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Significant Stakeholders: Toward an Agile Knowledge Management System in the Time of Coronavirus Crisis

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Abstract—*Effective crisis response requires sophisticated knowledge management in organizations. Agile systems development capabilities for such crisis response systems are important, particularly for purposes of tailoring a crisis-oriented knowledge management system to a rapidly shifting threat landscape. We propose an architecture for achieving both of these ends in the form of an Agile Crisis Management System involving three specific stakeholders, and we discuss the steps, outcomes, and implications of such a system.*

Key words: Agile development, artifact, COVID-19, crisis management, knowledge management

I. INTRODUCTION

THE World Health Organization first characterized the name of the present Coronavirus outbreak as COVID-19 in January 2020. The outbreak has since spread to over 200 countries and territories, causing more than 45 million infections and more than 1 million deaths [Johns Hopkins University, 2020]. This pandemic is disrupting the global economy at unprecedented speed and scale ([Baldwin and di Mauro, 2020]; [Chen *et al*., 2020]; [Gopinath, 2020]). Gross Domestic Product for the United States fell by 4.8%, according to data for the first quarter of 2020—the largest quarterly decline since the fourth quarter of 2008 [Congressional Research Service, 2020]. Similarly, the Eurozone economy contracted by 3.8%, which represents its largest quarterly decline since 1995 [Congressional Research Service, 2020]. As a result, the Federal Reserve, along with the central banks of other leading nations, is engaging in a set of interventions in financial markets while launching a series of economic stimulus plans.

Despite governmental initiatives and scientific progress in finding cures and palliatives, we propose that organizations should resort to "saving themselves." Government support can be procedurally and financially delayed at a time when companies should strive for business continuity and survival by appropriating the resources that remain at their control. Among these organizational resources, corporate information systems remain highly salient. In a recent study, De Weck *et al.* [2020] pointed out the key issue that companies must deal with all of this: how can they effectively pivot from regular operations to crisis management methods and models? It is our clear sense that the utility of well-designed well-run corporate information systems serves the role not only of enabling organizations but in these special circumstances, sustaining organizations (e.g., [Joshi *et al.*, 2010]; [Joshi and Mudigonda, 2008]; [Straub and Watson, 2001]; [Venkatraman, 1994]). Whereas in normal times, information systems streamline decision-making processes at different organizational levels to ensure organizational efficiency and performance, in the current circumstances of the COVID-19 crisis, the corporate information system can be revamped to support organizational resilience in the face of adversity, by strengthening the firm's capability to cope with risks. Risks, by and large, being remediated by complete information from the transaction costs perspective, information systems are a risk-reducing entity in such circumstances since they bring fuller information to the decision-making process.

The key question to be asked regarding IS capabilities in the firm is this: "how to favor the emergence of bottom-up local actions while ensuring top-down monitoring and coordination of the actions?" [De Weck *et al.*, 2020]. In the current pandemic, governmental authority (for the sake of public health and safety) can enforce business closures and quarantine organizational employees. In that perspective, organizational management has to confront a significant challenge in the form of isolation of organizational communication. Effective action is then hobbled by insufficient knowledge. Another side-effect of the lack of proper knowledge management practices in such emergencies is that employees become stressed and frustrated as they seek to obtain adequate actionable intelligence about their workplace and their role in it. Hence, the acknowledged importance of vertical communications within organizations is counterbalanced with the utility of horizontal communications, such as peer-to-peer and cross-functional information flows.

To that end, the first purpose of this article is to illuminate three distinct groups of stakeholders according to economic, technological, and human considerations while designing a crisis management system. We characterize these specific stakeholder groups as administrative authority, technical authority, and frontline employees. In answer to the challenges facing these critical constituencies in the firm, we propose the introduction of a knowledge-based crisis management system. In generating a prototype of such a systems solution, we illustrate how stakeholders interact with each other while engaging in capturing, discovering, sharing, and utilizing knowledge in crisis circumstances.

The article begins with a literature review of the knowledge management processes and systems, followed by the presentation of the prototype of a knowledge-based crisis management system including its features, functionalities, stakeholders, and development method. Finally, we discuss several issues of the proposed crisis management system prototype that should be addressed in future research.

II. Knowledge Management and Knowledge Management Systems

Knowledge management can be defined as the concerted, coordinated, and deliberate effort to create, structure, disseminate, and apply organizational knowledge in order to create value [Bose, 2003]. The strategy of knowledge management revolves around shared learning and shared knowledge (e.g., [Earl, 2001]; [Holsapple and Singh, 2001]; [Leibowitz, 2000]; [Nonaka and Takeuchi, 1995]). In sharing, there are two general ways to go about it: codification, which involves collecting and storing organized knowledge in databases, personalization, which is the sharing of knowledge directly between individuals with technological channels merely serving as the facilitator of the process [Hansen *et al.*, 1999].

In a contrasting view, Earl [2001] promoted a taxonomy of strategies for knowledge management (which he calls "schools"). There are three main categories of schools: the technocratic school (i.e., systems and engineering), the economic school (commercial matters), and the behavioral school (organizational in nature, strategic in deployment). The technocratic school stresses the knowledge sharing and preserving the role of technologies such as websites and databases; codification, connectivity, and capability are the "philosophy" of the technocratic school. In contrast, the economic school embodies the spirit of commercialization, and the behavioral school emphasizes human-oriented collaboration, connectivity, and consciousness.

