't. When we talk about meta-data and management information and all those terms that have been buzz words out there in the IT information business, you know, a lot of people don't catch the nuances of the difference between data and information, you know, and meta-information, meta-data. You know, that's where it's at and all that.

Two participants skirted the issue of exactly what information was, and focused on the idea that the same information can be conveyed in many different containers. One said "I think

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information can be anything whether it's -- whether it's books, periodicals, Internet, whatever."
The other gave a more detailed definition, more clearly differentiating between channel and
content:

> Information, it could be in a variety of forms. It could be in print or electronic version.
> You know, books, journals, newspapers, websites. So the way I would think of
> information just being from a global perspective. It can take many different shapes or
> forms or different type of varieties thinking that not everything is paper anymore. That
> so much is being converted to electronic.

When discussing channel preferences, one participant said he had no preference for an
information channel, the context at the time of need dictated the best form.

> Like if I'm working in the emergency department, I may want it electronic so I can get it
> right now. If I'm working in the dark, I may want it audible so I can hear it and can't see
> it. So more situational it depends on than anything else

Two participants focused on information as a process not an entity. They emphasized
information sharing between people. One said, "Information means sharing resources and
communicating well with other agencies I guess as it pertains to emergency management." The
other said is the "sharing of knowledge, materials." These definitions illustrate the blurring of
information as content, channel and process.

4.3 COMMON INFORMATION PRACTICES

All participants reported having Internet access at work. Participants with long careers have adapted to the changing technology in the workplace.

> I've been with the health department over 30 years and when I started as a public health nurse in Westmoreland County, we shared phones. We had two desks in the middle of the office that had desk phones and now everybody has a laptop.

The respondent goes on to say pagers, cell phones, and PDAs are all commonly used in their office today.

The Web and email have become the default channels for the delivery of text-based information. Searching the Internet is synonymous with searching Google to participants, but often they prefer to go directly to a trusted website. Types of sites mentioned included federal government agencies, such as the Department of Homeland Security (DHS) or CDC, and advocacy or non-profit organization such as the American Heart Association and the American Red Cross. While some prefer to read printed documents, they preferred the Web for its superior utility for locating information. A frequently-reported information need prompting a search was existing plans or documentation of the other agencies' experiences as a base model for new plans. The phrase "avoid reinventing the wheel" was frequently used.

All participants reported receiving and reading push email, such as newsletters and alerts, from professional organizations and government agencies. They found this channel useful yet overwhelming in volume. Types of resources they used included discussion lists, newsletters, and electronic news clipping services. Participants manage the volume in various ways. One

said, "I try and get as much information as I can from skimming things versus in depth reading and commenting and you find time." Another described having a routine for evaluating and managing email.

> I go through my routine and I can sort things real quick by how much time I have and how much interest I have and what else is on my plate, you know. And it's easy to see by names and by titles and by things who it's coming from and what it is. You know, I know what the content is. So I don't mind going through 300 emails in the morning. I really don't. And that's about how many I get, 200, 300 emails in the morning. Not a big deal. You know, because I can go through 10 of them click, click, click, you know, and get rid of them. Don't even have to bother opening them.

None of the participants mentioned using text messaging by cell phone for professional purposes, although the technology has been available since the mid 1990s.

People are an essential source of tacit information. Most participants are quite comfortable calling on colleagues at work and their extended outside network as sources of information. When reporting complete information seeking episodes, they often described using a mixture of tacit information from people and codified information from documents to fill the information need. They often prefer people over documents for their tacit knowledge.

> Because I think that people—in talking to people too, I think they hold the biggest source of information. I think the Internet, those types of things, hold the facts, but I think the history coupled with the facts kind of gives you the perspective of where you are and why

things maybe aren't where you think they should be. And so, when someone at least

through conversation can share with you, "Well, you know what? That was huge two

years ago but then so and so came and it's this huge—they don't want to do it."

Most participants reported valuing in-person conferences or meetings, trainings and exercises,

partially as sources of information, but even more as opportunities to build their professional

network.

Yeah, there recently was a joint DPW and Department of Corrections safety conference

and that's where I met face-to-face most of these people that I'm now leaning on heavily

and it was nice because I had a list of names and e-mails, but when you get to talk to

people, you realize who's willing to help, who has the knowledge. And they have some

various speakers on different topics and some different presentations made it to

conference, but honestly, I thought that the social networking was more important to me

than any of the actual informational presentations.

The information needs of participants that were new to their job or had recently switched

organizations focused on learning the organization and basics of how to do their job.

Participants well-established in their careers were more focused on current awareness, and the

politics of their organization. This was true across the disciplines.

4.4   USING LIBRARIES: AN UNCOMMON INFORMATION PRACTICE

There were some information practices that only a few participants were engaging in. An important finding for information providers, especially librarians, is only one person, a physician, mentioned going to a librarian for information assistance. This physician also mentioned regularly using the medical library in the hospital and its electronic resources. Only one other person, a nurse working for a regional PA-DOH, mentioned walking into a library to obtain information such as journal articles. This person had access to an academic library as a currently enrolled student. Both library users are in health fields, where peer-reviewed literature is abundant, valued, and fairly accessible. Two participants explained why they didn't use libraries. The first is in public health, the second is not in a health-related field. Both cite ease of Internet use over using a library.

