The AMBER Alert System: An IS Artifact Design from a Rhetorical Situation Perspective

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Abstract

This paper connects IS artifact theory and a rhetorical framework to propose a set of design propositions that could improve the effectiveness of the AMBER Alert system in engaging public participation in finding missing children. Our design propositions emphasize the difference between AMBER Alerts and other emergency messages and propose a design extension that still relies on the affordances of the system but minimizes the system constraints. An effective instantiation of the proposed artifact is expected to persuade the public to collaborate with authorities.

Keywords: AMBER Alert, IS artifact, Rhetorical framework, Design science, General systems theory.

1. Introduction

An AMBER Alert is part of emergency broadcast systems in many countries, originating in the United States. Its mission is to seek public assistance in recovering abducted children under the age of 17 by disseminating information about the victim. Named after Amber Hagerman, a 9-year-old girl abducted and murdered in Texas in 1996, the AMBER Alert has successfully recovered at least 1,186 children as of December 2023 (About AMBER Alert, 2023). The alerts are broadcast over various media, including radio, television, and mobile phones, leveraging mass communication to enlist public vigilance and facilitate law enforcement efforts. Due to the convergence of telecom and media, the rapid dissemination of AMBER Alerts via mobile phones has become the most important outlet for such alerts. This dissemination ensures that critical information reaches the public quickly, turning communities into networks of vigilant individuals who can aid in the safe return of abducted children (Griffin et al., 2016). However, multiple calls have been made to improve the efficiency of AMBER Alerts from a functional perspective and to increase the positive outcome of the systems (Griffin et al., 2022; McDermott et al., 2020). It is crucial to note that while the media often pays less attention to marginalized groups (missing white girl syndrome), AMBER Alert serves as a potential "antidote" to this syndrome (Griffin et al., 2024).

The AMBER Alert is currently one of four types of alerts in the Wireless Emergency Alert (WEA) System (FEMA, 2023) included in the general Emergency Alert System (EAS). In addition to the AMBER Alert, the WEA system includes national or presidential alerts, imminent threat alerts, and public safety messages, with all but the presidential alerts being optional for the public to receive (About AMBER Alert, 2023).

The EAS was initially designed and regulated in 1994. However, it was not until 2006 that the AMBER Alert was integrated into the EAS by the Federal Communications Commission (FCC, 2023). Then, in 2012, the FCC issued mandatory regulations for mobile operators to implement WEA, allowing authorities to send text-like messages to devices in a specific geographical area (FCC, 2024). This has proven to be problematic for the AMBER Alert. The EAS has always focused on informing and instructing the public about safety measures and does not require any interaction with the public (GSMA, 2023). In contrast, the AMBER Alert relies heavily on public participation (Griffin et al., 2016). The effectiveness of an AMBER Alert depends on the public's vigilance and willingness to report sightings or information to authorities (Griffin et al., 2016). Furthermore, the AMBER Alert motivates the public to help others rather than themselves, while other emergency alerts directly benefit individuals' safety.

By analyzing the AMBER Alert as an IS artifact (e.g., Chatterjee et al., 2021), we intend to offer design principles to increase the system's effectiveness in supporting authorities' efforts to recover missing children. On average, over the past five years, 50% of the reported cases involved children from marginalized racial groups (About AMBER Alert, 2023). The AMBER Alert integrates technology

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(mobile networks), information details (details of the abduction), and social components (collaboration between law enforcement and the public). However, some missing components of an IS artifact in the WEA system prevent AMBER Alerts from operating more efficiently.

The AMBER Alert system aims to encourage the public to participate in the recovery of missing children by providing tips to law enforcement, which is the social component of this IS artifact. Therefore, persuasive communication plays a critical role in the success of the IS. We can determine how to enhance interactions between subsystems using rhetoric to analyze how social components interact with the system. Thus, our research uses rhetoric to maximize the benefit of the information processing that occurs in the AMBER Alert system.

