Indian Institute of Management Kozhikode

Case Study

IIMK/WPS/367/ITS/2020/01

March 2020

Collaborative information behaviour during epidemics: The case of Nipah outbreak in Southern India

Ben Krishna[1]
Anindita Paul[2]

[1]Doctoral Scholar, Information Technology and Systems, Indian Institute of Management, Kozhikode, IIMK Campus PO, Kunnamangalam, Kozhikode, Kerala 673 570, India; Email - benkrishna12fpm@iimk.ac.in

[2]Associate Professor, Information Technology and Systems, Indian Institute of Management, Kozhikode, IIMK Campus PO, Kunnamangalam, Kozhikode, Kerala 673570, India; Email: apaul@iimk.ac.in, Phone Number (+91) 495 – 2809122

Abstract

This study primarily investigates facilitating role of ICT during collaborative Information seeking at the time of epidemics. A detailed and systematic literature review has been done to identify themes related to Collaborative Information Behavior (CIB) in the literature. These themes are further assessed in light of the preliminary data collected from the four interviews from health care officials on the Nipah Virus epidemic in Kerala in the year 2018 and a conceptual model is proposed. Our study will contribute to the literature in CIB in the context of an epidemic.

Keywords –Collaborative Information Behaviour, epidemic, CSCW, India, Information Behaviour

Introduction

Information seeking, retrieval and use in organizational setting is an important topic that has drawn considerable interest by researchers(Karunakaran et al. 2013). Information technology,contextual triggers, and the intention to perform collaborative information behaviour(CIB)undergoes dynamic changes making it a complex phenomenon. It is worth looking into the changes experienced by groupsduring information seeking, retrieval, and usein different contextsespecially when using new information technologies.The construct CIB isdefined as the "totality of behaviour exhibited when people work together to (a) understand and formulate an information need through the help of shared representations; (b) seek the needed information through a cyclical process of searching, retrieving, and sharing; and (c) put the information found to use" (Karunakaran et al. 2013). People search for information for finding meaning from that information so that theycan extend their state of knowledge for problem-solving or decision making(Kuhlthau 1991) . The role of collaboration in information seeking is pivotal and many researchers have recognized the need to go beyond the interaction between individual and information alone; since most of the tasks in organizational set up are not done individually but in a collaborative manner(Reddy and Jansen 2008).

The purpose of most of the previous research was developing a model for CIB in collaborative contexts and aid in information system design to support context(Karamuftuoglu 1998 ; Hansen and Järvelin 2005 ; Courtright 2007 ; Hyldegård 2006 ; Quand Hansen 2008 ; Golovchinsky et al., 2009 ; Reddy and Jansen 2008 ; Hyldegård, J.,2009 ; Allen, D.,2011 ; Karunakaran et al., 2013 ; Hertzum and Simonsen 2019). However, these models are based on organizational settings like health institution(emergency medicine or intensive care unit), engineering, R&D, educational settings especially research or project, picturing context as a static phenomenon. The context of an epidemic is

characterized by a high degree of risk, timeliness of action and decision making, urgency, contingency and following stahdard operating procedures. This study takes the context of an epidemic and understand the CIB of the healthcare professionals. Our study seeks to contribute to the literature of information seeking behaviourin a healthcare settingduring an emergency by highlighting the role of collaboration in information seeking of both within and among the group of healthcare professionals.

We studymultiplegroups of professionals fromhealthcare, animal husbandry,administration and investigates how their information seeking within the group and between the group is shaped by the critical and time bounded context. Such acollaboration in a real life context calls forattentionto various dimensions. Our study can lay out considerations for designing of information retrieval and sharing technologies that enable seamless collaborative information behaviour. More importantly, this study showcase how to understand, predict and control the information flow and pattern using information communication and technology(ICT) by understanding the intention to perform collaborative information behaviour.This study also helps to understand information seeking and its constituentssuch as professional's perspective (Dervin 1998 ; Wilson 1999 ; Ellis 1989 ; Kuhlthau 1991; Leckie et al. 1996; Sonnenwald and Livonen 1999), situational factors(Byström and Järvelin 1995; Freund 2015 ; Mai 2016 ; Sonnenwald and Pierce 2000), task and work procedure(Fidel et al. 2004 ; Qu and Hansen 2008 ; Browne 2014 ; Hertzum and Simonsen 2019) along with theinfluenceon one another during collabrative information seeking.Further, we propose a concept of contextual collaborative information behaviour based on the understanding of literature and explore it further in a case study.

This study is organized as follows: In the next section, we provide an overview of the previous research done in information seeking, retrieval and usein various contexts using various information systems and technology. Next, we discuss the case study of the Nipah virus outbreak in Kerala during 2018, how information was sought collaboratively, and the various dimensions involved. The professionals who were invovled in the frontline were interviewed. We then discuss the findings and issues. Next, we propose a concept of contextual collaborative information behaviour as a future direction. Lastly, we describe the limitation of the studyand conclude by summarizing the findings.

Theoretical Background and Related work

To get a better understanding of the information seeking behaviour in a collaborative environment, we draw on previous research regarding contextual triggers, its influence on work procedure and tasks and perceptions ofa group of professionals. CIB starts with generating an information need and intention to collaborate andICT can facilitate such collaboration. Figure 1 depicts the various factors involved and its relation with the other as derived from the literature.
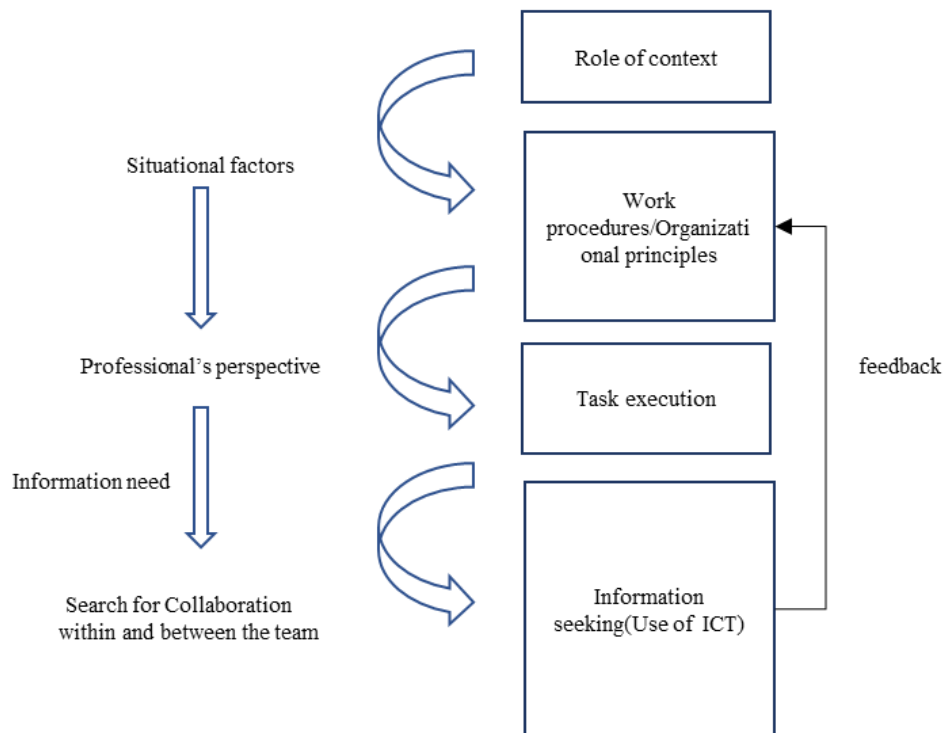
Figure 1. Structural diagram of literature covered

