GIS-based Command System for Major Public Event Reporting: An Applied Research Postprint

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Date: 2023-10-08T00:00:00+00:00

Abstract

Addressing the practical requirements of command operations for major public event reporting in news media, this study integrates Geographic Information Systems (GIS) with emergency news reporting business processes to resolve existing pain points. The design and implementation of a GIS-based command system for major public event reporting are presented, with comprehensive investigation into business workflows, system architecture, and functional modules. The system was deployed and validated through application in the news coverage of the "September 3rd Parade". Practical outcomes demonstrate that numerous integrated innovations within the system represent unprecedented advances in the media industry, bearing revolutionary implications for the management paradigms and comprehensive support methodologies of major public event reporting command operations, while offering guiding significance for the development of modern IoT-enabled reporting command centers.

Full Text

Abstract

In response to the practical needs of news media in commanding major public event reporting, this study integrates GIS with emergency news reporting operations to address current pain points in the field. We designed and implemented a GIS-based command system for major public event reporting, examining its business processes, system architecture, and functional capabilities, which was then applied and tested in the "September 3rd Military Parade" news coverage. Practical results demonstrate that many of the system's integrated innovations are unprecedented in the media industry, representing a revolutionary advancement in the management model and comprehensive support methods for major public event reporting command, while offering guiding significance for constructing modern IoT-style reporting command centers.

Keywords: Major Public Events; Reporting Command; GIS

1. Problems in Traditional News Reporting Command Systems

Xinhua News Agency has long prioritized technical support for emergency reporting on major public events, establishing a dedicated emergency reporting technical team on 24-hour standby and conducting regular drills and training for support personnel, thereby significantly enhancing capacity for covering major emergencies. However, numerous operational pain points persist in the command and management of such coverage. First, information synthesis and analysis capabilities remain inadequate, particularly in modeling emergency events, leading to arbitrary command decisions that hinder scientific decision-making. Second, manual, one-by-one information dissemination is not only inefficient but also error-prone, impeding rapid and effective emergency response. Third, statistical analysis of emergency reporting still requires manual processing, lacking comprehensive accident assessment and analysis tools that would facilitate rapid news production. Fourth, process data from reporting command cannot directly enter the news production workflow, constraining rapid news dissemination.

2.2.1 Integrated Emergency Reporting Command System with GIS, GPS, and Unified Communications

The construction of a modern IoT-style operational management command center—integrating emerging media collection, editing, and distribution workflows, interview vehicle dynamics, journalist deployment status, and real-time monitoring of dispatches from both headquarters and domestic bureaus—represents an essential path and practical requirement for national news agencies advancing media convergence. Following a major public event, the entire command process uses GIS as its backbone. The super command center serves as the system's central brain, responsible for clue collection, planning, and task distribution for coverage strategies. Unified communications and GIS permeate the entire system, enabling commanders to directly contact frontline journalists, branch offices, and relevant department personnel, thereby achieving multi-departmental collaborative operations based on GIS. System users receive reporting instructions through the reporting command APP and provide dynamic feedback. Smart watches serve as auxiliary mobile devices, offering message alerts, call notifications, and task reminders. The Internet of Vehicles transmits interview vehicle locations back to the backend in real-time, facilitating unified vehicle dispatching by commanders [Figure 2: see original paper].

GIS spatial display technology presents the distribution of human and material resources across layers, unified communications technology enables on-site video transmission and live broadcasting, and GPS monitoring technology facilitates real-time personnel and equipment dispatching. This creates an electronic

sandbox for emergency reporting command and dispatch, while the system automatically generates activation plans and intelligent handling solutions to assist command personnel in seamless cross-distance coordination with the scene, enabling remote command decisions and resource allocation. Integrating GIS, GPS, and unified communications into traditional news reporting operations represents an industry-first innovation in the media sector.

2.2.2 Leading the Reengineering of News Reporting Command Business Processes

The system leverages personnel data and editorial business data required in news reporting, supported by GIS technology and unified communications technology, to provide data support and decision-making assistance for emergency reporting management on major public emergencies through multi-source data sharing and integrated analysis. Technically, it organically integrates functions including clue management, event management, equipment management, user management, manuscript management, comprehensive analysis, and system management, leading the upgrade and reengineering of news reporting command business processes. The workflow proceeds as follows: The system first collects news clues and performs intuitive display and automatic alerts based on GIS. It then classifies events into four levels based on nature, severity, controllability, and impact scope [1]: particularly serious (Level I), major (Level II), relatively major (Level III), and general (Level IV), marked with red, orange, yellow, and blue respectively, triggering corresponding 预案 levels. The system backend activates emergency plans using CBR (Case-Based Reasoning) technology—an analogical reasoning method that solves problems based on past experience [2]. Following plan activation, new events are created to enter the emergency reporting workflow. The emergency team leader then develops coverage strategies based on previous plan experience, establishes an emergency reporting group, and conducts task distribution, personnel command, and resource allocation based on GIS and unified communications. Simultaneously, the system retrieves models and plans from the case database as references for command personnel, records the entire emergency dispatch process, and forms new cases to supplement the case database. Team leaders initiate recruitment, allowing interested journalists to apply for group participation. The emergency team then decomposes and assigns reporting tasks, analyzing and commanding task completion based on GIS. Finally, reporting personnel rush to the scene, gather news information, transmit it back to the system backend, where editors produce news products using the returned information.