Traditionally understood as the art of persuasion (Rapp, 2022), rhetoric can be used to analyze and propose improvements to the AMBER Alert IS artifact. Though technical in nature, the broader reach of an IS artifact involves significant communicative and persuasive elements that are pivotal to its design, implementation, adoption, and proper use (Johnston et al., 2023). It is important to note that rhetorical theories have been successfully used to study and explain technological and managerial issues in the IS field (e.g., Barrett et al., 2013; Johnston et al., 2015).

In this paper, coupled with the IS artifact theoretical lens, we use the rhetorical situation by Bitzer (1968) as a framework to guide the analysis of AMBER Alerts. Bitzer's framework is useful in the analysis of the AMBER Alert system for its key elements: exigence, audience, and constraints. Each of these elements is defined and contextualized within the AMBER Alert system, with the concept of constraints particularly relevant to this study. Constraints are the many factors that influence an audience to act or not act. In the case of AMBER Alerts, this study is concerned with identifying constraints that prevent the audience from acting and conceptually proposing design recommendations to remove these constraints and help the AMBER Alert become an improved IS artifact.

Our paper puts forward a set of design principles for an Amber Alert IS artifact as the initial stage of a design science project for an IS artifact. As Thomas et al. (2022) posit, the IS artifact design science process "begins with the awareness of the problem or, more specifically, a practical problem experienced by people in the everyday world" (p. 1454), leading to a proposed research effort involving a tentative design of an IS artifact to effectively offer a solution to the problem (Thomas et al., 2022). In that way, our paper intends to offer a practicable and generalizable IS artifact that goes beyond the technology itself (Thomas et al., 2022). Our research effort considers that "the artifact to be designed is not just the technology (Kline, 1985) or the IT artifact but the entire IS artifact, of which the technology artifact is just a part" (Thomas et al., 2022, p. 1434).

2. Background

The WEA public safety system allows authorized government officials to send geographically targeted emergency alerts to mobile devices. It was established under the Warning, Alert, and Response Network (WARN) Act and is a partnership between the FCC, the Federal Emergency Management Agency (FEMA), and wireless carriers. (FCC, 2023).

The WEA system enables transmitting alerts using a dedicated technology called Cell Broadcast Service (CBS), separate from standard voice calls and SMS text messages (FCC, 2023). Using a separate service ensures they are not delayed by network congestion during emergencies. The alerts notify users with a unique attention signal and vibration cadence, a feature designed for those with hearing or vision disabilities. Mobile devices must be capable of receiving CBS messages, and the user's wireless carrier must participate in the program. Although carriers' participation was voluntary in the EAS, they were required to deploy WEA by April 2012.

The FCC is responsible for ensuring WEA is accessible to as many people as possible and has been constantly searching for improvements to the system (FCC, 2024). The FCC aims to make WEA more effective and user-friendly while addressing accessibility concerns.

As mentioned earlier, the WEA system is designed to deliver four main types of alerts to mobile devices. Presidential Alert is the highest alert level issued by the President of the United States or a designated representative. This alert category addresses the nation during emergencies of national significance, such as natural disasters or terrorist attacks. Unlike other WEA alerts, Presidential Alerts cannot be opted out of by users, ensuring maximum reach during critical situations.

The second type of alert is imminent Threat Alert, which warns about severe man-made or natural disasters that pose an imminent threat to life or property. This category can include elements such as Extreme Weather Alerts (e.g., tornado warnings, hurricane warnings, flash flood warnings) or other emergencies (e.g., chemical spills, wildfires, nuclear plant issues).

Public Safety Message is the third type of alert that informs the public about time-sensitive situations

that affect public safety. This alert might include information about local emergencies like police activity, active shooters, localized evacuation orders, riots, and other urgent situations.