Role of Context

The role that context plays in shaping the behaviour of people while seeking information has been studied previously(Dervin 1998 ; Leckie et al. 1996 ; Wilson 1999 ; Courtright 2007 ; Reddy and Jansen 2008).These studies tried to understand the information behaviour through various models and explainedvarious aspects related to information starting from the need, seeking behaviour, its retrieval through various information systems and finally the information use. Dervin's Sense-making theory focuses on the user perspective how the user makes sense making and sense unmaking of the information need. This was viewed as a metaphorical framework which has components - a) situation (time and space), b) gaps identified (barriers or blocks), c) gaps bridged (using ideas, questioning and answering, from various resources) and d) how it helps or is used. Wilson's model suggests that in an uncertain situation information user perceives a need and this stimulates the information seeking behaviourof the user who further advances to the steps of using various information systems for seeking. The user evaluates the usefulness of the information gathered and if not satisfied, then repeats the search process. These models were primarily focusedon workplace settings. These studies, however, were based on information practices of actors and underplayed their context hence disregarding actors-in-context.Major disasters are characterized by uncertainty, complexity, time-dependent(short time span for processing),and uncertainty(information might be ambiguous, unreliable or conflicting)(Benini 1997 ; Shone and Parry 2004). During an incident happened in 1989

during a football match where the services like police, ambulance, and fire service came together to manage the incident and posed various challenges to collaborate. The challenges were further aggravated by the involvement of the public and volunteers. The root cause of the challenges was the difficulties in information seeking and sharing between different groups. Likewise, there are various triggers and dimensions of Information behaviour in relation with various work domains (Sonnenwald and Pierce 2000 ; Hansen et al., 2015;Leeder and Shah 2016), and work task(Reddy et al., 2010 ; Hansen and Järvelin 2005).

Studies have investigated the relation between individual information behaviour in a group setting in various contexts.Sonnenwald and Pierce's (2000)study oncollaborative information behaviour in a command and control situation identified three themes 1) interwoven situational awareness (talks about individual and intragroup information gathering and dissemination) 2) dense social network (information needs to be communicated and social structure to be established) 3) contestedcollaboration(individual challenges one another's contribution). In a war like situation, they found,a dense social network is challengingowing to continuous threat from the enemy on one hand and equally important need for identifying vital information. In astudy done in the medical domain (Reddy and Jansen 2008),a model was developed for understanding the activities and dimensions pertaining to individual information behaviour and CIB.Hyldegård (2006,2009) proposed the natural extension of the information search process(Kuhlthau 1991), in relation to group process in order to understand the CIB. Group members were found to demonstrate similar cognitive experience during information seeking and social interaction but different emotional experience during information seeking because of the mismatch of motivation, ambitions and goal foci.A similar study has been done on academic researchers to identify the triggers for collaborative information seeking(Spence et al. 2006). It remains to be seen what aspects of the collaborative context in a medical emergency like situation characterise CIB.

How work procedure and perceived task influenced by context affect professional perspective?

Collaboration happens at the various level during a crisis situation especially at the macro level (all stakeholders in the whole community), inter-group level (e.g., Health Department, Fire, and rescue department, Administration of state) and individual level(intragroup). At the macro level, there are many complexities involved because of the interdependencies between the departments and the elements such as systems, processes, and various individuals. Thus exhibits a vague picture of the situation within the short time frame of crisis (McEntire 2002). This interaction between the various stakeholders should flow in a coordinated way, there may be or may not be the presence of a common leader, but usually the presence of assigned leader to coordinate the various groups (Denning 2006). There were cases like during 9/11 attack, where the lack of coordination among the various agencies

(Fire and Police department) resulted in chaos (Kean and Hamilton 2004). At the inter-group level transparency of the information is crucial because of the different organizational culture and goals (Mendonca et al. 2007). Often at times, various agencies have a different style of execution of daily activities, various work procedures, various roles and task they perform, and various capabilities designed for facing various challenges. When the disaster struck these structures and processes needs to revamp (Quarantelli 1982).

Further, a number of professional behaviour models which explains factors that influence information seeking.(Leckie et al.1996)explained the information seeking behaviour of 3 different groups of professionals (Engineers, Healthcare professionals, and Lawyers) and built a generic model for the professional. The basic supposition of the model was that work roles and the task undertaken by the professionals bring about information need. These Information needs are not constant and affected by intervening factors such as demographics, context, frequency, predictability, importance, and complexity. The interplay between these factors allows the professionals to make a trade-off between the use of information source and information awareness. The relevant experience and knowledge about the information source and content determine the path of information seeking. In another empirical study of (Byströmand Järvelin 1995),professional workers(civil servants) drew attention to task complexity and how she/he seeks what information is needed, what actions to be taken and satisfaction of needs. The model identifies these elements 1) Task perception of actor 2) Personal factors 3) situational factors to interpolate each other to influence information seeking. Similar kind of study conducted by (Freund 2015) which primarily focused on the circumstances and influences affecting software engineers' work. The resulting model consists of various elements like contextual factors, personal factors, work task, information task, and conditioning variables to identify information need and choice among information sources.

More specific models of professionals in an emergency situation were studied previously and how their seeking behaviourwas characterized.(Hertzum and Simonsen 2019) tried to provide a link between professional's information seeking with their professional work, in his study he tries to connect task as a link between workplace procedure and information seeking in the context of triage and timeouts in the emergency department. Also, he tried to find out the tension between the procedure in principle and procedure in practice when an emergency situation arises. I*n another*study was the identification of factors that results in emergenciesin high workload environments such as fatigue, multiple team members, lack of communication among members, Change in the shift of personnel(nurses), inability to engage, language barriers or limited health literacy, patient position or room changed(Browne 2014).Johannessen (2016)identified that nurses use their discretion when they perform critical assessments in emergency departments even if formalized triage system is present.But on the contrary, nurses were not allowed to use their discretion if the formal system is in place.

Because of the exhaustive guidelines and hectic environment which forces nurses to use discretion at first place and this may risk the life of the patient. The study suggests an interactionist view of discretion to contain deviant behaviour.

Information seeking activities in a workplace or organization seems to be closely interrelated to situational factors, workplace procedures(a procedure in principle), and tasks(a procedure in practice). Professional's perspective(both cognitive and emotional) plays a mediating role between the above dimensions. There were various studies highlighting the importance of collaborative information seeking and retrieval because contexts are changing, information needs are changing, information retrieval system is changing; individuals no longer anchoring the task completion, information is fragmented across various actors, systems and artifacts(Hansen and Järvelin 2005) . In an organization, actors mostly collaborate within a group or collaborate among groups and are considered as an important aspect of human- work interaction where information exchange possibly happen(Fidel et al.2004).

Several researchers have identified that collaborative information seeking and retrieval can be systematically analyzed using cognitive work analysis(Rasmussen et al.1994)framework. This framework supposes the information seeking as cognitive work; actors consider their cognitive and emotional ability, the environment they are working, constraints they were imposed upon and the task they perform. Collaborative work is characterized by both space and time and in a complex situation entails more mobility for the team because of the nature and distributed nature of the work, this entropy can be controlled by "constructing standard operation arrangements of people, places, resources, and knowledge"(Bardram and Bossen 2005).