2.2.3 Deep Integration of Instant Messaging, Mobile Live Streaming, and News Products

The reporting command client serves as the terminal receiving device for the reporting command system (supporting both iOS and Android), through which all reporting instructions are issued and communicated. All personnel can use

this APP to achieve instant messaging, file transfer, corporate address book access, group discussions, video conferencing, video live streaming, and other information interactions. When frontline journalists use the APP for group chats, they can directly send on-site text, images, and videos within the group chat and forward them with one click to the new media database for editorial use. Simultaneously, frontline journalists can initiate video live streaming based on the APP, transmitting live video streams from the scene to the backend studio, enabling mobile internet-based live broadcasting of breaking events.

2.2.4 Knowledge Base Management

Each emergency reporting plan, manuscript, summary, evaluation, and leadership instruction is uniformly archived to form a knowledge base that serves as the primary data source for 预案. Concurrently, the entire process of each emergency reporting operation forms new plans that supplement the plan database, continuously improving and refining emergency plans.

3.1 Deployment Planning

Following the design philosophy of overall planning, phased implementation, high-availability loose coupling, and business module componentization, the entire reporting command system business module is designed as a componentized service, forming five main functional modules: command center, unified communications platform, reporting command APP, GIS platform, and Internet of Vehicles. The entire system is deployed on Xinhua News Agency's private cloud platform, with ten newly created virtual machines, each configured with 4 CPU cores, 4G memory, 100G hard drive, and CentOS 6.2 operating system. Specifically, two virtual machines deploy the instant messaging module, two deploy the Internet of Vehicles module, two deploy the GIS platform, two deploy the reporting command web portal, and two deploy the unified communications module, with all virtual machines mounted to the same NAS storage. All virtual machine management is incorporated into the unified management of Xinhua News Agency's cloud platform, enabling unified monitoring of operations and unified resource allocation.

3.3 Application Practice

Xinhua News Agency trialed and validated the system during the major news event of the "70th Anniversary of the Anti-Japanese War Memorial Ceremony," achieving noticeable results.

3.3.1 Command Center

The command center serves as a collaborative and organizational command platform for news reporting participants, enabling topic planning, command

dispatching, event management, resource monitoring, video live streaming, and knowledge archiving based on unified communications and GIS.

3.3.2 Unified Communications Platform

The unified communications platform is a business support platform integrating communication access, control, and media processing, primarily providing services including unified communications, multimedia conferencing, video communication, screen sharing, instant messaging, voice messaging, and file transfer. Based on this platform, commanders can directly initiate dispatching (audio, video, telephone) to frontline journalists through the command console.

3.3.3 Reporting Command APP

The reporting command APP integrates instant messaging, file transfer, corporate address book, group discussions, video conferencing, video live streaming, and other information interaction methods, enabling frontline journalists and command center personnel to communicate via mobile terminals. Frontline journalists use the mobile APP to directly send collected images and videos into the new media database. The new media database receives manuscripts sent from the client, making them available for editors to produce mobile news products that have achieved nearly one million click-through rates.

3.4 Application Effect Analysis

During the September 3rd Military Parade period, frontline personnel used the reporting command APP to rapidly transmit video footage and panoramic photos captured on mobile phones back to the headquarters command center. Based on these highly timely materials, the command center produced news products such as “Scenes Unseen on Television” and “Panoramic View of the Parade Site.” These products, with their unique perspectives and strong sense of presence, garnered consistent praise and popularity among netizens. “Scenes Unseen on Television” achieved nearly one million clicks, marking the highest click-through rate in the history of Xinhua News Agency’s client “Dynamic News” column.

4. Outlook

The GIS-based major public event reporting command system made its debut in the September 3rd Military Parade news coverage, achieving positive response and recognition that proved its value and potential. However, the role of mobile UGC (User Generated Content) has become prominent in many major emergencies—the Wukan incident and the July 21st Beijing torrential rain event demonstrated how Weibo enabled instantaneous information release, micro-live broadcasting, and public opinion supervision through mass observation. UGC shows incomparable advantages over other media in terms of reporting efficiency and scope. How to integrate emerging media to form a media linkage mechanism in emergency reporting, where various media types cooperate, complement

each other's strengths, and collaboratively generate communication synergy represents the next research direction.

References

[1] Wu Likui. Research on Emergency Reporting Mechanisms for Major Public Emergencies [D]. Jinan University, 2013(4).

[2] Wang Yu. Research on GIS-Based Port Emergency Decision Support and Command System [J]. Traffic Information and Security, 2014(01): 110-115.

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Note: Figure translations are in progress. See original paper for figures.