Researchers and practitioners have cautioned against overreliance on technological solutions in knowledge management (e.g., [Davenport and Prusak, 1999]; [Nonaka and Takeuchi, 1995]); yet, technology can overcome the barriers of time and space that would restrain knowledge management activities [Chua, 2004]. Knowledge management has been applied in many domains, in a solution of various pressing problems, such as information product evolution [Tiwana and Ramesh, 2001], hospitality and tourism industry management [Racherla and Hu, 2009], and healthcare management [Bose, 2003]. This interest in and practical application for knowledge management solutions has led to several intriguing conceptual models for the management and sharing of knowledge, including Tiwana's [2000] OSI-centric model, Abou-Zeid's [2002] reference model, Binney's [2001] KM spectrum, and Chua's [2004] three-tier architecture. These all provide starting points for considering the role of knowledge management in support of crisis management activities, as would be pertinent in the current COVID-19 situation.

In this article, we incorporate knowledge management and knowledge management systems into a scenario of crisis management, leading to the explication of a knowledge-based crisis management system. According to Mitroff ([1988]; [1994]), crisis management can be defined as a series of ongoing and systematic processes for detecting, preventing, controlling, and learning from crises by the implementation of business practices. As Mitroff [1994] suggested, there are four primary dimensions to consider while addressing crises: types, phases, systems, and stakeholders.

We thus summarize the scope and nature of our crisis management KMS as follows: Crisis-oriented knowledge management will be both *ad hoc* and agile, in the effort to promptly address the adverse physical and psychological effects caused by the COVID-19 crisis. The system we envision is deployed in a period of crisis and postcrisis. Unlike the typical lifecycle of crisis management proposed by Mitroff ([1988]; [1994]) and Pearson and Mitroff [1993], our proposed crisis-oriented knowledge management system is organized around the sequential precepts of *Containment/Damage Limitation, Recovery, Learning, Signal Detection, and Prevention/Preparation*. Stakeholders are particularly relevant in the operation and outcomes of such a crisis-oriented knowledge management system (see Table 1). These stakeholders include administrative authorities and technical authorities, as well as organizational frontline employees, and also include the overarching role of a *Superior Authority* outside the organization, such as state and local legislatures, centers for disease control and prevention or financial assistance agencies.

Figure 1 plots an activity diagram of the knowledge-based crisis management system from a static perspective. It shows that the crisis management system comprises three stakeholders, as discussed above: Administrative authority, technical authority, and frontline employees. The proposed system integrates agile development for timely response to crisis scenarios. To that end, the timely collaboration among these roles can ensure organizational business continuity while mitigating the harm caused by the COVID-19 pandemic.

Table 1. Stakeholders of the Crisis Management System (CMS).

Stakeholder	Administrative Authority	Technical Authority	Frontline Employees
Role	***"Administrative/ policy Answerers"*** The *economic* aspect of the system: The organizational leadership relies on the CMS to ensure business continuity while mitigating the adverse effects of the COVID-19 crisis. Hence, the system should be developed in an economic-efficient fashion – with variable functionalities, yet determined time and resources (cf. Traditional/Taylor-istic development)	***"Technical Answerers"*** The *technical* aspect of the system: Besides their routine tasks, these technicians also need to serve their "internal customer" – welcoming changing requirements (even in late development), informing new features, and streamlining the troubleshooting. . . (cf. [Beck et al., 2001])	***"Insightful Questioners"*** The *social/humane* aspect of the system: Their goal is twofold: (1) acquiring and applying relevant knowledge to their work during the crisis, (2) acquiring psychological comfort while maintaining a good work status
Know. Sharing	Sharing government regulations, scenario planning details, and information regarding emergency and relief agencies with employees; sharing organizational CM information and knowledge with external stakeholders	Providing relevant IT services to all system users (e.g., troubleshooting, training) while sharing the knowledge of how to use the system efficiently and effectively	Sharing knowledge about how to accomplish tasks during the crisis
Know. Acquisition	Communicating and coordinating with various stakeholders (i.e., frontline and technical employees) while acquiring their reviews and feedback based on their experience and expertise, and revising policies and procedures accordingly	Communicating with various system users while acquiring their reviews and feedback to "patch and update" the system (here, "patching" represents all possibilities of improving the system on both technical and user sides)	While they can be the most ignorable stakeholders in the community of interest, they still can contribute their insights and information to improve the system.
System features	• ***Goal-driven:*** capturing, adapting, transferring, and reusing knowledge related to COVID-19 and relevant crisis management practice • ***Reusable:*** the system should be designed as reusable for future similar instances (e.g., reusing the source code and infrastructure) • ***Collaborative:*** collaborate with colleagues to facilitate the process of knowledge management while developing an agile CMS	• ***Adaptive*** (alternatively, continuous, or concurrent): developing new functionalities and features based on dynamic requirements (e.g., shifting from an intra-organizational KMS to an inter-organizational one) • ***Collaborative:*** collaborate with colleagues to promote the process of knowledge management while developing an agile CMS	•***Collaborative***: collaborating with colleagues via "sharing" their questions and knowledge to the extent of their frontline experience and expertise. • ***Humane:*** the system should be 1) designed with high-level usability, 2) fully assisted with technical staff, and 3) directed by the administration to simplify and streamline the CMS adoption and use.