Various model of CIB

Karamuftuoglu (1998) attempted to lay down the theoretical foundation of collaborative information seeking. The author argued that understanding the knowledge production, transmission, and use will be helpful for the information retrieval process and further helpful to information retrieval system design. Technological advances help to merge various heterogenous medium into a homogeneous digital medium. Many studies(collaborative information retrieval activities of the design team in Boeing and Microsoft) were done in the University of Washington(Raya Fidel, Harry Bruce, A M Pejtersen, Steven Poltrock, Susan Dumais) to lay the foundation on the Collaborative information behaviour. Information problems were effectively addressed during information seeking, retrieval, and usage when the team worked in collaboration. They have identified communication patterns and work activities;their research was mainly focused on cognitive work analysis approach(Reddy et al., 2010).Hansen and Järvelin (2005) investigated the instance of collaboration in Information retrieval

through the study of patent engineers and developed a model. The model points out the important aspects of what, when and how collaboration manifest work – task performance in a professional work setting. They have identified two categories of retrieval activities which are document-related and Human-related. Document -related collaborative activities focused on the creation and use of reports, the reference document for individual or others in the team for the future whereas human-related collaborative activities focused on direct usage of knowledge possessed by other colleagues in the same team or another team. Qu and Hansen (2008)argued the sensemaking theory proposed by Dervin can be extended as collaborative sensemaking to create shared understanding. The study defined collaborative sensemaking as " process where a group of people (a group, a community, a society, etc.) seeks or creates a shared representation collaboratively to accomplish a shared task". The process of building shared understanding will create a body of new knowledge as it forces to the collaboration of new ideas, merging, reconstruction from existing representations.Hertzum(2008) introduced a concept called collaborative grounding to facilitate collaborative information seeking behaviour. The study uncovered six dimensions(purpose, Types, Roles, Activities, Granularity, Coupling) from the information seeking literature and argued that insights among the dimensions are difficult to integrate and collaborative grounding deliver the multiple instances of interrelations among dimensions.

Role of Information communication and technologies

Although the above body of research indicates the factors influence collaborative information behaviour, parallelly there is research that suggests how information retrieval is conducted.Golovchinsky et al. (2009) proposed a model consists of four dimensions(Intent, depth, concurrency, and location) of collaborative information seeking to identify differences between various forms of online collaboration. The author argues that these model can predict system design aspects of collaborative retrieval system;identified searchers intent as the import criteria for design as retrieval system built for a collaborative purpose will be totally different from the system which takes similar behavioural pattern. Google personalized search is seen as asynchronous, deeply-mediated, implicit (search intention is unknown to others) and distributed search. Use of tools like SearchTogether(Morrisand Horvitz 2007, October) was designed for smaller teams to work synchronously, support explicit intent and work in co-location or distributed. Similarly, a collaborative tool called MUSE(Multi-user search engine) that support communication between groups or within a group developed by Reddyand Jansen (2008).Ingwersen (1996) represents the model for information retrieval interaction in User's cognitive point of view through basic elements of global cognitive theory. Spink (1997) purpose the concept of feedback in the information retrieval(IR) and various feedback during mediated IR.

Further, study conducted by Bennett et al. (2005) focused on how technology(especially internet) as an information source facilitate the information seeking behaviours of physicians and specialists, physicians especially use internet to address direct patient care questions and drug reference whereas the specialists searched literature, journals, and consulted with peers through the internet as information source. Similar kind of study was done by Del Fiol et al. (2014) which highlighted the importance of clinicians in asking questions about patient care and pursue further using technology-based tools to find unanswered questions for decision making. In a situation like a disaster where instantaneity and immediacy of the information gathering and sharing is vital, emphasis on the emergency management organization(interchangeably uses professionals or officials) put their emphasis on the real-time data gathering, situational awareness, communication of information are a priority. ICT plays a big role in conceptualizing the idea. Yet in some situation officials stay away from the social media, focusing only on the one-way channel to disseminate information(Akhgar et al. 2013). There has been a challenge for the officials to share information regarding the identity and status of the affected victim with the public or collaborating with the other agencies or family as information is concerned with individual privacy. A clash between the privacy of individual and public security. But over time they have identified the need for using an informal channel to collaborate. Social demographics features seemed to vital in the context of disaster as it influences the information sharing, as it assists the official(Zheng et al. 2015).

The use of Information sources during a disaster is different for different situation. In some situation like Hurricane Bret in 1999 local newspaper and internet tend to be least important whereas television broadcast and radio were popular(Prater et al. 2000). During the bridge collapse in Minneapolis, friends and family were the important sources of information followed by TV, Internet, and radio(Zheng et al. 2015). Robinson and Khattak (2010) identified radio, TV, internet, mobile phone and GPS as the primary information source when people on the move. In another study, Allen et al. (2014) studied information sharing and interoperability of Information communication technologies in the emergency incident like a disaster. He conceptualized a framework using Activity theory to understand the network of activity system between two services group. One of the highlights of the study was the shared object concept between two services team(e.g., Medical and Security). These teams were joined together to respond to the incident which was inherently driven by certain norms like Social cause, passing appropriate information, Maintain security, provide situation report and influenced by the situation factors. The study also highlighted the flaw in the philosophy of design of information system. Research has given importance for the system building, but there are flaws in designing the process for the system to be effective in a situation like major incidents.

Further, Public tend to seek information from the social networks in the case of everyday life information, instead of going to formal sources (Savolainen, R. ,1995). In the case of social media, apart from the live video and voice communication services(e.g., Skype, Whatsapp), information

seeking and sharing is asynchronous and few responses are considered based on the other information resources (Khoo 2014). Moreover, types of information behaviour in social media falls into these areas 1) Everyday information seeking 2) browsing and monitoring 3) opportunistic information seeking 4) intentional information seeking, sharing and use 5) intermediatory roles like seeking, summarizing and forwarding 6) online communities for entertainment and social cause. Collaborative information behaviour in the social media has been subdivided into the announcement of information(update from a group member or information resource link), responding to a query(online Q and A communities), and group projects.

Summary

Relatedliterature on Information behaviour, both Individual Information seeking and collaborative Information seekingreflects on the various aspects that information seeking pattern of individuals and group. However, the focus was mostly on the collaborative aspects of the professionals and group of professionals in various context, especially in an organizational setting. Further, the information behaviour studied focused on the user's need for information seeking, and what motivates the user to seek for information. While interaction with information user may experience cognitive or feeling aspect, studies converge to identify the need for a behavioural approach. Actors-in-context plays an important role in understanding the characteristics of information behaviour. Further Task complexity, situational factor, personal factors,work procedures, availability and certainty of the information resources, information channels interplay and further makes it difficult to understand collaborative information behaviour. Also, the studies distinguished between the way professional or group of professionals differ in seeking information in a different context. To our limited knowledge, there are studies regarding the collaborative information behaviour in various healthcare contexts (clinics, emergency medicine, intensive care unit) and other crisis situation, however,studies that focus on the epidemicwhere a deadly virus attacking the area and group of professionals tried to contain the situation through collaborative information processing has not been investigated. Thus in order to gain insight into the various characteristics of intragroup and intergroup collaboration in seeking information need, this study focus on the above areas of interest in the context of anepidemic.

