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# **University Wide Emergency Notification Systems: Measuring Effectiveness**

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## **ABSTRACT**

The objective of this research-in-progress is to investigate the overall effectiveness of university wide emergency notification systems. In response to the massacre at Virginia Tech University in 2007, one of the key findings by the investigative panel was that the administration failed to notify students in a timely manner. Many universities implemented campus wide notification systems following the release of this crucial document. A theory of task-technology fit is used to identify four distinct measures of effectiveness: timeliness, event identification, directed actions, and diversity of communication media. This research-in-progress includes a discussion of results from a pilot survey conducted on a single campus. This document outlines the research design, survey development, and data analysis. Implications and contributions are discussed.

## **Keywords**

Emergency notification systems, task-technology fit, information quality, measures of effectiveness.

## **INTRODUCTION**

Few news stories strike fear across all levels of society like announcements of violent attacks occurring at educational institutions. Witnessing vulnerable children who are potentially in harm's way strikes terror in our hearts, regardless of the age of the victims. In the aftermath of such tragedies, we collectively search for answers and methods to prevent any recurrence. Following the massacre at Virginia Tech University in 2007, one of the key findings by the investigative panel was that the administration failed to notify students in a timely manner (Fox and Savage, 2009). It was determined that the delay likely led to additional, unnecessary deaths. Many universities implemented campus wide notification systems following the release of this document.

On February 14, 2008, the campus administration activated its warning system in response to an incident at Northern Illinois University, in which a former student killed 5 students and wounded 18 other individuals. Everyone agreed that such prompt action is credited for saving lives. In response to this event, on May 31, 2008 the Illinois House and Senate unanimously approved a proposal that required all universities in the state, both public and private, to develop campus security plans in coordination with the Illinois Emergency Management Agency (Lowe, 2008).

The objective of this research-in-progress is to investigate the overall effectiveness of university wide emergency notification systems (Wolf, 2004). This study identifies four distinct measures of effectiveness: timeliness, event identification, directed actions, and diversity of communication media. These measures were determined to be most salient after reviewing comments from the pilot survey and performing a content analysis of various news reports (e.g., Fox and Savage, 2009). The emergent themes were then mapped to the measurement components presented by Goodhue and Thompson (1995). The following sections discuss the pilot survey administered on a single campus during an isolated closure event. This manuscript outlines the research design, survey development, and data analysis. Anticipated implications and contributions are later discussed.

## **LITERATURE REVIEW**

The theoretical foundation for this project is task-technology fit (e.g. Dennis, Wixom and Vandenberg, 2001; Gebauer, Shaw and Gribbins, 2010; Goodhue, 1998; Goodhue and Thompson, 1995; Zigurs and Bucklund, 1998; Zigurs, Bucklund, Connolly and Wilson, 1999; Zigurs and Khazanchi, 2008). Goodhue and Thompson (1995) found that performance and positive outcomes depended on the fit between the activity and the information technology (IT) being employed. They developed eight measurement components: (1) Quality (data quality), (2) Locatability (meaning of the data), (3) Authorization (proper access to the data), (4) Compatibility (data compatibility), (5) Ease of use and Training, (6) Production Timeliness, (7) Systems Reliability, and (8) Relationship With Users (Goodhue and Thompson, 1995: 222).

An emergency alert system provides notification to affected entities, providing critical information and gathering details (Chiu, Lin, Kafeza, Wang, Hu, Hu, and Zhuang, 2010). Alerts can be issued to notify people of a variety of urgent situations, letting them know what actions to take to mitigate negative outcomes.

**RESEARCH DESIGN**

This project investigates the effectiveness of university wide emergency notification systems. In compliance with state guidelines and regulations, universities of all sizes implemented systems. It is assumed that the systems will function properly in the event of an actual emergency. However, very little research has been conducted to objectively assess their effectiveness (noted exception Wolf, 2004). This study will help to fill the gap, developing a practical methodology to allocate scores and identify deficiencies of key performance indicators.