The last type of alert in the WEA is the AMBER Alert. This alert, unlike other alerts, is issued to aid in the recovery of abducted children. This alert provides information about the abducted child, the suspected abductor, and any associated vehicles to request help from the public in locating the missing child. The AMBER Alert is initiated by law enforcement agencies and broadcasted through the WEA system to mobile devices in the relevant geographic area.

3. Theoretical framework

3.1. IS artifact

The understanding of Information Systems (IS) artifacts has developed significantly over time, and there is now a consensus on three components of IS artifacts (e.g., Chatterjee et al., 2021; Lee et al., 2015; Matook & Brown, 2017). The first is the technology artifact, encompassing the hardware and software tools created to address specific problems. The second is the social artifact, which encompasses the interactions and relationships among the system's users and stakeholders. The third is the information artifact, involving the data and information generated, processed, or created because of interactions between the social and the technical artifacts (Lee et al., 2015).

The integration among technical capabilities, information flows, and social interactions, as well as the resulting synergy created, are crucial for forming IS artifacts and effectively operating such systems to achieve predefined goals (Matook & Brown, 2017). Therefore, an IS artifact is a system where the whole is greater than the sum of its parts. Using general system theory (Von Bertalanffy, 1972), Matook and Brown (2017) also explain that IS artifacts should have boundaries to separate them from their environment. Moreover, the state of a system, defined by its properties at any given time, seeks equilibrium for optimal performance. External stimuli can disrupt this balance, prompting the system to use feedback to restore or achieve a new balanced state. Therefore, a system should receive inputs, transform them, and output the results, with feedback playing a crucial role in this transformation and self-regulation process. Feedback is always provided because of interacting with the environment (Chatterjee et al., 2020).

The synergy between an IS artifact's social and technical components occurs through an affording-constraining relationship. Arranging technology within social structures (or vice versa) can facilitate or constrain usage and practices in social contexts. The features of the technology itself do not solely determine the relationship between affordances and constraints within an IS artifact. It is also shaped by the users' skills and inclinations to utilize these features and the broader organizational environment in which the technology is implemented. Whenever constraints outweigh the affordances, it represents design opportunities to improve the IS artifact (Leonardi, 2011).

3.2. Rhetoric in the IS literature

As a general theoretical lens, rhetoric has been broadly used in IS literature to address persuasive, effective, and motivating communication in IT managerial activities. For example, the information security literature has proposed enhanced frameworks that leverage rhetoric as a method to understand the use of fear appeals to increase compliance with security policies (e.g., Johnston et al., 2023; Torres & Crossler, 2019; Johnston et al., 2015). These studies highlight the importance of rhetoric in influencing the adoption of secure behaviors. IT diffusion literature has used rhetoric to explain how rhetorical claims and arguments are strategically framed through discourse to influence views on technology and attitudes toward adopting technological innovation (Barret et al., 2013). The IS literature has also studied the role of technology in mediating rhetorical strategies and how they affect policy changes and IT innovation (Bernardi et al., 2017). Rhetoric has also been used in proposing language usage with appeals to emotions or technical communication in framing and building argumentation on technology innovation decisions (King & Kugler, 1993). Schultze and Leidner (2002) used rhetorical theory to guide their IS-based knowledge management literature review. Schultze and Leidner identified the normative, interpretive, critical, and dialogic discourses used in the literature and proposed different ways to broaden research in IS-based knowledge management.

Also, rhetoric has been used as a methodological tool. For example, rhetorical analysis has been used to look beyond the literal content of texts, highlighting the dissonance between management and worker discourses in IT service support (Trussson et al., 2014). More recently, rhetoric was used to design an artifact detecting radical online postings (Etudo & Yoon, 2024), while another study found that investors respond to rhetorical signals rather than substantive signals in technology announcements (Nishant et al., 2023). Finally, one study's results showed that an unsupervised approach for rhetorical parsing in text

summarization can improve the faithfulness of summarization results (Hou & Lu, 2020).