A. Administrative Authority Administrative authority refers to individuals in company management who oversees business operations and continuity in organizations. These individuals are the policymakers who develop procedures to cope with the COVID-19 crisis. They can be considered as “administrative/policy answerers” in a knowledge-based crisis management system because they provide authoritative answers to questions of policy and operation in the firm. In that sense, they communicate to and coordinate with the efforts of frontline employees while at the same time acquiring their constructive feedback.

Administrative authorities can develop and revise crisis management strategies while sharing policy-related information with individuals of technical authority and frontline responsibility. Such policy information could include but not be limited to government regulations, scenario planning details, and information from emergency and relief agencies. Policies developed by administrative authorities can then be delivered to the technical authority for patching into and updating on the crisis management system, which can subsequently be utilized to generate reports for even higher authority (i.e., governments, corporate headquarters). Administrative authority serves the role of organizational leadership, which is a vital contribution to a prospective agile crisis management system designed to ensure business continuity while mitigating harms caused by the COVID-19 crisis. This process is facilitated by providing agile crisis management system requirements to the technical authority for subsequent crisis management system agile development purposes.

B. Technical Authority The stakeholder group focused on technical/system answers is the technical authority. By communicating with various system users to collect reviews and feedback, the technical authority serves to “patch and update” an agile crisis management system. As demonstrated in Figure 1, this involves designing, developing, implementing, and maintaining the system. The technical authority also provides relevant services such as troubleshooting and training to system users unlike traditional systems maintenance processes, the agile crisis management system has three salient features.

First, the “patch and update” feature refers to the range of possibilities for improving the system for both technical and social users (e.g., ease of use, usability); traditional system improvement approaches usually involve only the requirements of the technical users. Second, compared with traditional development approaches that feature both variable resources and time determined functionalities, the agile crisis management system is developed in an economic/efficient fashion, being agile (having variable functionalities, given limited resources and time in the crisis). Third, to ensure organizational continuity while mitigating the harm caused by the COVID-19 crisis, the design principles of an agile crisis management system emphasize system characteristics performance, reusability, and maintainability. Therefore, many implementations of an agile crisis management system are reusable for similar instances, they should occur in the future (e.g., the source code and the infrastructure can be reused). Such adaptive, agile, and powerful development strategies make knowledge management systems improvement possible under the COVID-19 crisis environment.

C. Frontline Employees Frontline employees are considered “insightful questioners.” They apply their knowledge to their daily work tasks. As demonstrated in Figure 1, frontline employees obtain two services in an agile crisis management system: They acquire relevant knowledge and apply it to their work, and they also acquire psychological comfort in the process of maintaining a functional working status. To improve an agile crisis management system, frontline employees provide feedback and ask questions of both technical authority and administrative authority. This process serves to improve the humanistic characteristics qualities of agile crisis management systems.

Maintaining business continuity and mitigating harm caused by the COVID-19 crisis is a demanding need for this knowledge management system. To satisfy this requirement, we propose a specific knowledge management system focused on crisis management. We have termed this “agile crisis management,” and this system enables us to develop variable functionalities even in the face of limited resources and time. Figure 2 depicts the dataflow of the agile crisis management system.

To patch resilience in the face of the COVID outbreak using our proposed agile crisis management system, we propose four typical steps to be involved. First, as demonstrated in Figure 2, the administrative authority collects, analyzes, and revises feedback and questions from both the technical authority and from frontline employees. Then, the administrative authority creates requirements for the technical authority to patch and update the system. Such requirements typically include policies, revised procedures, new features, budgets, resources and time constraints, as well as *ad hoc* tasks. Since an agile crisis management system is entirely directed by administrative staff, it embodies the spirit of “patching”—updating the agile crisis management system with little or no intervention on the part of users. This process produces a shift from an intraorganizational crisis management approach to an interorganizational one.

In the second step, after receiving requirements, the technical authority initiates discussions with both frontline employees and the administrative authority regarding the received requirements. Such early-stage customer involvement distinguishes an agile crisis management system from systems based on traditional patching strategies. It ensures that patches and updates accurately meet customer requirements, thus removing unnecessary effort for postimplementation adjustments and shortening the overall system delivery time.

In the third step, the technical authority makes use of agile development strategies to generate patches and updates for the crisis-oriented knowledge management system. Such agile development processes contain five stages, including requirements engineering, meeting and planning, designing, coding and code testing, and the final product release. It is noteworthy that unlike traditional requirement approaches such as the waterfall model, the steps of specification, design, implementation, and testing in agile approaches are interleaved so that overheads are reduced in the software development process (e.g., by limiting documentation). As such, requirements can be changed without excessive rework leading to quick response.