1. How the factors discussed contribute to collaborative information behaviour?

2. How ICT facilitate collaborative information seeking?

Methodology- Research context and framework

A systematic literature review was conducted using various databases like Science direct, Library and information science, EBSCO. Keywords like collaborative information behaviour, ICT, information sharing, information seeking were used. Literature was shortlisted based on citation, relevance, and/or importance. Preliminary data were collected using interviews. Face-to-Face Interviews were

conducted among four individuals who have worked as chiefs of the emergency teams involved. The interview was conducted at the workplace of interviewee and duration has ranged from 30 minutes to 60 minutes.The interview wasconducted in and around various parts of Kerala(especially Kozhikode,Thiruvananthapuram, Mangalore).Digital notepads and audio recording were used to conduct the interview. Interview questions were prepared by drawing insights from the literature((Fidel et al.2004),(Spence et al.2005, November) and conducted using the critical incident technique(Flanagan 1954)which is widely used in information science(Sonnenwaldand Pierce 2000).In addition to the interviews, more insights about the collaborative information seeking were drawn from the articles, medical articles, social media pages, and podcasts. Due to the confidentiality and sensitive nature of the information few of the official communication has been hidden from the interviewer and also to maintain the anonymity of the interviewee,the designation was used.
Themes(Erlingsson and Brysiewicz 2017) were identified from the data collected during the interview and extended the themeto develop the preliminary conceptual model. Initially, condensation was done by shortening the interview scripts as well as voice recording preserving core meanings, later codes were identified from the condensed meaning units. Further categories were formed by grouping the codes based on various aspects, either similarities or difference, of the script's content. The underlying theme was identified based on the relation between the categories.

Findings and Discussion

In this section, findings from the literature and pilot study are laid out and discussed in relation to the research questions. Main themes emergedwere contextual triggers, behavioural characteristics of actors, intention to seek information need, and facilitating role of ICTare discussed here.

Pilot Study: An outline of the Nipah outbreak
Nipah virus infection is Zoonotic virus infection where the mortality rate is between 38% to 75%. So far there is no medicine discovered for curing the virus, the only treatment is supportive care. When considering the dynamic, critical and time-sensitive nature of the context, effective prevention of transmission of the virus was the primary motive. Total 23 cases were reported in the Kerala and 2 survived. The virus was contained within these 23 patients within a short span of time(May 5th, 2018 – May 30th, 2018). The spread of the disease happened in three waves. The first wave is index patient, the second wave is from index patient to other patients from the hospital, the third wave is disease spread into health workers, doctors from the hospital and spread to the community. Once it reaches to the community it is very hard to control. In Kerala, virus spread was contained in the second wave. Previously there were 2 outbreaks reported in India, which was on 2001 and 2007 in West Bengal. In 2001, the mortality rate was 68%(45 out of 66) and in 2007, it was 100%(5 out of 5). The reason for increased mortality rate was late detection of virus and less coordination of public, health department and state administration(Arankalle et al. 2011; Chadha et al. 2006). Also, health professionals were

reluctant to treat the patient because of fear. This indicates the seeking behaviour of the group under study shaped by the contextual triggers.

Contextual triggers

This study addresses how the context shapes the CIB. Previous research has identified various triggers that characterize the need for collaborative information seeking and has characterized as a separate entity. A key aspect of this study is linking context to individual behaviour and positively contribute to the group dynamics. Also focuses on the between-group collaboration.In some ways, this is consistent and straightforward with prior research. Major triggers for collaborative behaviour can be generally classified into the complexity of information need, fragmented information sources, lack of domain expertise, lack in immediately accessible information (Reddy and Jansen 2008) which occur due to the context. The context may be an epidemic where individual expertise alone no longer performs information need, and in some other context where the students try to write an article of intense nature in short span of time which may contain fragmented information sources. In an uncertain situation, the user of information perceives a need and this stimulates the information seeking behaviour which user further advances to the steps of using various information systems for seeking (Wilson 1999). The role of context in the information behaviour and how it set the boundary condition and how the user's reflect on the context(Courtright 2007).But the themes and model differs from previous research and here it explains how the context is linked to the work procedure as well as task the perception of the individual.

For example, during identification face of the virus, a patient was admitted to the intensive care unitin a private hospitalwith symptoms of severe encephalitis. The root cause of the Illness of the patient was unknown. Group of healthcare professional went for identifying the root cause; Here the information need was complex, there were fragmented information sources, none of the individual professional have previous experience or expertise to diagnose the disease. ICU team discovered the history of the patient's brother having similar symptoms died 12 days ago. ICU team collaborated with the administrative team to summon the members who had in contact. Family members of the patient also developed symptoms which gave the hint of possible deadly virus infection. The team at the private hospital had a discussion with the Manipal Center for Virus Research(MCVR) which is distantly located in the same evening. Meanwhile, other doctors of the critical care department carry out information search for the root cause using online channels and peer-to-peer communication virtual channels who are distantly located. In another instance, one of the triggers that influenced the task perception of the doctor was the ideology of the patients. Initially, doctors were stopped by patients to take the blood samples since they belong to the Muslim community and it was Ramadan period; later with the help of religious leaders issue was resolved. These interactions seemed to help

to develop an understanding of the context shaping the behaviour of the individuals and set the boundary condition.

Context is also characterized by human involvement outside the boundary. Coordination of public was crucial in containing the virus, fake information would have created panic and impacted the activities. Communication of risk factors was one of the vital activity. A phenomenon of collaborative information seeking among the professionals and sharing the information outside the boundary simultaneously happened. The abundance of fruit bats which was suspected of spreading the virus is present in the locality. The exact source of the virus was then still unknown. Entomologists and animal husbandry team took up the task of collecting samples of mosquitos, bats, water, birds and other animals. Information regarding the risk factors and precaution were aired through social media especially digital media, youtube, podcasts, WhatsApp messages to the public and they reciprocated. This uncovers an interesting finding that in the case of the epidemic; information seeking and sharing, knowledge creation, and transmission are intertwined. When the information need was complete, information sharing starts and it is a cycle between knowledge creator and knowledge seeker.The "literacy rate" of the population emerged as a contextual qualifier in that situation. Professional's Intention to seek and share information was triggered by the "literacy rate" where the actors outside the boundary of investigation responded positively which strengthened the intention to seek information.

Behavioural characteristics of actors and Group Dynamics

The context influences the beliefs that might influence the choice of actions. In the individual level, the challenge is to seek and process the information from various resources and it exhausts the mental capacity of the individual, which is often called as cognitive load(de Greef and ArcisZewski 2007). This might affects the individual's behaviour on perceived task and role(Mendonca et al. 2007). But this is often mitigated by the collaboration behaviour performed by an individual(Reddy and Jansen 2008). Professionals seek information when they are baffled by the challenges experienced during a crisis. Possible explanations to the challenges are lack of information resource access, failure to receive the information, trust factor in the information received, and communication failures among groups(Dombroski et al. 2006).

For example, during the response phase of containing the virus, main activities undertook were 1) Isolation of confirmed,contacted, suspected cases 2) Contact tracing 3) Infection control in hospital 4) communication of risk factors. One obvious question regarding the conduct of collaborative information seeking is, how one can relate to the above activities? This can be justified by stating that there was no previous experience in dealing with such dynamic health emergencies.In a time constrained and uncertain environment; individual attitude, belief, and values(intuition) along with cognitive bias influence information seeking(Allen 2011) and influence the decision making(Mishra

et al., 2015). 2642 contacts were traced and kept under surveillance. Suspected and contacted cases were sent back to home and kept under quarantine. Communication channels were kept open to contact suspected and contacted cases. One of the uniqueness of the response team was identifying a large number of cases in a short span of time. Specific activities performed to gather information regarding the possible spread of virus were 1) Contact identification 2) Contact listing 3) Contact follow up.Each individual bind to the group by certain work procedure protocol(hospital guidelines and Ebola[1]Protocol). One important finding while considering the professional's perspective in executing the task; emotional factors(fear, contested collaboration, personal ambitions) were kept aside,the task was carried in accordance with work procedure, procedure in principle and procedure in practice match.