3.3. Rhetorical situation

The efficacy of the AMBER Alert system might be better understood through the framework of Lloyd F. Bitzer's (1968) rhetorical situation. In Bitzer's framework, "a situation is rhetorical insofar as it needs and invites discourse capable of participating in a situation and thereby altering its reality" (Bitzer, 1968, p. 6). When a situation that needs discourse or language as part of its resolution occurs, it is rhetorical. The elements of a rhetorical situation are 1- exigence, the occurrence of some problem that needs a resolution; 2- audience, the person or people who can resolve the situation; and 3- constraints, the limiting factors that influence an audience to act or not act.

In Bitzer's framework, exigence creates a rhetorical situation and determines its audience. The rhetorical situation is a problem, a defect, or something other than it should be (Bitzer, 1980). Exigences give rise to rhetorical situations when they can be modified by discourse, that is when language is a key part of a situation's resolution. Circumstances with inevitable outcomes (e.g., death and weather) or with outcomes that can be modified by action alone (e.g., fixing a broken pipe) do not give rise to rhetorical situations (Bitzer, 1968). Instead, a situation is rhetorical "only when it is capable of positive modification and when positive modification requires discourse or can be assisted by discourse" (Bitzer, 1968, p. 6). After determining that an exigence might be modified via language, the next step is determining who can do the modification; the audience is the person or group of people who can respond to rhetorical discourse and resolve the situation in some capacity (Bitzer, 1968).

The final element of the rhetorical situation is the concept of constraints, which are the "persons, events, objects, and relations which are part of the situation because they have the power to constrain decision and action needed to modify the exigence" (Bitzer, 1968, p. 8). Constraints might include "beliefs, attitudes, documents, facts, traditions, images, interest, motives, and the like" (Bitzer, 1968, p. 8). They can even include "elements of mental life" like "ideas, images, meanings, symbols, laws, rules, conventions, attitudes, interests, and aspirations" (Bitzer, 1980, p. 22). Grant-Davie (1997) defines constraints as "all factors in the situation, aside from the rhetor and the audience, that may lead the audience to be either more or less sympathetic to the discourse" (p. 273). Constraints ultimately influence an audience to act or not act, making them directly related to the outcome of a rhetorical situation.

The AMBER Alert system can be placed within Bitzer's framework to be understood as addressing a rhetorical situation. It communicates a rhetorical exigence (a missing child investigation) to the audience (the public), whose response is a factor in the significant modification of the situation (Bitzer, 1968). However, rhetorical situations should not invite just any response but a fitting one (Bitzer, 1968). This paper suggests that while the AMBER Alert system is responding to a rhetorical situation, it is not yet providing a fitting response—one that appropriately attends to the exigence, audience, and constraints of the audience—as evidenced in the low response rate (e.g., Griffin et al., 2016; 2022). A fitting response begins with the rhetor, who needs to issue a compelling invitation and constrain the audience to act rather than not act. Therefore, the concept of constraints is particularly relevant to our study of the AMBER Alert system. In the following section, we look at the specific constraints in the alert system that influence the public toward inaction.

4. The AMBER alert as an IS artifact

As shown in Figure 1, the current AMBER Alert system starts with a law enforcement agency requesting FEMA to issue a regional or state AMBER Alert. Once the request is approved, the alert and the critical information law enforcement gave about the abduction are issued within minutes. The public in the geospatial targeted areas receives the message on their phones, but it can be stored. Furthermore, they cannot interact with the received message to report a sighting and must contact law enforcement directly.