> Well, it's been a while since I've used a library. I did sign up for the state library and then never used it…There is a state library. There -- I've used in the past the local hospital medical library, but I haven't used that in the past -- recent past. I just find I guess most of the time I'm finding the information specific to my needs good enough, you know, online. (end quote 1)

> We have different type of plans that we have to submit to the state and it just depends on the nature of it. But I'd say, you know, depending on the subject, the library could be helpful. But geographically knowing where we're at, we have a small community library. That's where the great old fashioned Internet comes in handy of trying to really locate things and even a lot of libraries have such a great access to different databases that even

a lot of times you -- even if you went to the library, you would be using a computer to access a database of something. So if I can do that from the comforts of my office, then that makes it that much easier. (end quote 2)

The two public health professionals were the only participants to specifically mention using MEDLINE to find information. One said, "If I'm looking for something clinically related, I can look on MEDLINE." The physician gave his thoughts on why he attended to peer-reviewed literature saying, "If I read peer review journals, it's a whole lot easier to sift out, you know, what's going to work and what's not going to work or if someone else said, you know, this is not going to work." He expanded on that statement to explain why he thought other preparedness professions did not rely on peer-reviewed literature:

I guess the way we were educated, you know, the research based education. You know, and all of us are going a little bit more towards evidenced based. You know, certainly things that I do, you know a lot of it is evidence based now as opposed to be purely research based, although they both have married hopefully in most cases. It's just -- it's different. You know, particularly the biggest example would be looking at law enforcement. You know, the things that they do, just -- there's just not a lot of evidence for a whole lot of what they do. You know, well this worked. Okay. You know, it's more based on the legal system and the laws as opposed to any research or any this worked and this didn't work. You know, there's not a lot attached to it. It's interesting to -- you know, the example of frustration would be trying to take medical things to the police and say this is what you need to be doing.

4.5   INFORMATION USE ENVIRONMENTS OF PARTICIPANT GROUPS

This section provides a profile of three of the professions in the study represented by more than one person. The descriptions are organized around four concepts derived from Taylor's IUE model; 1. sets of people, 2. settings, 3. problems, and 4. sources used and information practices. The three disciplines included are public health, emergency management, and information technology.

4.5.1   Public Health Professionals

4.5.1.1 Sets of people Three public health professionals participated in the study. Two are registered nurses with BSN degrees, one of which also has an MPH. The third has a MHA degree. The MHA holder works for the PA-DOH, and has experience outside of work volunteering in emergency and disaster relief. The nurses work in regional departments of the PA-DOH, providing epidemiological and management services to their regions. Key components of the regional work include supervising the investigation and response to disease outbreaks, supervising nursing in the state health center in each county of their region, and communicating with the public on health topics such as MRSA, rabies, and influenza. They are used to working in groups to share information and plan.

> And so, you know, we knew what we were getting into before we made the visit. Again, we had to do our research. We huddled -- put our heads -- okay. What do you think we're going to see. What are we going to recommend. You have -- we had four people on the team. So you have four sets of eyes.

They also are prepared to work independently if the situation requires it.

> You have the gamut. Because the community is your patient. So I think it takes a maturity. I think it takes somebody that can think on their feet. I mean because you don't have -- in the hospital setting, you pretty much have some security of a lot of people with you while you're making decisions or you can bounce something off and sometimes you may not have that luxury when you're in the field. You may be the only public health nurse in that team or out in the field doing something. So you have to kind of have that ability to think on your feet.

The state level participant's work includes substantial contact with the preparedness community throughout the state. Good presentation skills and the ability to interact professionally with a potentially unreceptive audience are essential. In-depth knowledge of applicable legal and regulatory documents, disaster response practice, and good problem analysis skills are essential.

4.5.1.2 Settings The PA-DOH has six district offices that are responsible for disease surveillance and response to outbreaks of communicable diseases. They supervise nurses in the state-sponsored local health centers in their region, which may have only one nurse staffing the office. They are networked horizontally with the other district offices, and vertically with the main PA-DOH office in Harrisburg. Each regional office has a modest number of employees, making support from the network of PA-DOH regional locations and the state offices essential to doing their work, especially in emergencies such as large disease outbreaks.

The duties of district employees have evolved over time from generalist to specialist. For example, a district may have a nurse who may be responsible for immunization, and another for

sexually transmitted disease, an environmental health specialist and an inspector of pools and bathing areas. Both district employees mentioned the value of having experts to call on in the Harrisburg office. The PA-DOH has a top-down structure, with Harrisburg setting policy and procedure standards and communicating them to the districts, issuing manuals such as an epidemiology manual, and requiring managers in district offices to learn and implement their administrative policies and procedures.

The offices are well-equipped with technology to receive and send information. While many sources of technology-mediated information are available in the office, the number of human information sources in the system has been reduced through the elimination of programs such as the state's Bureau of Nursing, and specialized positions such as tuberculosis specialist. While it is possible to get things from the Internet, journals, or agencies, one participant reported feeling the loss. Regardless of the richness of the available information sources, decisions must be made in a timely manner.

> …there are people who will sit there and say I don't have enough information, I have to look for more. But in public health when you're -- you know, have certain things that have to be done, you don't always have that luxury. I have to make a decision, I'm going to make it based on the information I have right now knowing a day from now, two days from now that might change. But you have to make a decision now. And you make it. And you make it according to whatever guidelines that you have the information that you have right now.

The state participant works for a department charged with coordinating all health preparedness activities at the state and local level, including health preparedness planning, training, volunteer registration, and informing the general public. Coordinating activities among groups across the state is challenging. Health preparedness activities are decentralized, involving many separate organizations; corporate and non-profit, governmental and non-governmental. Some have existing policies and procedures in conflict or competition with the state's organizational efforts. In some cases cooperation must be negotiated, since the state cannot dictate to all organizations. However, as the entity passing federal funding down to the preparedness organizations, the state has a powerful ability to influence practice.

In the offices at the state level, the normal flow of information is governed by bureaucratic principles, traveling up and down through management levels. The state participant reports that meetings that employees from multiple levels of management attend are important, allowing more direct access to people with information.

4.5.1.3 Problems Typical problems in the district public health offices include both well-structured and familiar problems and ill-structured novel problems of varying degrees of complexity. Many diseases, like seasonal influenza and rabies, are predictable in behavior and addressed using well established techniques. Occasionally unusual diseases appear, such as a case of hanta virus infection one participant investigated.

Another type of problem these participants address routinely is communication with the public about disease prevention and control. One participant reported routinely reading several newspapers and listening to talk radio, finding these valuable for planning public communication.

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In the state office, many of the tasks sound well-structured, such as interpreting regulations, disseminating information, contracting with outside vendors, and registering volunteers. However, they are rendered complex by the need to think strategically and understand the view point and sensitivities of various constituencies in the state. Competition for funding and dissatisfaction with the funding process are seen by the participant as a root cause of difficulties interacting with outside organizations.