In this, requirements engineering strives to generate system specifications for the design and implementation stages. The meeting and planning phase enables the technical authority to generate a development and delivery plan according to the specifications and requirements from the administrative authority. The subsequent design stages focus on four aspects: architectural design, database design, interface design, and component design. In this process, the core features of an agile crisis management system's performance, reusability, and maintainability are enhanced. For example, to enhance reusability, we have proposed that the crisis management system operates as a set of independent components such that each component can be reused for similar future instances as long as the interfaces of these components are used appropriately. The technical authority implements required patched in the coding/testing stages. A "refactoring" technique is adopted to make future changes easier. To further boost reusability and maintainability, the time and effort expended in refactoring reduce costs later in the development life cycle. In the fourth and final step, as noted in Figure 2, releases of patches and updates are applied to the agile crisis management system.

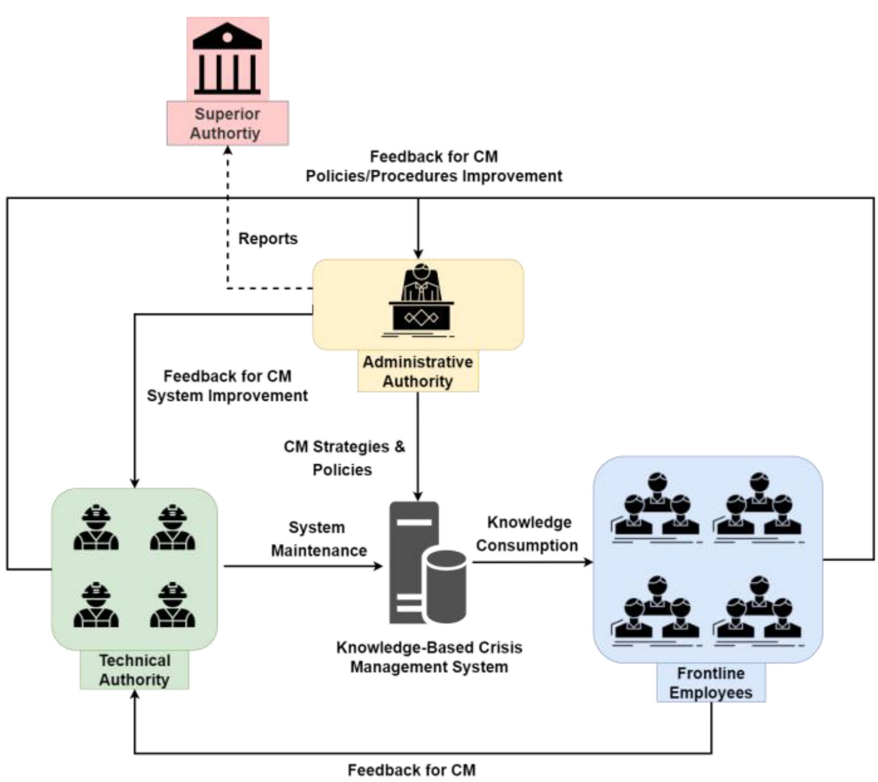


Figure 1. Activities of a knowledge-based crisis management system.

III. Human-Oriented Crisis Management Systems

Oriented toward humans, the agile crisis management system is designed with three specific layers for ease-of-use purposes. This architecture is meaningful since typical users will be system novices. The three layers are the webserver, the database server, and a features layer. In order to boost its reusability, the interface of the database server is relatively fixed; new features or updates are only applied to the features layer, and users only access the ease-of-use interface via web services. For example, frontline employees can easily retrieve information and knowledge by simply issuing query requests. The technical authority also provides two valuable services to frontline employees. One is troubleshooting, which is issued by frontline employees; the other is user training with technical staff assistance.

Our synopsis of the confluence of roles, knowledge sharing, and acquisition practices, and related system features are enumerated in Table 1.