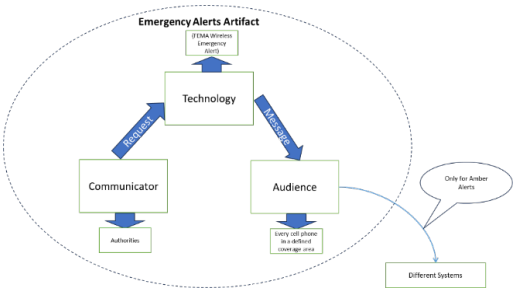

Figure 1. AMBER alert current situation

The AMBER Alert system serves as an IS artifact, offering a list of affordances while imposing some limitations and constraints on its components. One major issue is limited technological integration, as the system relies on tools like cell broadcasting messages (CBS), offering many advantages but limitations

regarding real-time interactive data processing. The flow and quality of information artifacts, encompassing data collection and dissemination, are not on par with efficient IS artifacts. Currently, the flow of information is only unidirectional (from law enforcement to technology, technology to the public). The current system is not dynamic without a feedback mechanism to improve the system continuously and update the information. Inefficiencies in awareness and public engagement within the social artifacts significantly reduce the impact of the system. From a general systems theory perspective (Von Bertalanffy, 1972; Chatterjee et al., 2020), the AMBER Alert system must function as an open system where all subsystems interact and adapt mutually. Any misalignment or poor adaptation among these subsystems can lead to operational inefficiencies.

The limitations imposed by the technical subsystem may constrain the public (social component) from having more effective and proper participation. We identify four general constraints preventing audience response to the AMBER Alert system, which are directly supported by Bitzer's discussion. They are as follows:

1. *People do not believe the AMBER Alerts personally affect them.* "An exigence that involves speaker or audience personally will generate more interest than one in which they are not directly involved" (Bitzer, 1980, p. 32). Regarding the AMBER Alert system, even if people understand the seriousness of the situation, they may not take action if they do not feel personally connected to it.

2. People do not believe they can make a *difference through the AMBER Alerts.* Bitzer (1980) states that people are more likely to respond to exigence if they believe their response can make a difference. People need to perceive that they can make an impact by acting to report their sightings.

3. *People pay closer attention to alerts when they are in their geographic region.* Bitzer (1980) states that people are more interested in exigencies close in time and place than those distant or far in the future. So, people are less likely to be on alert when an abduction is not in their area.

4. *People find the alert system generally inconvenient.* Even if people believe their actions will make a difference, Bitzer (1980) states that they are more likely to act if the effort required is low and requirements are readily available. So, if the current alert system does not create a low-effort response mode, there is a lower chance of participation.

By synthesizing constraints and limitations imposed by the AMBER alert system as an IS artifact and as a rhetorical situation explained above, we outline a list of affordances in Appendix A, Table 1, and a list of constraints in Table 2.

Likewise, we synthesize our design propositions with IS principles and Bitzer's framework. We propose solutions to encourage action by creating affordances where there were previously constraints.

5. An extension to the current AMBER alert IS artifact

Even though the current version of the AMBER Alert system is an IS artifact, it is inefficient because FEMA's public alert system utilized for such communication was not intended initially for AMBER Alerts (ETSI, 2023). AMBER Alerts communicate information that does not directly impact individuals but requires a level of persuasion to motivate people to act and communicate back with the authorities. However, other messages (WEAs) communicated through FEMA directly impact individuals' safety, which is persuasive enough for the audience to act. In addition, the action required is taking safety measures, with no interaction with a contact point or any feedback needed. Since none of the above communication dynamics apply to AMBER Alerts, we suggest extending the current system to increase its efficiency and thereby improve its response rate. It is important to note that AMBER Alerts still need to be part of the WEA through FEMA's public alert system and use the affordances of such a system to reach as many people as possible quickly. Therefore, we propose extending the system by including a few design propositions to leverage current affordances while simultaneously minimizing constraints. With the following proposed changes, we argue that a more complete IS artifact can be developed, which may result in a more efficient and effective system.

Design proposition 1: The system needs to offer a two-way flow of information between technology and social components.

The current AMBER Alert system relies on the public to call law enforcement to report a sighting. However, this process has its drawbacks. People may hesitate to call for various reasons, and some may find it difficult or inconvenient. Additionally, language barriers can further hinder reporting. People are more likely to take action when minimal effort is required and less likely to get involved when a situation demands significant time, resources, or complex actions.