I was surprised, I think, because when people were so antagonistic, and I would say, "My God, they hate the state." And I took it personally because I'm thinking, "You just met me, how can you be so angry at me?" And so what I've come to realize as more time has gone by and I've been—it's—I think the time from when I came and coming full-circle and I think a lot of it's related to the budget. So, when I came, the budget for the year was already established and I wasn't part of that process and I didn't have to spend time working on it. And so, now that I've—we're coming up on the full year—we just finished the grant and writing the grant and seeing who gets the money and how competitive it is and so I know that people participate in programs because the state's funding them and so they don't necessarily want to work with the state.

4.5.1.4 Sources used and information practices District level participants listed numerous information sources used on the job. Their first criteria in judging the quality of information was the reputation of the source. Highly valued sources included trusted government agencies such as the CDC, experts in public health, medicine, epidemiology, toxicology, and legal aspects of public health practice at the PA-DOH; journal articles, textbooks, and practice manuals; email discussion lists and information sources pushed out by reputable organizations. They utilized

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online trainings, which the state sometimes mandates, and attended state-sponsored meetings and in-person training sessions. Live events were deemed key to building a network of colleagues to call on for information. The district employees volunteered, unprompted by the interviewer, that they use the MEDLINE database to locate information. However they split on the utility of libraries. The person with the MPH uses them regularly while the other participant says that after obtaining a library card for the State Library she never used it, saying it was too far away, and the Internet and people provided most of what she needed.

Both district participants make sure that a core set of standard reference sources are available in each office in their district. They have both amassed large collections of paper documents, which they find difficult to manage for storage and efficient retrieval. One mentioned managing access to web-based information through bookmarking them in the web browser. When they need to locate new information they utilize a combination of codified sources such as journals and textbooks and tacit sources such as experts with valuable personal knowledge. One reported delegating information seeking tasks to others in the office, such as a statistician or a communicable disease nurse. Current awareness practices include monitoring of listservs and push sources from agencies such as the CDC, newspapers and talk radio. He felt that monitoring news and talk radio helped him understand the public's knowledge and attitudes towards health topics.

The state level participant reported using a few codified information sources, such as legal and regulatory documents. When looking up an unfamiliar topic, the Internet is used. Given the importance of political context to the work, it is not surprising that people are the preferred source of information, especially context and history. Vendors that supply goods and services were cited as an important source of information, both technical and for networking

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purposes. Federal email discussion lists about specific preparedness programs were also mentioned as good sources.

4.5.2 Emergency Management Professionals

4.5.2.1 Sets of people All three emergency management professionals have worked as firefighters, an occupation where entry and continuing advancement are based on training and certification. One participant who joined the firefighting unit in his town straight out of high school said "you have your family and you have your fire department family," showing a very strong social learning and bonding process shaping the identity of firefighters. All three participants attended college, an unusual finding, although the exact number of college educated emergency managers not known. In a 2006 national survey only 10% of all emergency possessed a bachelor's degree. (Clarke, 2006) More recent figures from the Bureau of Labor Statistics say a much higher number, 45%, have a bachelor's degree or higher. (National Center for O*Net Development, 2008) Many municipalities depend on the fire department to be the responding unit for emergencies. Thus, moving from firefighting to emergency management is a logical career path.

Two participants described their primary job activity as training, and the third was the director of a county emergency management agency (EMA). The emergency manager serves as a coordinator, working to ensure that the various agencies responding to an emergency are working effectively together and that communications are clear. This requires advance planning, knowledge of each agency's capabilities, procedures and priorities; and skills for negotiating differences between agencies should they arise. A primary skill of emergency managers is the ability to respond to varied and novel situations:

…in our office, we can move from dealing with a flood to a hazmat to a -- you know, planning for a dam failure to an ice storm. Between plans of all the various entities and the mission that we are tasked with, we have such a variety of stuff going on that it's important to understand the complexity of that.

4.5.2.2 Settings The emergency management work environment is shaped by regulatory guidance from FEMA, which is passed through PEMA, and from there to the regional and local level. Respondents reported varying levels of satisfaction with PEMA's provision of information. The county level participants felt that they understand and interact well with the emergency response entities in their county, such as fire, state police, and emergency medical services. The pace of work in emergency management is unpredictable. Emergencies can come up without warning, pushing routine activities aside, and as the county manager noted, county supervisors are not very understanding of missed deadlines.

Emergency management at the federal level has undergone reconfiguration since 9/11. The national level participant observed that FEMA's continuity of knowledge is hampered by turnover due to political appointment cycle, retirements, and the reorganization of the agency post 9/11. He also noted that as more government functions are contracted out, it becomes more difficult to maintain institutional memory. He is acutely aware of the political aspects of his job, observing the negative effects of siloing and turf wars on information sharing between units of the agency. While he personally makes it a point to share information as a means of assuring his reputation as knowledgeable, many in his office endorse the opposite strategy, holding information close as a means of preserving influence.

One participant described a form of communication and information gathering he called "push back" in which the federal agency pushes out a new plan or change to existing plans to the

states, and waits for the "push back" from the state agencies. This can generate useful and immediate feedback if the change is controversial. However there is a relationship cost to this method. It can generate some heated reactions and leave a lasting negative impression.

Sensitivity to security issues was noted by all participants as a barrier to information sharing between peer agencies. It reduces posting of EMA operating documents on the Internet. They get around this barrier by calling on people they know to obtain information, or using sources such as Lessons Learned Information Sharing (LLIS), a restricted-access website. While operational documents on the Internet are scarce, there is a glut of information delivered daily via email leading to information overload.

4.5.2.3 Problems The emergency manager reported that he must maintain awareness of the big picture, devise plans that meet the needs of all entities in the county, and appropriately allocate the resources available to meet those needs. For example if there was a fuel shortage, and multiple agencies had signed separate advance agreements with one fuel provider, the demand may exceed the capacity. The EMA role would be to coordinate the planning for emergency fuel distribution in advance of a crisis. This requires awareness of potential weaknesses in the system in advance of a crisis that makes them obvious, a complex analytic task.