IV. Prototype of the Crisis Management System

In our definition, a crisis management system is an information system used

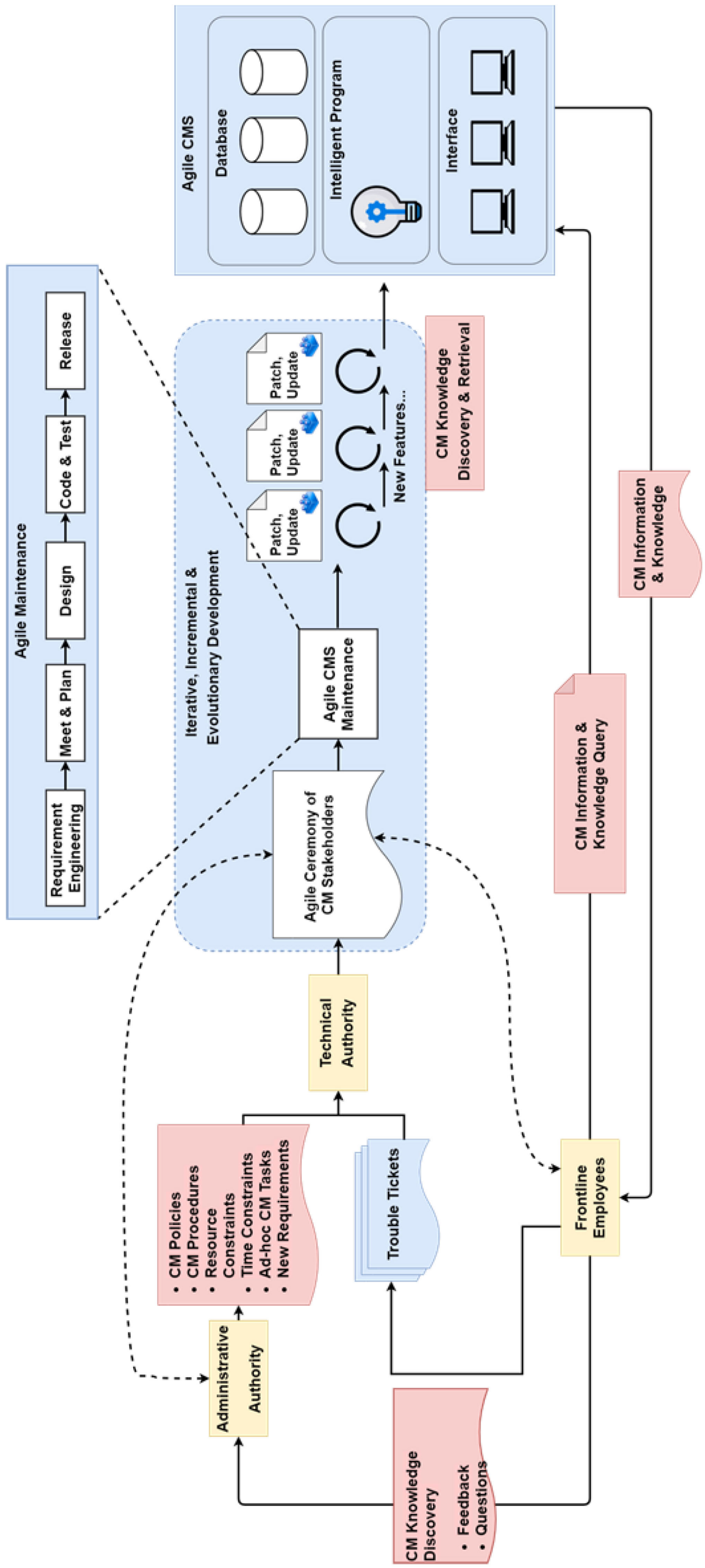


Figure 2. Dataflow of the knowledge-based crisis management system.

to discover, store, and retrieve corporate crisis management knowledge. It aims to promote collaboration among crisis management stakeholders, through locating knowledge sources, mining repositories for hidden knowledge, and disseminating knowledge in the workplace and beyond (e.g., employee health and well being in pandemic times). To corroborate our theoretical assumptions of a crisis management system based on stakeholders' knowledge, we thus develop a prototype of a crisis management system to cope with adverse effects due to the current coronavirus crisis.

Two fundamental technologies significantly contribute to the development and maintenance of this crisis management system: databases and portals. In view of this, crisis management stakeholders (administrative authority, technical authority, and frontline employees) should be able to acquire relevant crisis management knowledge (in this case, coronavirus crisis) they need at work while engaging in the knowledge-creating process through the portal-posting questions, solutions, and frontline insights.

A. Research Method In this article, we employ the design science research method while developing an Information Systems artifact—A stakeholders-oriented, knowledge-based crisis management system for crisis management during the pandemic of COVID-19. According to Peffers and Santos [2013], the rationale of design science is to develop artifacts that can address real-world problems and enhance organizational efficacy. Unlike natural sciences and social sciences that focus on understanding reality, the main principle of design science is to understand a problem and create knowledge through the building and application of an artifact [Hevner *et al.*, 2004]. Hence, we find it is appropriate to use the design science method here since the crisis management system we develop is essentially a knowledge-based application. Further, due to the complexity of the organizational setting and the ongoing epidemic of COVID-19, design science research has an advantage in the way of addressing such complex and wicked problems (cf. Baskerville and Wood-Harper, [1998]; [Hevner *et al*., 2004]).

B. Artifact Description Through a focus group comprised of Computer Science and Information Systems faculty and students and IT support staff from a medium-sized U.S. university, we collected information about the most important knowledge they would obtain, in the workplace. Then, we incorporate this inquiry into the requirements of a senior software engineering course project. To that end, an entity-relationship data model is formulated (see Figure 3). To illustrate, policies and technologies entities reflect the existing knowledge contributed by the administrative authority and the technical authority, respectively. For policies-makers, they need to import both governmental and organizational coronavirus policies, procedures, and guidelines. Given the possible change in work arrangement and schedule, corresponding work policies should be updated in the database, as well. Also, the administration needs to update their technology use policies because of the adoption of technologies in communications, screening for infection, and relevant information systems. The bilateral connections between policies, technologies, operations, and health promote an efficient retrieval and use of existing administrative and technical knowledge.

Further, the left part of the data model—Questions and answers entities reflect the continual process of knowledge-creating contributed by all the stakeholders, especially frontline employees who can provide a large number of insightful questions and even solutions.