We suggest an addition to the alert, allowing the public to report their sightings directly through the system. This addition should enable the public to interact directly with technology, providing the capability to update authorities in real time about the incidents of sightings. This real-time updating capability could transform the current static system into a dynamic one. The proposed dynamic nature could also inform the public about the latest updates on each case and encourage more interaction with the system (Matook & Brown, 2017).

Design proposition 2: The system needs to offer an automatic retrieval capability.

For the system to provide such capability, it must offer the ability to save or retrieve the content of messages by the public. This capability allows the alert information to be accessed and retrieved quickly, repeatedly, and for a longer time. The user can rely on technology instead of memory to recall information, so there will be no missing information, which decreases doubts when reporting.

The current AMBER alert contains too much detailed information, which makes it difficult to remember due to information overload. We suggest that FEMA still sends the alert through EAS. However, the alert message should only provide a few vital details, making it shorter. The message should encourage people to get more details about the abduction. The message can direct them to the extension where the information is visually presented and can be saved for future access.

Design proposition 3: The system must include a feedback loop once the case is closed.

A rhetorical situation can be resolved based on the audience's actions. People (the public and law enforcement) are more likely to act when they believe they can make a difference (Bitzer, 1980). Therefore, communicating with the social components of the system that a case has been resolved and the child has recovered can motivate individuals to act, knowing that their actions can make a difference. The current AMBER alert system does not offer feedback to the individuals involved in the situation (social components), resulting in uncertainty about case resolution. This can discourage them from participating actively in receiving alerts. Providing feedback has also been advocated by the emergency communication literature (e.g., Heath & Millar, 2003). In addition, people need closure (Webster & Kruglanski, 1994). A feedback loop ensures the IS artifact continuously works to resolve problems and meet the exigence initiating the rhetorical situation. Therefore, we propose a system that provides the result of each case to all its stakeholders by showing the final status of each case.

Design proposition 4: The system needs to provide visual information.

Recalling textual information is cognitively more demanding than recalling images (Paivio, 2013). As a result, individuals may find it difficult to act. Also, there is a chance of misinterpretation and misunderstanding due to the lack of accompanying images that could clarify the message. Therefore, even if the individual wants to report a sighting, they may hesitate to do so if they remember the details correctly, which can impede them from reporting. As a result, we propose a system that provides easier access to identify subjects and vehicles using pictures.

By suggesting the above extension to the current system, an Amber alert can be represented as the IS artifact depicted in Figure 2.

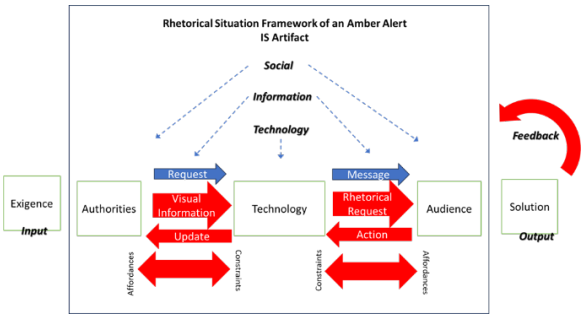

Figure 2. The proposed AMBER Alert system. (The red color represents our design propositions)

6. Implications for theory

Conducting a study on the AMBER Alert system through the lens of the Information Systems (IS) artifact framework allows for a comprehensive analysis that transcends the mere technological aspects and delves into the critical social and informational components. This approach aligns with the call by Thomas et al. (2022), who emphasized the importance of considering the multifaceted nature of IS artifacts. By adapting features from other IS artifacts with real-time and edge-computing capabilities, we can innovate within the AMBER Alert system, enhancing its effectiveness in new settings. This integration advances the practical application of IS theory and enriches our understanding of how technological systems can be optimized to serve societal needs effectively. This study thus contributes to the design of science literature by demonstrating how theoretical insights can be practically applied to improve critical emergency response systems.