Emergency managers encounter a variety of emergencies, and must have general problem solving skills applicable to whatever comes along:

A lot of what we do is learning on the job because nobody's ever done it before or it's been done somewhere else, but -- and you've read about it, but actually dealing with it has -- is not normal because we don't deal with the normal situations or the routine situations.

One general rule of emergency management is that emergencies are handled at the lowest level possible. A county EMA is called on when the lower level municipalities have an emergency beyond their ability to control, the county can call on the state, and the state may call on the national level. The pace of work is quite variable, moving from relaxed to response mode very quickly. EMAs also have the important task of raising elected officials' awareness of emergency preparedness needs. Participants reported that some elected officials are not inclined to learn about emergency response, leaving it largely to the fire department. The EMA coordinates and documents some county activities for municipal officials such as National Incident Management System (NIMS) training.

Counter terrorism initiatives funneled through the task force result in increased work for emergency managers, including training, planning, equipment purchase, inventory management, and recruitment and training of citizen volunteers. The emergency manager's priorities are the county first, the task force second. In response to this problem, the regional task force funded one position per county to manage the counterterrorism activities at the county level.

Time lags as initiatives move from the national to the local level are common and present problems. By the time federal requirements are interpreted by the state, and the process for releasing funds is set, very little time may be left to accomplish the work at hand. This has a reported negative effect on the relationship between the state and the county EMA.

Interagency communication gaps also occur between the EMAs and other relevant agencies such as health departments. For example, one participant reported the PA-DOH did not share information with the EMA about a disease outbreak associated with a petting zoo in his county. He said:

You know, it's one of those things. We want to be your partner when we're sharing

counter terrorism money, but when you have some kind of situation like that where you

have kids that are sick in the county, you would think that would be something that they'd

want to share at least with the emergency manager. If it went any further than that, you

know, it may not have to, but at least to give an awareness to the coordinator in the

county that there is a problem here that we need to deal with.

4.5.2.4 Sources used and information practices Emergency management professionals all

defined information as a tool for decision making. They reported using a mix of codified and

tacit information sources, including Internet sites, email listservs, field manuals and hazmat

references, newsletters, and people. People with expertise, tacit knowledge, are extremely

important sources of information in emergency management. As a "jack of all trades, master of

none," the county emergency manager said he relied on his list of experts for advice in

unfamiliar situations. Characteristics of information sources prized by one participant included

short, easy to read text, and graphic presentation of information. None of them reported using a

library or peer-reviewed journals to support their work.

Websites participants value include PEMA, FEMA, PA-DOH, and the Institute of

Terrorism Research and Response. Some sources such as weather radar via the Internet and

subscription electronic news clipping services were used to maintain awareness of current events

and conditions. Email is an important communication channel for all participants. All monitor a

number of relevant listservs and receive push email from organizations and agencies, reporting

spending between .5 and 1.5 hours a day reading email.

They reported mixed success in searching the Internet. One thought Google was great,

giving you "information, not data" and saying if you didn't find what you wanted in the first few

pages it was time to revise the search. The other two said they were often unsuccessful in finding the information they needed using Google, but did not produce detailed descriptions of their search strategies. One reported that the information load was too high, and that he skims it for content, sometimes taking reading home to finish.

While the gathering of information for agency work is very important, communication of information about emergencies to the general public is equally important. The county level trainer said "sharing I guess important information is key to what we do in emergency management." At the time of the interview they were developing an emergency preparedness a website for county residents. He said they often considered creating newsletters for audiences such as the general public or other agencies, but that there wasn't enough time to implement most of these ideas.

Two of the participants wanted an information tool that would sort and winnow incoming information automatically. One wanted a state-wide viable credentialing database for all disaster responders, and a uniform format for id badges that could be readily understood anywhere in the state. He said they were working on one for their region, but didn't know of an effort to do that at the state level.

4.5.3   Information Technology Professionals

4.5.3.1 Sets of people Two study participants hold information technology degrees. Both have previous experience in the military. Neither currently works exclusively in the provision of information technology services, but their orientation to information technology has a strong influence on their information practices, as evidenced by their attention to organization and preservation of digital information, and their level of sophistication in information search

techniques. One of these also holds a business degree and has worked in "information technology disaster recovery, business continuity, business resiliency and private sector crisis management," in several different industries. At the time of the interview he worked for a large healthcare provider. He was not trained in the core business of health care prior to taking this job, but reports avidly educating himself on the field. The second participant was an emergency management planner for PEMA, the state emergency planning agency, at the time of the interview. He described his main job as the development and revision of planning documents.

4.5.3.2 Settings The two participants worked in very different settings; private versus public sector, and health care versus emergency management. The participant in healthcare worked in a division that planned for business continuity in an emergency, and in an actual emergency would work to coordinate efforts, maintain service provision, and information flow, and distribute assets where most needed. He described the staff as multidisciplinary with "real, real open dialogue and information exchange." The health system participates in regional preparedness activities, and is part of the team manning ESF-8, the public health and medical services, at the region's emergency operations center when it is activated. The participant believes the larger preparedness community doesn't sufficiently appreciate the importance of healthcare to disaster preparedness. As evidence he reported non- health care participant drop off over the course of a day-long phone exercise built around a health emergency scenario.

The department of the second participant does emergency management planning at the state level. He updates older plans and the writes of new ones as needed. The agency and the participant work with county level emergency managers on a regular basis, but he does not have routine contact with professionals in other preparedness-related professions at any level of government. He reports that in his agency such contacts would be at a higher level, and that any

information he needs from other disciplines comes through his manager. Like emergency management agencies at all governmental levels in this study, their staff size is modest. This often surprises outsiders who envision a much larger agency carrying out emergency response rather than coordinating the efforts of others. The agency doesn't have uniform standards for filing of documents in either print or electronic form, a situation he views as a barrier to institutional memory. There is no one in the department with responsibility to oversee or insure the quality of information management.