As for the users of the crisis management system, the basic features and functionalities are described in the user stories (see Table 2). It is worth noting that in the portal part, a ranking mechanism is embedded. This user-participation-based function, aligning with the system administer, can filter out irrelevant and immaterial questions and answers, thus ensuring and enhancing the quality of crisis knowledge discovery, capture, and creation. Also, the graphic user interface (GUI) of the prototype of our system is presented in Figure 4. In addition to the buttons of functional knowledge areas (health, policies, operations, and technologies), the interface also provides links to questions/answers forum, coronavirus dashboard, and daily symptom screener.

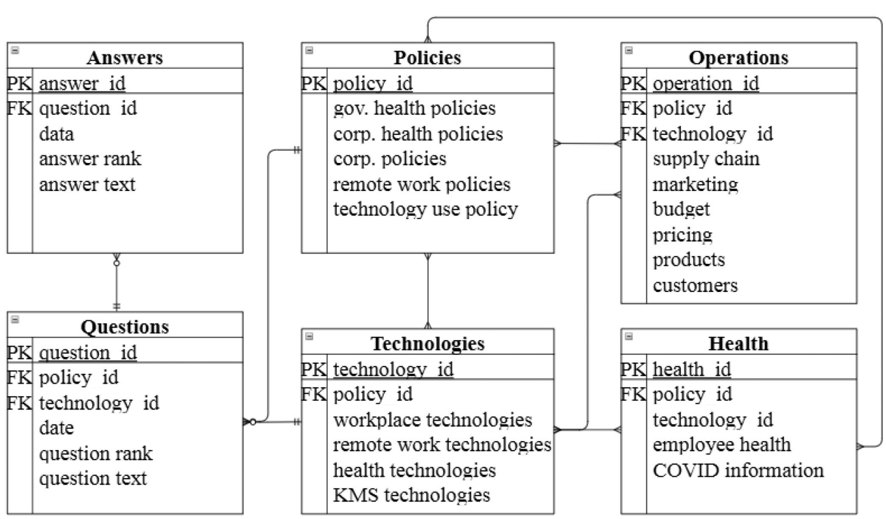


Figure 3. Data model of the knowledge-based crisis management system.

Table 2. User Stories and System Features.

Login	User will be able to access specific profiles given the credentials
Post a question	User will be able to post a question another user can view
View a question	User will be able to see all of his or her questions
Respond to a question	User will be able to respond to questions directly
Rate a question	User will be able to rate responses to questions
Search through query base & question base	User will be able to search and get back both knowledge base results and questions related to his or her initial search.

C. Evaluation and Demonstration In developing the knowledge-based crisis management system, we adopt an iterative, incremental, and evolutionary agile software development method. Two information systems professors performed the roles and responsibilities of organizational sponsors, while two groups of senior computer science students were the system developers under the guidance of a computer science professor.

Briefly stated, the requirements of the crisis management system are translated into a backlog of user stories. Each story is used to specify a single software feature/service. Our development process consists of three sprint development cycles (see Figure 5). In each cycle, students choose several user stories to guide their development. At the end of each sprint, “organizational sponsors” conduct sprint evaluation while providing feedback to the “developer team” on their progress. In the first sprint, the architectural design is founded and carried out, in addition to the product backlog. To assess the sprint status and progress, “developers” are required to prepare a sprint report and a peer-evaluation report, while demonstrating their work in front of “organizational sponsors” (information systems faculty) and “supervisors” (computer science faculty). This sprint cycles continue toward the completion of the crisis management system development. In the last sprint, “developers” wrap up the entire project, conduct system tests, and generate the README file that contains instructions for the user about the software program (Appendices A and B).

V. Future Research

We apply artificial *ex-ante* evaluation to determine the progress we have made related to the crisis management system during the coronavirus pandemic. Also, the information systems faculty played an important role (exploratory focus group) in suggesting features, functionalities of the artifact, and proposing improvement in the sprint cycles. Nevertheless, we believe a further evaluation of the artifact utility by a confirmatory focus group (e.g., IT practitioners and corporate employees/users) would be useful. In the future, more iterations are needed by recruiting more groups of system developers (better with industry experience).

There are also several general issues related to the system which stakeholders should address as the system evolves for future use.

Security and privacy: Given the structure and scale of specific large organizations and conglomerates (also in consideration of the costs involved), a myriad of workgroups, units, and companies can share a single set of crisis management systems while managing unauthorized access. Further, without an efficient and anonymous mechanism, some stakeholders would not share information and knowledge with others because of privacy concerns.

System performance: Due to the limited resources that can be allocated to developing the system, the agile development methods, features, functionalities, and performance may not satisfy initial expectations.

Motivation mechanisms: While many users would like to acquire information and knowledge from the crisis management knowledge sharing platform, they may not be sufficiently interested in sharing and discovering new knowledge related to the crisis. In contrast, some users may share redundant and even incorrect information with their colleagues on the platform. Technical authority and administrative authority should establish procedural mechanisms to avoid such outcomes.

Integration: When workplace colleagues use different communication tools to share information and knowledge as compared to when they work from home, one has to consider the comparability and integration of these applications and software with the crisis management system.