This study exemplifies the creation of a problem-solving IS artifact within a new context. By proposing a redesign of the inner environments of the AMBER Alert system's technology, information, and social components, this research ensures their alignment with the specific outer environment conditions. This approach demonstrates that by adapting the IS artifact to the unique requirements of a new setting, its effectiveness can be maintained and even enhanced. Consequently, this study validates the practical application of design science principles and underscores the importance of comprehensive adaptation to achieve successful implementation across diverse contexts.

Moreover, this study offers a new theoretical framework designed to enhance persuasive and interactive communication between the social and technical subsystems of the AMBER Alert system. Examining the system through the rhetorical situation framework aims to engage the public, encouraging more actions. This framework improves the responsiveness and efficiency of the AMBER Alert system and demonstrates how leveraging rhetorical strategies can strengthen the interaction between social and technological components. As a result, this study contributes to the theoretical discourse on IS artifacts by highlighting the critical role of communication in the success of technology-driven emergency response systems.

7. Implications for practice

Proposing changes to the AMBER Alert system involves a multidisciplinary approach, addressing technological, social, legal, and operational aspects. This study explores the new design's general implications by focusing on technical and social areas and considering legal and operational factors. Our proposed design leverages modern communication capabilities, such as mobile apps, for more effective and accessible dissemination of alerts, necessitating updates to the existing infrastructure. This design encourages public participation and engagement, potentially altering public behavior and improving alert responsiveness.

While continuing to emphasize the use of FEMA, our proposed design incorporates robust privacy and legal safeguards without compromising operational efficacy or the extensive outreach provided by the Emergency Alert System (EAS). By increasing public participation, we hope to achieve higher success rates in locating abducted individuals, thereby enhancing support for families and victims.

8. Future steps

Following guidelines for generalizing an IS artifact (Thomas et al., 2022), we plan to build a prototype of the proposed extension to the AMBER Alert. The prototype will allow us to conduct a series of experiments to test how successful the different additions are in a controlled lab experimental setting.

9. Conclusion

This paper offers a set of design propositions that to improve the effectiveness of the AMBER Alert in engaging public participation in finding missing children. We propose a more nuanced IS artifact (Chatterjee et al., 2017) based on the rhetorical situation framework (Bitzer, 1968). Our design suggestions emphasize the need for collaboration by developing an IS artifact that effectively enhances the AMBER Alert system's overall efficiency and impact.

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Appendix A

Table 1: Lis of Affordance Offered by the Current AMBER Alert System		
Affordance Name	**Description**	**Needs met**
Push Notification	As cell broadcast messages (CBMs), AMBER Alerts are automatically enabled on user handsets and typically do not require users to opt in. Therefore, they can reach many users compared to systems that require users to download or subscribe to an app.	Opt-in and automatic reach
Mass Notification	Mobile network's radio cells can transmit AMBER alerts as cell broadcast messages (CBMs) to multiple devices simultaneously rather than targeting a specific mobile device. Since CB operates on a one-to-many basis, this system provides mass communication capability.	Reaching out to as many targeted people (audience) as possible to spread the word
Instant Notification	Millions of compatible handsets, within seconds, can receive an AMBER alert without network congestion, enabling rapid dissemination of information.	Reaching out to the audience as quickly as possible.
Geospatial Notification	The target areas for an AMBER Alert are where people are most likely to see the abductor and child. So, it can range from a single radio cell to an entire mobile network. Since the AMBER Alert system utilizes a network's radio cells, it is inherently location-based technology.	Reaching out to the audience in the targeted areas
Audible Override Notification	AMBER Alerts is configured to emit a unique alert tone, overriding any silencing or mute settings on mobile devices. These alerts automatically appear on the screen of a mobile handset without needing to be opened, providing an immediate visual alert.	Grabbing the attention of the audience.
Privacy	An AMBER Alert broadcasts to any compatible device in the area rather than to phone numbers. Therefore, it offers anonymity, requires no pre-registration, and stores no mobile subscriber information.	Compatible with privacy concerns.
Security	As a CBM, AMBER alerts are challenging to fake (unlike SMS). The physical security of CB facilities and multiple authorization stages significantly reduce the risk of impersonation.	Compatible with security concerns.