He says internal information sharing is done by attaching documents to email, posting them to a shared server, or making and circulating photocopies. Coworkers vary widely in their computer skill levels. Some resist trying new things such as central document repositories to improve document accessibility. Information management policies are either not enforced or do not exist. The participant reports there is no clear policy on retention of email, no policy on what should be classified information, and no policy on document retention.

4.5.3.3 Problems Healthcare organizations have a primary duty to provide the best care they can under normal or emergency conditions, and to gather and preserve the medical information of their patients, and maintain patient confidentiality. With that in mind, the first participant's employer has invested in information technology and planning efforts to insure its continued operations under emergency conditions. As an accredited hospital system, they must routinely meet the requirements of the Joint Commission which include documentation of an Emergency Operations Plan and a Hazard Vulnerability Analysis.

The primary duties of emergency management agencies at the county level have been described in the section on emergency managers. At the state level the purposes are the same, but the scale is larger, encompassing the state. They provide regulatory guidance, training, and

pass through of federal funding to the county EMAs, interacting with them on a regular basis. One of their important functions is to take federal funding programs and create a plan for distribution of the funds and requirements placed on the counties who receive them.

4.5.3.4 Sources used and information practices Both information technology professionals in the sample were highly proficient in information seeking and management of data. The first participant claimed a recent awareness of the "increased value of peer review resources." He loves to learn, and reports taking over 100 online trainings since moving to health care. He also takes in-person trainings and academic classes. He prefers people to documents as sources, and described routine use of informational interviews with experts in his field working at similar health systems in other cities. He prepares a list of questions for these interviews and asks for suggestions on who else he should be interviewing.

He spends about an hour each morning "orienting" doing a quick flip through the hundreds of emails that come each day, prioritizing, reading and organizing them. One email resource he mentioned finding very useful is the DHS Open Source Report. He is very selective in what he sends on to others, not wanting to "spam" them. He stores a large amount of information on computer for future use, and periodically weeds his collection to keep under control. To initially learn about the business of health care he turned to the Internet. He reports using websites from the CDC, PA-DOH, Federal Bureau of Investigation (FBI), DHS, FEMA and LLIS regularly. Like others in this study, he finds the LLIS information useful, and would like to see a similar tool focused on health care.

The emergency planner reported searching existing planning documents, from either internal or external sources, as his most common search task. Often he isn't looking for a whole document, but for a nugget of information within it, that may not be apparent based on the title of

the document or its file name. He does computer searches within full text documents on the agency server to locate the needed information. However, he looks for outside planning documents on the Internet more often than in-house documents. There is plenty of time in his work day to do his information searching. He reported using Internet sites including LLIS, National Emergency Management Association (NEMA), Association of Public-Safety Communications Officials International (APCO), and FEMA for information besides planning documents.

Uniquely among study participants, he claimed regular use of RSS feeds as a current awareness tools. He reads them in Microsoft Outlook, enjoying the convenience of a central location for both email and RSS feeds. He also participates in what he referred to as "reflector groups", online email discussion groups by topic such as Yahoo groups. The use of the term reflector groups illustrates an expert's perspective on technology. A reflector group is an email system. Subscribers send messages to a single email address which then distributes that message automatically to all subscribers. Many people use them without knowing that is what they are.

Both IT professionals describe information searching skills above those of the average person. One said "I have to put my hands in my pocket when I see people doing all the three, four, five clicks to get somewhere. You know, sort of the old traditional 3.1 Windows way of getting someplace." One described using Google with a conscious and sophisticated understanding of how to get good results from the search engine:

So that's why I try not be too broad in the search, you know. I try and be as fairly specific initially and if like nothing comes up, you start backing off until you go -- until you get to the point and you say gee, that's got even stuff that's even nowhere near what

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I'm looking for. We need to tighten it up a little bit again and try to pull stuff out. And I

know even with searching with looking at stuff and finding it -- like on Google, usually if

you're looking for something and it's out there, you'll find that first page or two, you'll

find the most relevant stuff. I've already gone eight, ten pages down just trying to find

something I'm looking for and what I'm seeing isn't what I want.

5.0   DISCUSSION

The goal of this study is to describe the information practices of disaster response professionals, concentrating on practices during the preparedness phase. In summary, the information practices of disaster preparedness professionals vary by professional training and workplace setting as Taylor proposed, but certain aspects of information practice are quite similar in all settings. Across professions, they use social networks and personal contacts as information sources. All settings represented in this study have reliable Internet and email access and rely on it heavily. While they value social networking with other professionals, and use the Internet, most participants in this study do not bring the two together, for example by using Web-based social media tools to maintain contact, share information, or engage in planning activities. Neither did they report using text messaging to communicate with other professionals. These two findings may reflect the age of the participants and their technical training experiences.

Everyday life information practices and work information practices influence each other, now that the Internet is found in both settings. Because of the Internet, and email in particular, emergency responders are experiencing information overload. Many participants in the current study would like some good tools for automatically filtering information down to a manageable load. The following sections summarize the findings on each of the four original research questions.

5.1   CONCEPTUALIZATION OF INFORMATION NEEDS

Most participants defined information as a decision-making tool. The need to make a decision highlights gaps in knowledge and lends urgency to addressing the need, increasing recognition. However, not all information needs described in the interviews were driven by the need to make a decision.   Some arose from regulatory requirements, for example, the need to identify appropriate distribution points for a Strategic National Stockpile distribution plan.

There are information needs critical to participants that libraries are not geared towards addressing, most notably, the "big picture" understanding of the political landscape. Personal social networks will continue to fill that need. Multidisciplinary preparedness training programs such as PPLI, multi-agency drills and exercises, conferences, and meetings will continue to be the primary tools of social network building.