In another instance, during the installation of isolation ward, a group of healthcare workers and a group of technicians had a difference of attitude. Technicians thought that was a suicidal mission to be in a contagious environment. Another way of looking at it as perceived behaviour control of one group of professional more than others even though they have the same intention. Similarly, in one of the situation, Doctors have identified the need for suppressing the condition of disease through a medicine called "Ribavirin". Since the stock was not immediately available, doctors gathered 2 boxes from the hospitals where doctors had an association. The intention to use the information and resource was moderated highly by the adequate planning(internal control belief) of the professionals.In a similar situation, the administration was forced to alter the law and order situation to control the fake information spread through communication channels by making it non-bailable offense. Here actors perception about the situation was hindered by the external factors to achieve desired income of control spreading of fear. Similarly in another occasion when bats were identified as the root cause of the virus, public tried to destroy the habitat of bats, which was interviewed by the Animal husbandry team, as it will hinder the information seeking activity of finding the root cause of virus spread. These can be identified as control factors which are external which shapes the behaviour of the group.

Individuals and group are bounded by certain norms and these norms dictate the perceived behavioural control of actors in the group. Contextual triggers influence with the perception of the group as well as the individual. Sometimes the individual and group may experience different emotional experience or cognitive experience. Certainly, the norms play a crucial role in binding together, which is also influenced by contextual triggers. Key variables in the collaboration are the norms and attitude of the individual to collaborate, along with knowledge, motivation, and skill (Gudykunst and Kim 1984). There are control factors like barriers like information overload, cultural differences, conflict of organizational goals, a political factor which hinders the perceived behaviour of the individual and thus hinders communication.

---

[1] "Ebola Virus Disease (EVD) is a rare and deadly disease in people and nonhuman primates."

Role of ICT

One of the major aspects of collaborative information behaviour is the facilitating role played by information retrieval and sharing technologies. There are numerous technologies used, especially in the initial stage of the identification phase, relied on web-based systems, virtual peer-to-peer communication, and Electronic patient record. Team members lacked the experience in handling the situation and they were constantly in communication with peers. Thus collaborative seeking was the first choice. During disaster management, officials have the intention to collaborate based on the variables like perceived task support, group value or norms, and user satisfaction. This will have an impact on the intention to use the Information system (Lee et al. 2011).

Information retrieval tools acted as facilitator for the seeking process. For summoning the relatives, instant messaging application(Whatsapp), as well as mobile communication, were used. Virtual communication(video conferencing) was used as a tool to communicate with the director of the virology department and instant messaging was used for regular updates.This is explained in one of the situations where consultant doctor of the critical care medicine identified patient had brain inflammation but with increased pressure by looking at the electronic patient record. Suddenly he felt it was unusual and never felt in 15 years of experience. Nothing seemed to work and later they relied on web-based systems to search for a possible explanation and got a hint that they were dealing with something bigger. Later they had video conferencing with the virology department head to discuss the matters; sent the sample to test for potential virus infection for confirming the possibility"

Information sharing among the team members was through emails in official discussions, whereas instant messaging mobile applications(Whatsapp) was used in a real-time seeking and sharing. When it comes to seeking and sharing information outside the professional circle mostly to the public, it was social media and traditional channel played a key role and strengthen the seeking activity. "Qkopy[2]" mobile app, "Arogya Jagratha[3]","Youtube", and Digital news media were the online platforms. Traditional channel like mobile communication and direct communication also aided in information seeking.

Further, the healthcare workers were given live demo each and every time through the online video by the geographically dispersed expertise team, like how to wear Personal protection equipment when entering into an isolation ward, how to dispose of the used gears and tools. Here healthcare workers were seeking to get themselves not infected and Expert team providesa protocol to how to handle the gears and equipment.

---

[2] "Qkopy is a social communication platform works as a mobile app. The app works like a radio, ie an information or data can be propagated or broadcasted to 'n' number of people instantly from a single credible source as notifications. Here the credible source is the mobile number which is registered with the app to sign up as a new user account with this app. Since the mobile number is the unique ID here, no fake account can be created, hence we can control fake messages and inauthentic(not genuine) forwarded messages which make the public miss informed and panic. The public who save the mobile number with the Qkopy app installed on their mobile devices will receive the authentic information propagated from a single credible source"

[3] "@arogyajagratha is facebook page created by the Health department of kerala. Arogya Jagratha is a programme launched by the Directorate of Health, Kerala,to resist and control communicable diseases in the state. The programme ensures the public participation and the contributions from all departments."

Summary

From the above discussion, it can be assessed that information seeking in a time-constrained, complex, uncertain, and fragmented information sources environment, collaborative information seeking and decision making was carried out by analytical and conscious activity and agrees with the most of literature of information science. Contextual triggers emerged out of the situation itself(Nipah Virus), also from the external actors outside the boundary of studies (a group of professionals) like ideology, literacy rate, culture, and social cause. During CIB, contextual triggers have played an important role in shaping the intention of the groups to behave in a specified manner and more complex the information need, more the intention to dictate behaviour. Perceived behavioural control of the individual was influenced by several control factors, examples of internal factors from the discussion were the skills and abilities of the professional, expertise drawn from their experience and knowledge. External factors were contextual triggers and norms. The community of the professional was bound together by certain norms and rules. Professional voluntarily participated in collaborative information seeking and thus community acted as one entity. Here one of the triggers for information need was identified as "Social Cause". Here, in this case, work procedure acted as one of the norms and controlled the behaviour of the professional; Procedure in principle and procedure in practice matched in terms of the task executed. External triggers shaped the belief of the individual and more often they have to influence their environment to achieve the intended behaviour. Finally, Information retrieval and sharing technologies played the role of faciliator to strengthen the search for the information need. New age collaboration platforms were extensively used and it enforced collaborative behaviour within and between teams. Moreover sharing and information use of distorted nature was avoided using the above-discussed technologies.

A proposed conceptual model: Contextual Collaborative Information Behaviour

It was understood that explaining human behaviour in all its simplicity is not an easy task. When it comes to understanding the collaborative informationbehaviour, there are various dimensions which contribute to the behaviour. Various theoretical frameworks have been discussed to explain Collaborative information behaviour(CIB). In this paper we were trying to explain the various dimensions that were identified in the previous research; Also using contextual case study in the real and naturalistic environment, where I was able to confirm several elements but not all, also uncovered few elements. Here we are trying to propose a conceptual model – Contextual Collaborative Information Behaviour(CCIB)- states that contextual triggers, intentions, and Group Dynamics , together shape contextual collaborative information behaviour in the presence of ICT as facilitator.Specific contexts have been previously assessed with respect to various professionals(doctors, Nurses, Policemen, Civil servants) , particular individuals(students, Researchers)and organizations(Educational, Medical, Military) to understand collaborative

information seeking and behaviour. Specific behaviours lead to specific models, the one proposed remedy could be an aggregation of specific behaviours. However few have attempted to do so. The idea behind the aggregation of the specific behaviours is the elements contributed to specific behaviours on different contexts and a different set of the group might cancel each other and tend to merge to a few handfuls of valid measures. Eventhough the principle of aggregation does not hold completely on different specific occasions but some triggers of the contexts and totality of human behaviour in group applicable across specific samples. It may be argued that aggregated contextual intention and perceived behavioural control of actors in the group may not act directly but indirectly shape the collaborative information seeking and behaviour.Figure 2. represents the concept in the form of a structural diagram.