Table 2: Lis of Constraints Imposed by the Current AMBER Alert System		
Constraint Name	Description	Potential Issues ((related rhetorical constraints)
Lack of Automatic Alert Retention	There is no built-in system for automatically saving AMBER Alerts on phone devices. Therefore, extra steps are required on the users' side to save the alerts for future use. They can take a screenshot of the alert or download some Apps to keep a log of all the notifications. These workaround methods, of course, add another constraint to users. Without saved alerts, the potential issues are:	Memory Dependence: Users must rely on their memory to recall the details of the alert, which can lead to inaccuracies or forgotten information over time. (1, 2)
		Memory Unreliability: Users may feel uneasy about relying solely on their memory to recall important details, leading to hesitance in reporting sightings. (4)
		Recall Risk: Users might not have the information readily available when encountering potential sightings. (1,2)
		Inconvenience: Users need to take additional steps to manually save the alert, which can be inconvenient, especially in emergencies requiring immediate attention. (4)
		Potential for Overlooked Alerts: Users who miss the initial notification might not realize they got an alert and cannot react to the alert. (1,2,4)
		Missed follow-up information: Users may miss important updates about the alert if they cannot reference the original message. (1,2,4)

Text-Based Alert	AMBER Alerts are sent exclusively in text format, without incorporating visual representations such as images or videos. This can limit the effectiveness of the alerts, as visual information could significantly enhance the ability to recognize and respond to the alert content. Text-based alerts may raise the following potential issues:	Misinterpretation: Misrepresentation or misunderstanding due to the lack of accompanying images that could clarify the message. (1,2,4)
		Information Overload: It is more overwhelming and challenging to process detailed descriptions in text rather than visual information. (1,2,4)
		Cognitively Taxing: To remember and visualize details from the text, users must rely more on their cognitive ability, which can be challenging under stress or in emergencies. (1,2,4)
		Visual Memory Recall: The lack of images can slow the recognition process and make it harder for users to remember the alert's details, potentially reducing the chances of later recognizing the missing person or suspect. (4)
		Reduced Engagement: Not capturing attention as effectively as multimedia alerts. (1,2)
Short Exposure Period	AMBER Alerts typically stay on the phone screen for only a short period, which can lead to several issues for users. This limited exposure time can raise the following potential issues:	Reducing Retention: The brief exposure time may not be sufficient for users to remember the alert's details, making it difficult to recall important information later. (3,4)
		Overlooked Details: Critical details within the alert, such as descriptions of suspects or vehicles, may be overlooked due to the short display time. (3,4)
Inopportune messaging	Sometimes, these alerts are received during inconvenient or disruptive times, such as in the middle of the night or while driving.	Desensitization: Over time, people may start to ignore the alerts or disable them completely, reducing the overall effectiveness of the AMBER Alert system. (1,2,3,4)
		Task Interruptions: Although the alarming ringtone and the vibration are designed to capture attention, if the person is engaged in a primary task and the alert comes as a secondary task, their attention and cognitive resources are allocated to the primary task (Vance et al., 2022), which may reduce their ability to focus and comprehend the alert. (3)
Lack of Interactive Reporting Mechanism	The AMBER Alert system does not provide an interactive platform for the public to report sightings or tips directly within the system. Instead, individuals must contact law enforcement via phone calls to relay any information.	User Hesitation: Some individuals might hesitate to call law enforcement due to concerns about privacy or fear of making an official report. (2,3)
		Miscommunication: Verbal reports can lead to misunderstandings or misinterpretations of the provided information. (N.A.)
		Delayed Reporting: Users may experience delays in reporting sightings due to the time required to make a phone call. (3,4)