5.2   INFORMATION SEEKING

Because time and manpower are limited, information needs are "satisficed," meaning the search for information ends when an adequate but not exhaustive search for information has been done. The best information given the available time and resources is used for decision making. Disaster preparedness professionals want the most direct, fastest route to information. They seldom report using single sources in an information search, seeking through both codified and uncodified sources. A typical pattern could be starting with a quick search on the Internet for some basic information followed by asking colleagues what they know. Colleagues may refer them to other people, documents, Internet sites, or databases for more information. They will

continue to bounce between sources until enough information to satisfy the need at hand is assembled, or until time and circumstances force a move from information gathering to making decisions.

Trust in an information source is key shaper of information seeking practices as described by participants. All participants report use of Internet sites managed by respected state and federal government agencies and organizations. With the exception of some health professionals, disaster preparedness workers are not seeking information from libraries. Public health and medical personnel learn to trust and use the peer-reviewed literature as part of their education. Emergency managers and public safety personnel do not have the same experience in their early career development. There may be less peer-reviewed literature in the emergency management and public safety fields and it may be hard to access outside of academia. Low use of peer-reviewed literature concurs with Marincioni's report that 64% of emergency managers in the United States report use professional literature, but only 1/3 report using academic literature. (Marincioni, 2007)

Participants sign up for push email from trusted agencies to automate the information gathering process. They value the current awareness potential of push email. They do not enjoy managing the flood of information, a finding that concurs with Turoff and Murray (2008).

The preference for grey literature such as after-action reports and planning documents from other agencies over published academic literature that Turoff and Murrary (2008) noted is supported by the current study. Many agency experiences are never documented, leaving them uncodified and undiffused. Even if documented, they may not be posted in an accessible place for other agencies, so much valuable information remains accessible only in the agency, so it is

codified but still undiffused. The amount of undiffused information leads practitioners to rely on colleagues, social networks and expert contacts for information access.

5.3   EFFECTS OF CONTEXT ON INFORMATION PRACTICE

The work environments of participants have adequate or better information technology. However, available time for seeking information is limited. The additional requirement of participation in regional task forces reduces available time even further while increasing need for information to support planning. Agency response to the increased work load includes the hiring of additional staff and contracting out some of the planning processes to non-governmental agencies. The funding mechanisms reward collaborative production of planning documents. No participants indicated that they reward sharing of those documents with outside agencies.

Organizational structure was cited as a barrier to information sharing in bureaucratic government organizations. Siloing between departments and between agencies and turf wars were both reported as inhibiting information flow.

Most disaster professionals in this study do not work in organizations with libraries. Medical responders based in hospitals are an exception. Even if disaster preparedness professionals are aware of access to the state library or the local public library, the convenience of the Internet makes it unlikely they will choose to use such a library over the Internet. Libraries are not just physically distant from them, they are conceptually distant. Only the health professionals have learned to think of libraries as important information sources in the course of their professional training.

5.4   INFORMATION SHARING PRACTICES

Practitioners interviewed for the present study value meetings and in person trainings for building networks and sharing information. Once in-person connections are made, they feel more comfortable continuing using email to communicate. While social networks are extremely important to the participants, they are not using Web 2.0 social media tools to expand or engage with network membership. Unlike Turoff and Murray (2008) the current study did not produce substantial discussions of using Web 2.0, social tagging, or taxonomies for organizing information. One participant with an information technology background mentioned using RSS feeds, but that was all. Perhaps Turoff and Murray's sample, which included academics and librarians, was more attuned to current Internet technology trends. While these newer tools can facilitate communication and production of useful information repositories, practitioners will need to see compelling evidence of their utility and gain proficiency in using them before incorporating them into their information toolkit.

Some of the key boundaries that must be crossed in information sharing are between levels of government. Multiple participants at all levels of government in the state noted that the state budget process was a source of great frustration for county and municipal governments, leading to local government resistance to participation in state-led programs. Regional public health professionals, as state rather than local employees face resistance while participating in regional task forces with local agency personnel. Interestingly, the budget process and its fallout prompted several information seeking episodes related by participants, including state employees investigating the source of resistance to their programs, and county participants looking for information from the state on budget procedures.

Participants expressed interest in access to central repositories of documents from other agencies, but none discussed how they prefer to get content into such a resource, or even if they would submit their content for inclusion.

5.5   LIMITATIONS

This study is exploratory in nature.   It utilized a modest sized sample and only one form of data collection.   The sample, drawn from a group that self-selected to participate in leadership training, and volunteered to participate in this study, may be different in substantive ways from the general population of disaster preparedness leaders in the USA. Ideally a fuller case study should be done, adding observational data, closer examination of the information resources used in the disaster preparedness fields, and a more thorough evaluation of the utility of existing information sharing vehicles used by practitioners to the existing interview data. Because all of the data is based on recall rather than observation it is possible that important resources and nuances of information practice have not been captured.

It is possible that better data could have been collected if the original intent, use of the constant comparison method of data analysis, applied after each interview, had been followed. This would have allowed for more fine-tuning of the interview questions and more targeted recruitment of individuals with underrepresented viewpoints.   The superiority of constant comparative analysis was weighed against the opportunity to interview multiple participants at their convenience at PPLI training sessions and convenience won.

Finally, this thesis is based on a solo research venture. A team approach including researchers from more disciplinary areas could yield more insights.

6.0 CONCLUSIONS: IMPLICATIONS FOR LIBRARIANS

The findings on information practices and preferences can be leveraged by librarians to plan and implement effective information resources and services for disaster related professions. In particular they should be mindful of the communication preferences of disaster professionals and the physical and cognitive distance from libraries of each individual profession. When planning development of information resources remember they turn first to trusted organizations and government agencies. Partner with those organizations to provide new resources and develop new ones. This will increase adoption of the sources.

Disaster professionals define information very broadly, including resources not found in libraries and a heavy reliance on social networking. Utilizing the informationist model of service provision, which has librarians working on location with their clients, librarians can become part of the social network of disaster professionals by participating in local, regional, and state preparedness planning organizations. Attendance at their meetings will build librarians' awareness of the information needs in the preparedness community and provide opportunities to raise awareness of useful information sources in the community. It will also foster understanding of the political and structural barriers and facilitators to information access in that collaborative environment. Site visits to the individual work environments and emergency operations centers would also be informative for librarians and further networking. All of these

activities would increase disaster professionals' awareness of librarians as available partners for finding and filtering information to support preparedness work.