The central factor of the concept is the intention to perform the CIBIntention to perform CIB is dictated by the need for finding information. This need is characterized by how individuals perceive the problem at hand, how they perceive the triggers and constraints imposed by context, how they consider associated feelings, thoughts, and actions. Generally, the strength of the factors increases the strength of intention to perform CIB. As an example, contextual triggers is characterized by uncertainty, complex and dynamic factors, which need to be matched with appropriate task and principles, may not be solved by single expertise but multiple interactions with multiple agents; all these together increase the need for information which in turn increase intention to perform CIB. The idea behind the intention and behavioural control together shape the behaviour is not a new concept but have been well explained in Psychology. Theory of planned behaviour(Ajzen 1991) provides a possible theoretical base considering the factors that shape the collaborative information seeking. Similarly,knowledge production in social practices is always collaborative labor and participants or users in the practice deeply embedded into the process through their consensus and collective nature(Karamuftuoglu 1998).
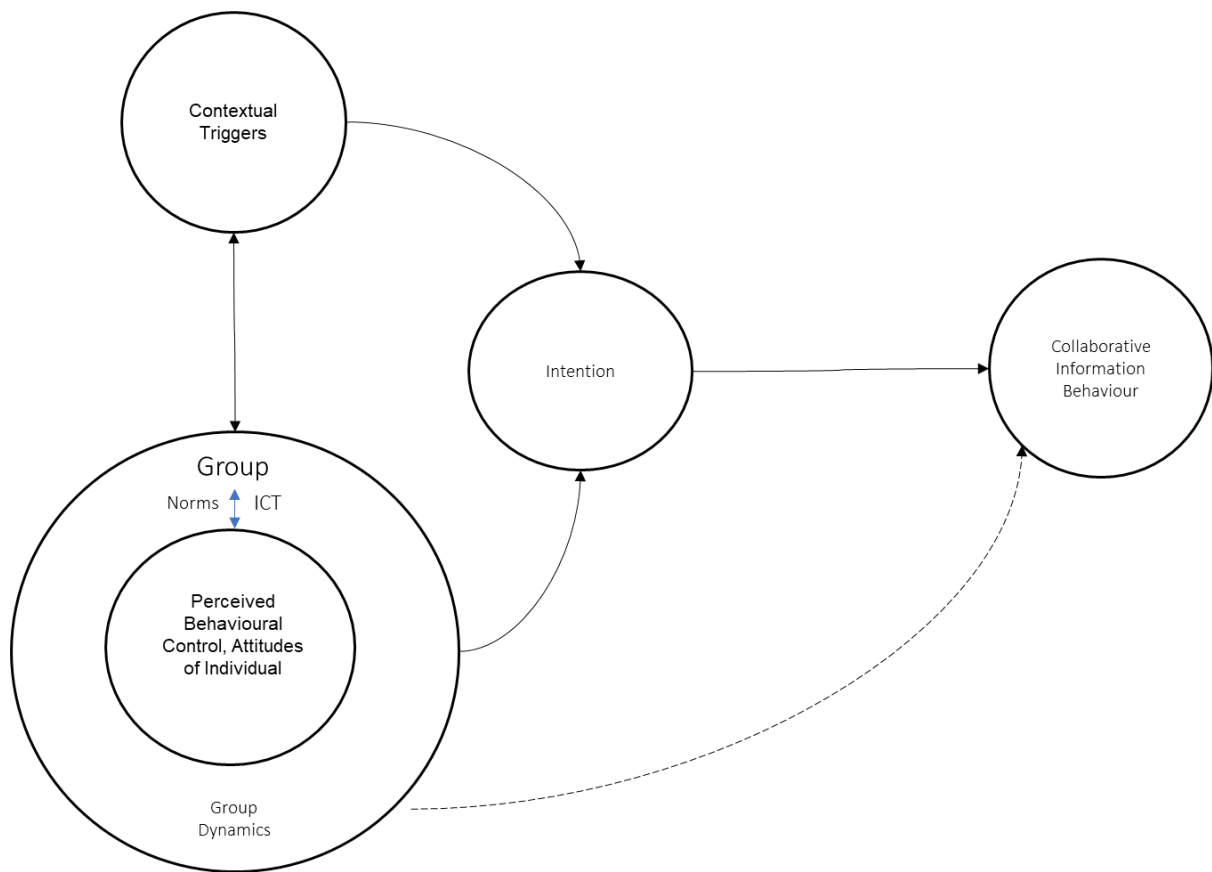
Figure 2: Structural diagram of the conceptual model

The current view of perceived behavioural control is congruent with the explanation given in (Ajzen 1991). Reason for choosing the perceived behavioural control rather than actual behavioural control is that the latter one seems to very obvious that with given resources and occasional,individual or group carry out the information need. But it is rather interesting to understand the perception of the individual or group to dictate the information need. It explains the individual's confidence in the ability to perform certain behaviour and such beliefs might influence the choice of actions, following the work principles, choice of using cognitive and emotional reactions, the effort they put, use and selection of information resources and channels, judging the relevance and interpretation of information. Individuals and community are bounded by certain norms and these norms dictate the perceived behavioural control of actors in the group. Contextual triggers influence with the perception of the group as well as the individual. Sometimes the individual and group may experience different emotional experience or cognitive experience. Certainly, the norms play a crucial role in binding together, which is also influenced by contextual triggers. This concept also explains the direct link between perceived behaviour control and CIB. For example, assuming that the intention is constant, coherence of the group can directly shape the CIB, i.e., a group with high coherence (Expertise of group outweigh individual expertise and in sync) will have better-seeking capability which results in an efficient outcome. Moreover, if the resources and occasion are static which will tend perceived

control to actual control, it will directly shape the seeking pattern. For example, if the group of students was asked to submit a project using ten research papers in four hours, their seeking pattern only shaped by the available resources and occasion.ICT plays a supporting role in collaboration among information seekers. More the system possess characteristics such as awareness, chat, conferencing, and visualization(Reddyand Jansen 2008) more it will strengthen the collaboration. Various feedback mechanisms like if the information need is not meet or partially met, identification of new information need and pursuing the same are not included for the simplicity of representation.

Limitation

In this section, we change our attention to look at various problem areas associated with this article and how to resolve. The case study has limitation it lacks the direct observation of variables as it was involved interviews of the participants, their bias in narrating the occasion occurs. This limitation might be overcome by understanding the nature of the participants, observation of their real task characteristics and so forth. The limitation related to the concept proposed as it lacks empirical study to prove the theory and at this point, it is a proposal of concept based on literature review and exploratory case study.

References

Ajzen, I. (1991). The theory of planned behavior. Organizational behavior and human decision processes, 50(2), 179-211.

Akhgar, B., Fortune, D., Hayes, R. E., Guerra, B., and Manso, M. (2013, November). Social media in crisis events: Open networks and collaboration supporting disaster response and recovery. In 2013 IEEE International conference on technologies for Homeland Security (HST) (pp. 760-765). IEEE.

Allen, D. (2011). Information behavior and decision making in time-constrained practice: A dual-processing perspective. Journal of the American Society for Information Science and Technology, 62(11), 2165-2181.