Figure 4. GUI of the knowledge-based crisis management system.

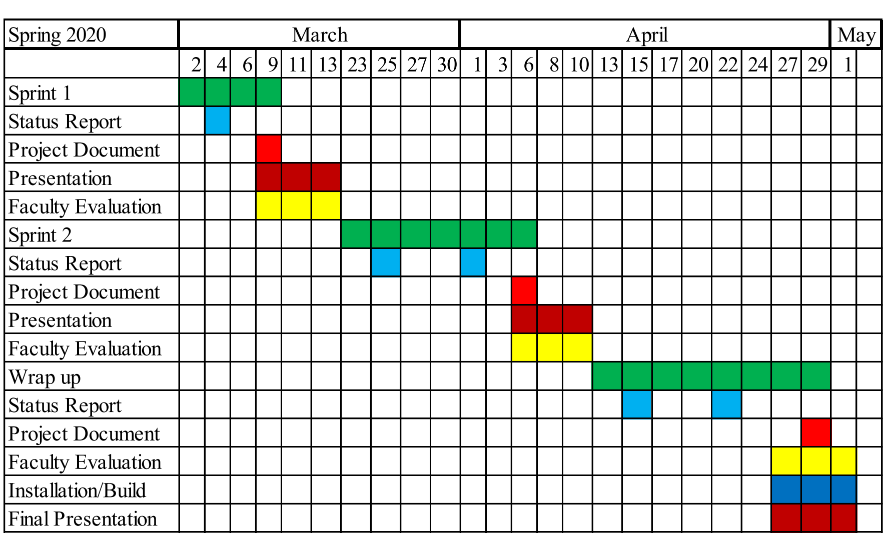


Figure 5. Timeline of the development of the crisis management system.

VI. Conclusion

The purpose of this article is to integrate knowledge management and knowledge management systems concepts with crisis management approaches, specifically required to respond to the COVID-19 pandemic. We believe a knowledge-based crisis management system can help many organizations cope with the problems of poor knowledge-sharing or weak knowledge-sharing platforms. To that end, we introduce a prototype based on well-established knowledge management theories and practices while using an agile development philosophy.

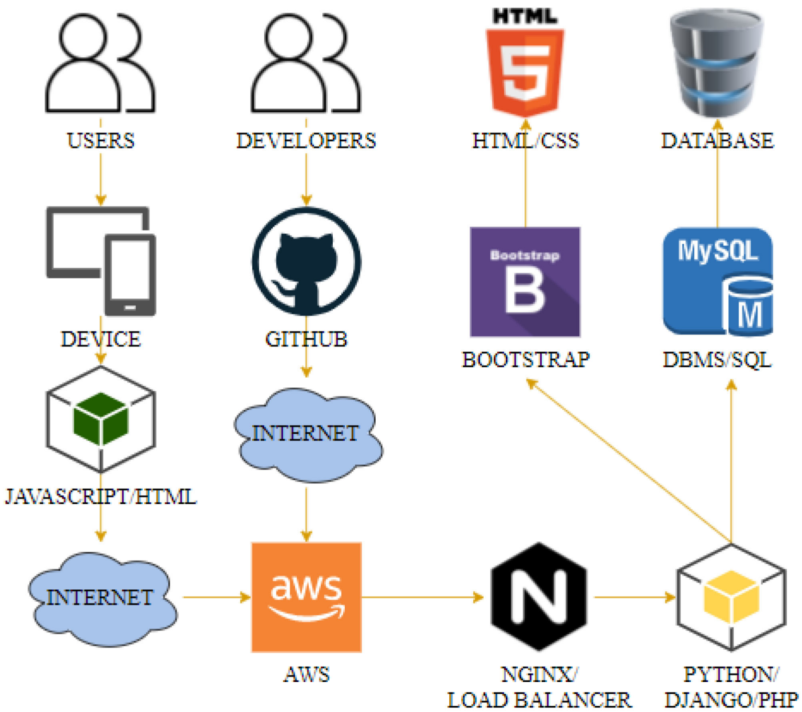
The contribution of this article can be twofold. Theoretically speaking, we explicate three salient groups of stakeholders in the confluence of the system and organizational crisis management—Administrative authority, technical authority, and frontline employees. The success of the system and crisis management efforts cannot be achieved without the collaborative efforts of these three critical stakeholders in knowledge discovery and sharing. Also, we provide a prototype of the crisis management system, with a focus on the coronavirus pandemic. This artifact and its agile development process provide a useful reference for a similar crisis management system design and development.

There are two future directions to extend the current research. First, the successful development of a crisis management system can help organizations who have been struggling with information or knowledge silos to become entirely more responsive in responding to the crisis. A case study based on the implementation and adoption of such system resources would provide valuable insights, as well. Another intriguing line of inquiry would be investigating the motivational factors of knowledge contributors in such agile crisis management systems.