Across professions preparedness planning requires access to model planning documents and after action reports from other agencies. Systems such as DHS' LLIS are useful, but the reported use of informal networking to access these documents suggests it is not sufficient for their needs. At the national level libraries and library organizations can advocate for increasing the number of reports added to the systems by making the submission process easier for state and local entities. Ideally this would be an automatic process built into reporting requirements attached to preparedness funding. Librarians can also put their expertise to work consulting on the design of efficient retrieval systems. This may require becoming knowledgeable about the policies and procedures governing creation of federal Internet resources.

Community colleges frequently provide training and degree programs for firefighters, emergency managers, and public safety professionals. Libraries in those colleges can contribute to the education of these professions by collecting practice based and research based resources in their collections and integrating information practice instruction into the curriculum.

Information professionals should continue to research the information practices of disaster preparedness practitioners, from entry level to the highest management levels. Some questions raised by this study deserve further exploration. How can the practical experience of preparedness professionals and agencies be efficiently captured and shared in a secure manner with other agencies? Is the currently preparedness community open to using Web-based tools beyond email for networking and sharing information? Do disaster planning agencies have sufficient institutional memory? If not, what can be done to improve it? What information skills

are needed by the future disaster planning workforce, and how can librarians best support their training?

Knowledge of the practices of front line first responders and local agency practice is essential given the bottom up nature of disaster response. Librarians may have the opportunity to channel information about information practice realities effectively between levels in agencies and between levels of government, facilitating improvement to practice, but only if they actively engage with the disaster preparedness community.

APPENDIX A

RECRUITMENT MATERIALS

There are 2 types of materials included, email messages, and follow up phone call scripts. There are two versions of each script. One is for potential subjects who are currently enrolled in PPLI and one is for graduates of the PPLI program.

EMAIL SCRIPTS

Email to PPLI Graduates

Note: This email will be sent by Gerry Barron, Director, Pennsylvania Preparedness Leadership Institute, to past PPLI trainees. If not enough potential subjects respond to the email, Mr. Barron will contact non responders and ask if it is acceptable for the PI to call them regarding participation. Follow up phone calls will be made by the PI.

Text of message:

Dear   ,

You are invited to participate in a research study. The purpose of the study is to increase understanding of the information needs and preferences of preparedness leaders in Pennsylvania. As a Pennsylvania Preparedness Leadership Institute graduate, your knowledge and experiences in the study area qualify you to participate in this research.

The results of the study will be used to
1. increase knowledge of how preparedness leaders seek, use and share information;
2. assess the need for new information resources for preparedness leaders in Pennsylvania ;

3. inform the development of information resources and information sharing tools for preparedness leaders in Pennsylvania.

This study is being conducted by Barbara Folb, MLS, Public Health Librarian at the University of Pittsburgh Health Sciences Library System and National Library of Medicine Informationist fellow at the University of Pittsburgh Center for Public Health Practice.

If you choose to participate, you will be scheduled to meet with Barbara Folb in your workplace or a public place that is convenient for you. If the interview will be in your workplace, Barbara will need to know who to contact at your workplace to obtain permission to conduct the interview. You will participate in an open-ended interview of 45 minutes - 1 hour in length. You will have the opportunity to share what you know about information needs and practices in your work place. Data from the interview will be supplemented with data from the PPLI registration form you completed for your most recent PPLI training.

There is no direct compensation to you for your voluntary participation. Results of the study will be analyzed and reported with all personal identifiers that link you to the data removed.

If you are interested in participating, please contact Barbara Folb at [email and phone omitted].

Email to Current PPLI Trainees

Note: This email will be sent by Gerry Barron, Director, Pennsylvania Preparedness Leadership Institute, prior to the PPLI training sessions in spring and summer 2008. These include 2 Regional PPLI trainings (sometime between March and May – 10-20 participants at each), 1 Advanced training (May, 10-20 participants), and one Executive training (May/June, 15-20 participants). If not enough potential subjects respond to the email, Mr. Barron will contact non responders and ask if it is acceptable for the PI to call them regarding participation. Follow up phone calls will be made by the PI.

Text of message:

Dear   ,

You are invited to participate in a research study. The purpose of the study is to increase understanding of the information needs and preferences of preparedness leaders in Pennsylvania. As a Pennsylvania Preparedness Leadership Institute trainee, your knowledge and experiences in the study area qualify you to participate in this research.

The results of the study will be used to

1. increase knowledge of how preparedness leaders seek, use and share information;
2. assess the need for new information resources for preparedness leaders in Pennsylvania ;
3. inform the development of information resources and information sharing tools for preparedness leaders in Pennsylvania.

This study is being conducted by Barbara Folb, MLS, Public Health Librarian at the University of Pittsburgh Health Sciences Library System and National Library of Medicine Public Health Informationist fellow at the University of Pittsburgh Center for Public Health Practice.

If you choose to participate, you will be scheduled to meet with Barbara Folb during the time period of your upcoming PPLI training meeting at the PPLI meeting site. You will not miss any of the training in order to participate. You will participate in an open-ended interview of 45 minutes - 1 hour in length. You will have the opportunity to share what you know about information needs and practices in your work place. Data from the interview will be supplemented with data from the PPLI registration form you completed for your PPLI training.

There is no direct compensation to you for your voluntary participation. Whether or not you choose to participate with have no effect on your PPLI participation. Results of the study will be analyzed and reported with all personal identifiers that link you to the data removed.

If you are interested in participating, please contact Barbara Folb [email and phone omitted].

FOLLOWUP EMAIL FOR NON-RESPONDERS

Dear   ,

I recently sent you an invitation to participate in a research study of the information needs and practices of preparedness leaders in Pennsylvania. The text of that message follows my signature. Recruitment is still under way. Would it be acceptable for Barbara Folb, the investigator, to contact you directly by phone regarding participation in the study?