Allen, D. K., Karanasios, S., & Norman, A. (2014). Information sharing and interoperability: the case of major incident management. European Journal of Information Systems, 23(4), 418-432.

Arankalle, V. A., Bandyopadhyay, B. T., Ramdasi, A. Y., Jadi, R., Patil, D. R., Rahman, M., ... and Neogi, D. K. (2011). Genomic characterization of Nipah virus, west Bengal, India. Emerging infectious diseases, 17(5), 907.

Arunkumar, G., Chandni, R., Mourya, D. T., Singh, S. K., Sadanandan, R., Sudan, P., ... and Yadav,

P. D. (2018). Outbreak investigation of Nipah virus disease in Kerala, India, 2018. The Journal of infectious diseases.

Bardram, J. E., and Bossen, C. (2005). Mobility work: The spatial dimension of collaboration at a hospital. Computer supported cooperative work (CSCW), 14(2), 131-160.

Benini, A. A. (1997). Uncertainty and information flows in humanitarian agencies. Disasters, 21(4), 335-353.

Bennett, N. L., Casebeer, L. L., Kristofco, R., and Collins, B. C. (2005). Family physicians' information seeking behaviors: a survey comparison with other specialties. BMC Medical Informatics and Decision Making, 5(1), 9.

Bodker, S. (1989). A human activity approach to user interfaces. Human-Computer Interaction, 4(3), 171-195.

Browne, M. (2014). What if a pilot was too busy for the checklist? Emergency department safety and the timeout process. Clinical Pediatric Emergency Medicine, 15(3), 269-273.

Byström, K., and Järvelin, K. (1995). Task complexity affects information seeking and use. Information processing and management, 31(2), 191-213.

Chadha, M. S., Comer, J. A., Lowe, L., Rota, P. A., Rollin, P. E., Bellini, W. J., ... and Mishra, A. C. (2006). Nipah virus-associated encephalitis outbreak, Siliguri, India. Emerging infectious diseases, 12(2), 235.

Courtright, C. (2007). Context in information behavior research. Annual review of information science and technology, 41(1), 273-306.

de Greef, T., and Arciszewski, H. (2007).A closed-loop adaptive system for command and control foundations of augmented cognition, lecture notes in computer science, pp. 276–285.

Del Fiol, G., Workman, T. E., and Gorman, P. N. (2014). Clinical questions raised by clinicians at the point of care: a systematic review. JAMA internal medicine, 174(5), 710-718.

Dervin, B. (1998). Sense-making theory and practice: an overview of user interests in knowledge seeking and use. Journal of knowledge management, 2(2), 36-46.

Dombroski, M., Fischhoff, B., and Fischbeck, P. (2006). Predicting emergency evacuation and sheltering behavior: A structured analytical approach. Risk Analysis, 26(6), 1675-1688.

Ellis, D. (1989). A behavioural approach to information retrieval system design. Journal of documentation, 45(3), 171-212.

Erlingsson, C., and Brysiewicz, P. (2017). A hands-on guide to doing content analysis. African

Journal of Emergency Medicine, 7(3), 93-99.

Fidel, R., Mark Pejtersen, A., Cleal, B., and Bruce, H. (2004). A multidimensional approach to the study of human-information interaction: A case study of collaborative information retrieval. Journal of the American Society for Information Science and Technology, 55(11), 939-953.

Flanagan, J. C. (1954). The critical incident technique. Psychological bulletin, 51(4), 327.

Freund, L. (2015). Contextualizing the information-seeking behavior of software engineers. Journal of the Association for Information Science and Technology, 66(8), 1594-1605.

Golovchinsky, G., Pickens, J., and Back, M. (2009). A taxonomy of collaboration in online information seeking. arXiv preprint arXiv:0908.0704.

Gudykunst, W. B., and Kim, Y. Y. (1984). Communicating with strangers: An approach to intercultural communication. Addison Wesley Publishing Company.

Hansen, P., and Järvelin, K. (2005). Collaborative information retrieval in an information-intensive domain. Information Processing and Management, 41(5), 1101-1119.

Hansen, P., Shah, C., and Klas, C. P. (Eds.). (2015). Collaborative information seeking: Best practices, new domains and new thoughts. Springer.

Hertzum, M. (2008). Collaborative information seeking: The combined activity of information seeking and collaborative grounding. Information Processing and Management, 44(2), 957-962.

Hertzum, M., and Hansen, P. (2019). Empirical studies of collaborative information seeking: a review of methodological issues. Journal of Documentation, 75(1), 140-163.

Hertzum, M., and Simonsen, J. (2019). How is professionals' information seeking shaped by workplace procedures? A study of healthcare clinicians. Information Processing and Management, 56(3), 624-636.

Hyldegård, J. (2006). Collaborative information behaviour—exploring Kuhlthau's Information Search Process model in a group-based educational setting. Information processing and management, 42(1), 276-298.

Hyldegård, J. (2009). Beyond the search process–Exploring group members' information behavior in context. Information Processing and Management, 45(1), 142-158.

Ingwersen, P. (1996). Cognitive perspectives of information retrieval interaction: elements of a cognitive IR theory. Journal of documentation, 52(1), 3-50.

Johannessen, L. E. F. (2016). How triage nurses use discretion: A literature review. Professions and Professionalism, 6(1).

Kaptelinin, V., and Nardi, B. (2018). Activity Theory as a Framework for Human-Technology Interaction Research.

Karamuftuoglu, M. (1998). Collaborative information retrieval: toward a social informatics view of IR interaction. Journal of the American Society for Information Science, 49(12), 1070-1080.

Karunakaran, A., Reddy, M. C., and Spence, P. R. (2013). Toward a model of collaborative information behavior in organizations. Journal of the American Society for Information Science and Technology, 64(12), 2437-2451.

Khoo, C. S. (2014). Issues in information behaviour on social media. LIBRES: Library and Information Science Research Electronic Journal, 24(2), 75.

Kuhlthau, C. C. (1991). Inside the search process: Information seeking from the user's perspective. Journal of the American society for information science, 42(5), 361-371.

Kuutti, K. (1996). Activity theory as a potential framework for human-computer interaction research. Context and consciousness: Activity theory and human-computer interaction, 1744.

Leckie, G. J., Pettigrew, K. E., and Sylvain, C. (1996). Modeling the information seeking of professionals: a general model derived from research on engineers, health care professionals, and lawyers. The Library Quarterly, 66(2), 161-193.

Mai, J. E. (2016). Looking for information: A survey of research on information seeking, needs, and behavior. Emerald Group Publishing.

McEntire, D. A. (2002). Coordinating multi organisational responses to disaster. Disaster Prevention and Management, 11(5), 369–379

Mendonca, D., Jefferson, T., and Harrald, J. (2007). Collaborative adhocracies and mix-and-match technologies in emergency management.Communications of the ACM, 50(3), 45–49.

Lee, J., Bharosa, N., Yang, J., Janssen, M., and Rao, H. R. (2011). Group value and intention to use—A study of multi-agency disaster management information systems for public safety. Decision Support Systems, 50(2), 404-414.

Leeder, C., and Shah, C. (2016). Collaborative information seeking in student group projects. Aslib Journal of Information Management, 68(5), 526-544.

Mishra, J., Allen, D., and Pearman, A. (2015). Information seeking, use, and decision making. Journal of the association for information science and technology, 66(4), 662-673.