Appendix A. Demo of Crisis Management System

README
Crisis Management System
SETTING
This is a project created during the Spring 2020 semester at Southern State University for the Senior Software engineering class. It is sponsored by Dr. A And Dr. B (MIS professors) and directed by Dr. C (Computer Science professor) at Southern State University (pseudonym). Through the use of web technologies, the portal has been implemented with Django and the database portion using MySQLite.
REQUIREMENTS
System: Windows 10(for demo) or server with Apache (for production)
Python 3.8.2+
Python Dependencies:
appdirs 1.4.3
asgiref 3.2.7
bleach 3.1.5
click 7.1.2
distlib 0.3.0
Django 3.0.5
filelock 3.0.12
joblib 0.14.1
markdown2 2.3.8
nltk 3.5
nltk libraries: stopwords and punkt
numpy 1.18.3
packaging 20.3
pbr 5.4.5
pyparsing 2.4.7
pytz 2020.1
regex 2020.4.4
scikit-learn 0.22.2. post1
scipy 1.4.1
six 1.14.0
sqlparse 0.3.1
stevedore 1.32.0
tqdm 4.45.0
virtualenv-clone 0.5.4
webencodings 0.5.1h
INSTALLATION
Windows installation guide:
Download and install version python 3.8.2+
Ensure that Windows Command Prompt has access to Python commands:
1. Go to Control Panel
2. Go to System
3. On the left side of the System window select Advanced system settings.
4. At the bottom of the System Properties window, select Environment Variables
5. Under “System Variables” select and double click “Path”, A new window will appear
6. Click New then Browser on the right side of the new window
7. In the “Browse For Folder”, Navigate to you Python installation and select “Python38-xx” file
Example Python Install location (Try this path, but may differ depending on system):
This PC -> Windows (C:) -> Users -> [Name of User] -> AppData -> Local -> Programs -> Python -> Python 3.8-32
8. Click OK in the Edit environment variable window
9. Click OK in the Environment Variables window
10. Click OK in the System Properties window
11. Test the configuration by opening a Command Prompt window and typing “python -V” and you should see Python 3.8.x
Command Prompt Tips:
Command Action
cd <name of file> -change into folder in current directory
cd .. -return to the previous directory
dir -list all files in the current directory
Resource for command prompt commands: https://www.digitalcitizen.life/command-prompt-how-use-basic-commands
Install program and python dependencies:
1. Extract Crisis-Knowledge-Base file to the desired location.
2. Start a command prompt and navigate, utilizing cd command, to the /Crisis-Knowledge-Base program location
in command prompt For example.
3. To install dependencies type “python -m pip install -r requirements.txt”
4. Wait for the installation to complete
Install nltk required libraries:
1. Open Command prompt
2. Type “python -m nltk.downloader stopwords”
3. Type “python -m nltk.downloader punkt”
4. Allow both files to finish download.
STARTING PROGRAM
1. Open Command Prompt
2. Navigate to the /Crisis-Knowledge-Base/Crisis_KBMS project location utilizing command prompt
3. Start the application by typing python manage.py runserver
4. Your server will start on a local host address ie. http://127.0.0.1:8000/
5. Go to that address to access the web application
Creating Admin/Super User
1. Open Command Prompt
2. Navigate to the /Crisis-Knowledge-Base/Crisis_KBMS project location utilizing command prompt
3. type “python manage.py createsuperuser”
4. When prompted enter username and press enter
5. when prompted enter a generic email address and press enter
5. When prompted enter password and press enter
6. When prompted reenter password
7. You should now have a super user that can be utilized to log into the admin page
Admin Portal:
1. First create a super user with instructions above and then start program
2. To access the admin portal you will need to go to the local host /admin. http://127.0.0.1:8000/admin
3. log in utilizing your admin credentials
4. Features of admin page
a. Add users and groups.
b. View or add information regarding the Crisis Management Knowledge base side of the app
c. View or add Add information
5. To explore more option you can click on a subject such as Knowledge which will allow you to view a list of
knowledge content.
Crisis Web Application:
1. To access the Web Application first Start the Program
2. Go to local host http://127.0.0.1:8000/
3. Enter admin or user credentials.
4. you can now navigate the application by utilizing the navigation bar at the top of the page.
5. you can view profile information by clicking the picture of a person in the top right of the page.
6. Post will allow you to post a question
7. View will allow you to view posted questions
8. Knowledge-base will allow you to view admin entered Knowledge and posted a question related to the entered query.
The results will be displayed in order by relevancy.
ABOUT DATABASE CONTENTS
The sample data in place currently has a core based around the crisis management best practices for Southern State University
found here: (hidden here for blind peer review)
Each item serves as a preloaded entry and directly relates to real-world data.
***Note through access to the administrative side of the project a user will have the authority to add Knowledge-Base
Entries of their own. (see sec. Admin Portal to access)
RESOURCES
Django - https://docs.djangoproject.com/en/3.0/
markdown2 - http://www.web2py.com/examples/static/sphinx/gluon/gluon.contrib.markdown.html#module-gluon.contrib.markdown.markdown2
nltk - https://www.nltk.org/
numpy - https://numpy.org/
scikit-learn - https://scikit-learn.org/stable/user_-guide.html
scipy - https://www.scipy.org/docs.html

APPENDIX B. STRUCTURE OF THE CRISIS MANAGEMENT SYSTEM



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