Sincerely,

Gerry Barron

[insert text of previous email here]

PHONE SCRIPTS

Script for Follow Up Phone Contact With PPLI Graduates
To be used if more recruitment is needed

Hi, this is Barbara Folb from the Center for Public Health Practice at the University of Pittsburgh. I'm calling to follow up on an email sent to you by Gerry Barron about my research study on the information needs and practices of preparedness leaders in Pennsylvania. Do you recall receiving the email?

(listen, respond to any comments on the email)

I'm hoping that you will consider participating in the study. In order to get a good picture of how preparedness professionals gather and use information in Pennsylvania, I need to include leaders from all 3 PEMA regions and both urban and rural areas. Your participation will assist in meeting this need.

If you choose to participate, we will schedule a meeting with in your workplace or a public place that is convenient for you. If the interview will be in your workplace, I will need to know who to contact at your workplace to obtain permission to conduct the interview. Then we will have an open-ended interview where I'll ask some questions, and you will have the opportunity to share what you know about information needs and practices in your work place. The interview takes about 45 minutes to an hour. I'll record the interview and it will be transcribed for later analysis. I'll supplement that information with the information from your most recent PPLI registration form.

There is no direct compensation to you for your voluntary participation. Results of the study will be analyzed and reported with all personal identifiers that link you to the data removed.

Is there anything else you need to know about the study in order to make a decision about participating?

Script for Follow Up Phone Contact with Current PPLI Participants
To be used if more recruitment is needed

Hi, this is Barbara Folb from the Center for Public Health Practice at the University of Pittsburgh. I'm calling to follow up on an email sent to you by Gerry Barron about my research study on the information needs and practices of preparedness leaders in Pennsylvania. Do you recall receiving the email?

(listen, respond to any comments on the email)

I'm hoping that you will consider participating in the study. In order to get a good picture of how preparedness professionals gather and use information in Pennsylvania, I need to include leaders from all 3 PEMA regions and both urban and rural areas. Your participation will assist in meeting this need.

If you choose to participate, we will schedule a one hour meeting during the week that your PPLI training is scheduled at the PPLI meeting site. You will not miss any of the training in order to participate. We will have an open-ended interview where I'll ask some questions, and you will have the opportunity to share what you know about information needs and practices in your work place. The interview takes about 45 minutes to an hour. I'll record the interview and it will be transcribed for later analysis. I'll supplement that information with the information from your most recent PPLI registration form.

There is no direct compensation to you for your voluntary participation. Whether or not you choose to participate with have no effect on your PPLI participation. Results of the study will be analyzed and reported with all personal identifiers that link you to the data removed.

Is there anything else you need to know about the study in order to make a decision about participating?

INTERVIEW SCRIPT

PPLI Information Assessment

Open- Ended Interview Script

Goals to keep in mind:
- What do the IUEs of the agencies participating in PPLI look like? How are they the same and how are they different?
- What are the preparedness-related information needs of the participants?
- How do the participants go about addressing their information needs?

Opening

(Read script advising participants of the scope of the study, what will be done with the study results, and their rights as a participant.)

The purpose of this study is to better understand how individuals working in preparedness areas in Pennsylvania think about and use information in their preparedness work. It is helpful to know about real world examples, so in this conversation I will ask you to describe instances from your work experience of looking for and sharing information, and the impact of those experiences on your work.

Questions

Definitions, General Preferences
1. What does the word information mean to you?
2. If all possible ways of seeking information were available to you, which would you be most likely to use? For example, using the Internet, printed materials, a colleague, or asking in a library.

Work Questions

3. I'd like to know more about your preparedness work. Tell me about your job.
4. If I went to work with you tomorrow, what would I need to know or learn in order to understand your work place and function in it effectively?

Information Seeking Questions

5. Looking back, can you recall a recent work day in which you needed information? Could you please tell me about that day?
    a. Was it a typical work day for you?
6. Do you recall an instance of getting good information from a colleague, in your workplace or at another agency? Please tell me about it.
7. Can you recall any instances where receiving some information was especially important to your work? Describe what happened.
8. Can you recall any instances where you were unable to get information you needed? Tell me about the event.
    a. What problems did you encounter?
9. Sometimes people experience recurring barriers to getting information, such as not enough time, or lack of access to the source. Are there recurring barriers to information in your work?

Information Sharing Questions

10. Please describe a recent instance of information sharing among colleagues in your workplace.
    a. Is it typical of how information is shared at work?
11. How does your agency keep and recall important information for later use? Do you think it works well?
12. Can you recall sharing information with another preparedness agency in the recent past? Please describe the situation.
13. Are there regular ways of sharing information with other preparedness professionals in your region or the state, such as newsletters, emails, routing of info, etc?
    a. If so, are they useful to you?
14. Social networking among disaster preparedness professionals has been cited as important to the success of disaster responses. How do you get to know others in your field?
15. Who in the preparedness field do you maintain regular contact with, say weekly, monthly or yearly?
    a. Where do they work?
    b. What is there job?

Wrap Up Questions

16. Is there anything else you would like to mention that would be important for me for this study?
17. Do you have any questions for me?

APPENDIX C

ACRONYMS

APCO - Association of Public-Safety Communications Officials International
CDC - Centers for Disease Control and Prevention
DHS - Department of Homeland Security
DIMRC - Disaster Information Management Research Center
DRC - Disaster Research Center
EMA – Emergency Management Agency
EOC - Emergency Operations Center
FBI - Federal Bureau of Investigations
FEMA - Federal Emergency Management Agency
ICS - Incident Command System
INSU - Information Needs, Seeking and Use
IT - Information technology
IUE – Information Use Environment
LLIS – Lessons Learned Information Sharing
MLA - Medical Library Association
NEMA - National Emergency Management Association
NIMS - National Incident Management System
NLM - National Library of Medicine
PA-DOH - Pennsylvania Department of Health
PEMA - Pennsylvania Emergency Management Agency
PPLI - Pennsylvania Preparedness Leadership Institute
SNS - Strategic National Stockpile
UPCPHP - University of Pittsburgh Center for Public Health Preparedness

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