**Pilot Survey**

A pilot survey was administered to a group of undergraduate business students (convenience sample). The participants responded to six questions requesting their personal experiences relative to a recent campus closure due to inclement weather. The average age of the 26 respondents was 19.8 years, and 42% were female (58% male). It was determined that students are an appropriate sample population because the notification system is designed to provide alerts to members of the campus community, primarily students. The purpose of this survey was to determine the importance of pursuing this line of research; it was used to motivate the study. (The survey items are included as Appendix.)

After the survey is revised, the researcher will work with public safety at the university to administer the instrument to a larger campus population, including faculty, staff, and students. The results will be analyzed, providing both quantitative and qualitative insights to the appropriate personnel on campus. Particular focus will be paid to those areas that need to be addressed. In other words, the primary goal is to assist public safety with identifying deficiencies, and to recommend solutions to improve the existing system. In the extreme case, these findings could influence life-or-death outcomes.

**Current Status of the Study**

The initial pilot test has been completed. The results are being analyzed and the instrument is being modified to integrate previously validated items from the task-technology fit literature (e.g., Goodhue and Thompson, 1995). The researcher will meet with the public safety staff to discuss the objectives of the project. Changes could be to the research design, depending on these discussions. The measures that will be included in the questionnaire are timeliness, event identification, directed actions, and diversity of communication media. Each factor will consist of three items developed from validated instruments. The revised questionnaire will be tested to ensure acceptable reliability and validity. A group of faculty members, staff and students will assist in evaluating the instrument, providing feedback. A five-point Likert scale will be employed, with familiar anchors (e.g. “Strongly agree”). Respondents will also be encouraged to provide explanations to justify their quantitative inputs. Partial least squares will be used to analyze the survey data. Textual comments will be content analyzed for key themes and relevant concerns.

**Future Directions**

The researcher plans to disseminate results to appropriate and interested departmental units at other universities. The effectiveness of emergency notification systems is vital for the safety and well-being of campus personnel. However, testing the systems on a regular basis is only beneficial if the results of the tests are analyzed and communicated. Findings must contribute to a continuous improvement plan, closing the gaps and verifying that all effectiveness measures reach acceptable levels. Communication channels must also be evaluated based on cost of implementation, ensuring that the system deployed meets required effectiveness criteria while remaining affordable.

One way results might be reported is through a digital dashboard connected to Web services. Table 1 shows a possible template for reporting results. Scores for each university system will populate the cells, focusing on the four dimensions of effectiveness discussed above.

	Timeliness of Announcement	Clarity of Event Notification	Specificity of Directed Actions	Diversity of Comm. Media
University A				

University <i>n</i>				
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**Table 1. Comparison of Effectiveness Measures**

This study focuses only on university systems. Other types of emergency notification systems are beyond the scope of this research. However, this stream of research might be broadened to include additional contexts, such as municipalities.

## CONCLUSION

This study provides a method for evaluating the effectiveness of university wide emergency notification systems. This study emphasizes the importance of assessing multiple aspects of effectiveness to ensure that the systems adequately provide essential, urgent information. These systems are designed to facilitate communications that maintain safe environments for all campus personnel. The task-technology fit model provides the foundation for evaluating and assessing the overall performance of emergency notification systems. Based on the price of adoption and the effort required to implement these nearly ubiquitous systems, it is imperative that universities ensure quality and effectiveness. This report provides an initial attempt at developing best practices for the industry.

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## Appendix

1. Were you aware that the campus officially closed at 2:00pm on Friday, 2/14/14? (Yes/No)
2. What was the time when you were first made aware of this decision? (Text box)
3. How did you first hear about the campus closure? (Select from a dropdown list of communication channels)
4. Including your initial notification, how did you hear about the campus closure? (Select all that apply)
5. What impact did the campus closure have on your scheduled activities? (Open-ended text box)
6. In your opinion, was the emergency notification system effective during this campus closure? (Yes/No)
7. Please explain your answer to the previous question. (Open-ended text box)