Morris, M. R., and Horvitz, E. (2007, October). SearchTogether: an interface for collaborative web search. In Proceedings of the 20th annual ACM symposium on User interface software and

technology (pp. 3-12). ACM.

Nardi, B. A. (Ed.). (1996). Context and consciousness: activity theory and human-computer interaction. mit Press.

Prater, C., Wenger, D., and Grady, K. (2000). Hurricane Bret post storm assessment: A review of the utilization of hurricane evacuation studies and information dissemination. Texas AandM Univ. Hazard Reduction and Recovery Center, College Station, Tex.

Qu, Y., and Hansen, D. L. (2008). Building shared understanding in collaborative sensemaking. In Proceedings of CHI 2008 Sensemaking Workshop.

Quarantelli, E. (1982). Social and organisational problems in a major emergency.Emergency Planning Digest, 9(1), 7–10

Rasmussen, J., Pejtersen, A. M., and Goodstein, L. P. (1994). Cognitive systems engineering.

Reddy, M. C., and Jansen, B. J. (2008). A model for understanding collaborative information behavior in context: A study of two healthcare teams. Information Processing and Management, 44(1), 256-273.

Reddy, M. C., Jansen, B. J., and Spence, P. R. (2010). Collaborative information behavior: exploring collaboration and coordination during information seeking and retrieval activities. In Collaborative information behavior: User engagement and communication sharing (pp. 73-88). IGI Global.

Robinson, R. M., and Khattak, A. (2010). Route change decision making by hurricane evacuees facing congestion. Transportation Research Record, 2196(1), 168-175.

Robinson, W. S. (1951). The logical structure of analytic induction. American Sociological Review, 16(6), 812-818.

Savolainen, R. (1995). Everyday life information seeking: Approaching information seeking in the context of "way of life". Library and information science

Shone, A., and Parry, B. (2004). Successful event management: a practical handbook. Cengage Learning EMEA.

Sonnenwald, D. H., and Iivonen, M. (1999). An integrated human information behavior research framework for information studies. Library and information Science research, 21(4), 429-457.

Sonnenwald, D. H., and Pierce, L. G. (2000). Information behavior in dynamic group work contexts: interwoven situational awareness, dense social networks and contested collaboration in command and control. Information Processing and Management, 36(3), 461-479.

Spence, P. R., Reddy, M. C., and Hall, R. (2005, November). A survey of collaborative information seeking practices of academic researchers. In Proceedings of the 2005 international ACM SIGGROUP conference on Supporting group work (pp. 85-88). ACM.

Spink, A. (1997). Study of interactive feedback during mediated information retrieval. Journal of the american society for information science, 48(5), 382-394.

Wang, D., Qi, C., and Wang, H. (2014). Improving emergency response collaboration and resource allocation by task network mapping and analysis. Safety science, 70, 9-18.

Wilson, T. D. (1999). Models in information behaviour research. Journal of documentation, 55(3), 249-270.

Zheng, Z., Lee, J. B., Saifuzzaman, M., & Sun, J. (2015). Exploring association between perceived importance of travel/traffic information and travel behaviour in natural disasters: A case study of the 2011 Brisbane floods. Transportation Research Part C: Emerging Technologies, 51, 243-259.

Appendix: Questions

Survey Question	Motivation	How to relate to RQ
Could you please explain when was the first time you hear about the virus attack and how you come to know about that?	To understand how they initially perceived the information need and understand what were the channels used for communication	"Do Information communication and technology moderates collaborative information seeking and information needs?"
What was your initial reaction? How did you gather more information regarding the event?	To understand whether the actors understand the situation cognitively or emotionally. Whether they have looked on work procedure, talked with other members or other groups of professional, searched in medical documents. To understand the situation factors like clarity, uncertainty, optimism, disappointment, Anxiety, relief or other	"Do Information communication and technology moderates collaborative information seeking and information needs?" "Do the factors that influence collaborative information seeking identified in the previous studies confirm the findings of the current research?"
Who all are people in the team? What all interdisciplinary groups were formed? How they interact?	To understand the team formation and what all expertise possessed by the team and how they	"Do Information communication and technology moderates collaborative information seeking

What were the goals of the Medical, virology and wildlife team? What were the constraints and priorities of the team?	collaborate. Interdisciplinary example: Medical, virology, wildlife	and information needs?" "Do the factors that influence collaborative information seeking identified in the previous studies confirm the findings of the current research?"
"What were the tasks identified and carried out? Is it matching with the work procedures or different?"	To understand what were the actions are taken or tasks executed and understand the procedure in principle and procedure in practice varies?.. professional perspective as mediator. To understand critical decisions and strategies made by each team in terms of the task? What all information was required? What were the channels/sources were available?	"Do the factors that influence collaborative information seeking identified in the previous studies confirm the findings of the current research?" "Do Information communication and technology moderates collaborative information seeking and information needs?"
"How was the work divided among teams? What was the nature of the teams (is it bureaucratic, independent, chaotic, values)?"	To understand the organizational principles of various groups and relationships between information seeking	"Do the factors that influence collaborative information seeking identified in the previous studies confirm the findings of the current research?"
"What were the expertise, capabilities, domain knowledge did possess by the individual in the team? Is there any personal priorities or personal value hindered the operation? Is there any special training given to the team to collaboratively act?"	To understand the team formation and what all expertise possessed by the team and how they collaborate? Do they modify the work procedure or guideline to effectively collaborate?	"Do the factors that influence collaborative information seeking identified in the previous studies confirm the findings of the current research?"
"What causes you to work together when looking for	"To understand various factors like a) The information needed is	"Do the factors that influence collaborative information seeking

information? "	complex. (b) The information needed requires different expertise. (c) The information is not immediately accessible. "	identified in the previous studies confirm the findings of the current research?"
"What medium did you most likely use when collaborating with your teammates or other groups to look for information? (control disease, identifying the root cause of disease, the spread of rumors, gaining the confidence of co-workers, scale up surveillance, prevent future outbreak)"	"To understand the mediums like (a) Electronic forum; (b) Email; (c) Face-to-face; (d) Fax; (e) Instant message; (f) Telephone; (f) Web conferencing "	"Do Information communication and technology moderates collaborative information seeking and information needs?"
"When collaborating with teammates to look for information, did you usually find the information for which the team is searching?If not, how did you seek information?"	To understand whether the collaboration information seeking was effective and other means of information seeking	"Do the factors that influence collaborative information seeking identified in the previous studies confirm the findings of the current research?"
"Participating in collaborative information seeking is easier than individual information seeking. "	To understand whether the collaboration information seeking was effective	"Do the factors that influence collaborative information seeking identified in the previous studies confirm the findings of the current research?"
"Participating in collaborative information seeking leads to more relevant information being found than when individually seeking information. "	To understand whether the collaboration information seeking was effective	"Do the factors that influence collaborative information seeking identified in the previous studies confirm the findings of the current research?"
"Participating in collaborative information seeking leads to information being found more quickly than when individually seeking information."	To understand whether the collaboration information seeking was effective	" the factors that influence collaborative information seeking identified in the previous studies confirm the findings of the current research?"

"Can you tell me about an occasion where you have experienced the same kind of situation and how you have managed the collaboration?"	To understand whether the newer versions of technology strengthen the CIS To understand the experience and expertise role played for professionals	"Do Information communication and technology moderates collaborative information seeking and information needs?" "Do the factors that influence collaborative information seeking identified in the previous studies confirm the findings of the current research?"