# Intelligent Technologies for Urban Hazardous Chemical Disaster Management

Subjects: Transportation
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Keywords: hazardous chemicals ; disaster ; intelligent technology ; active emergency command ; emergency management

## 1. Introduction

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## 2. Intelligent Technology in Disaster Emergency Management

It is the inherent necessity of disaster emergency management that it promotes the modernization of the emergency management capacity with intelligent information technology, enhances early risk identification and early warning from the source, and effectively uses innovative technologies to prevent and resolve serious security risks at any or all stages of the disaster cycle. How to formulate effective management strategies and practices through the integration and innovation of these emerging intelligent technologies, how to achieve the source governance of urban safety and how to improve regulatory efficiency and guarantee capacity are the current problems that need to be solved.

Emergency management is a vital part of urban governance capacity, and it is imperative to strengthen it. Intelligent technology is the key to improving early risk identification and warning, optimizing the emergency plan system, promoting the modernization of emergency management, and preventing and defusing security risks from the source. Hazardous chemicals are indispensable to humanity. While hazardous chemicals support human reproduction and development, their disasters cause irreparable societal losses. With the development of new-generation information technology, it is necessary to realize effective UHCDM with the help of the ITAECS. This paper adopts the concept of basing on the site, solving the site and strengthening source governance; it puts forward suggestions to realize the digitization and visualization of disaster sources and hidden danger sites through advanced sensing, IoT, DT technology, virtual reality emergency rescue rehearsal and immersive, active emergency command. For hazardous chemical disaster sources, especially hazardous chemical media such as hazardous hydrogen chemicals, natural gas and gasoline, storage containers, vehicles and transmission pipelines with more significant disasters, as well as entire industrial chain scenes such as the production, storage, transportation, operation and use of the disaster source, it is essential to realize the digitization and visualization of disaster sources and hidden danger sites. It is beneficial to realize a comprehensive grasp of the location, status, environment and safety, as well as the data linkage between the enterprise end of the disaster source and the government end of emergency management, to serve the government, enterprises, hazardous chemical parks and personnel involved in the hazardous chemicals industrial chain.

The limitations of ITAECS are also apparent as difficulties and challenges. In terms of technology, ITAECS involves the innovative research of technologies in many disciplines and the development of various technologies is uneven. The immediate and high-quality implementation of the whole set of strategies requires time and special funds. Regarding application, urban hazardous chemicals are distributed in every corner of the city and have a specific dynamic mobility; urban hazardous chemicals involve all aspects of the industrial chain. This strategy’s successful promotion and application need at least standardization from technology and management, but there is a lack of relevant standards. In terms of government supervision, the government’s support and the timely adoption and promotion of ITAECS also have a time lag

and a certain degree of uncertainty. Future approaches must be carried out in several aspects to mitigate difficulties or challenges, such as theory, technology, application, standardization and policy. First, the critical scientific and technological issues need to be focused on. It is necessary to integrate the resources of many professional research institutions, experts and scholars to research and develop related technologies. Continuous financial support policies and coordinated organizational policies should be studied and formulated. Second, systematic experimental verification, application demonstration and industry promotion are required. Integrating all aspects of industrial chain resources to effectively organize resources to realize the advancement and application of ITAECS is needed. Effective standardization research combined with the industry needs to be carried out. Third, urban hazardous chemicals' safe production involves many organizations and individuals in the government and industry. These organizations and individuals need to cooperate effectively to promote the development of ITAECS.

The smart city's core technical elements are the underlying sensing technology, IoT connection display technology, intelligent deduction technology, virtual reality emergency rescue rehearsal and immersive, active emergency command. Based on the smart city concept, this paper studies and puts forward the ITAECS for UHCDM, which will help to improve the level of hazardous chemical safety production and disaster emergency management and serve the more effective and safe use of hazardous chemicals for humanity. Intelligent technologies are conducive to the safe, reliable, efficient and green scene of the entire industrial chain, such as the production, storage, transportation, operation and use of hazardous chemicals and will realize the transparency of information throughout the industrial chain and improve the benefits and efficiency of enterprises, industries, governments and society. ITAECS helps to solve the weaknesses in the rapid disposal and accurate rescue in the early stage of the accident due to the lack of proper and adequate data on the disaster sources and hidden danger sites of hazardous chemicals to improve digital, accurate and intelligent management and control. ITAECS aligns with the industrial paradigm discussed and evolving worldwide and is conducive to clarifying and improving the emergency command of urban hazardous chemical disaster safety. It is beneficial for governments of all countries to strengthen urban safety source governance, improve the urban safety prevention and control mechanism, strengthen the urban safety guarantee and enhance the efficiency of urban safety supervision. ITAECS is conducive to reducing the cost of government decision making, protecting the safety of people's lives and property and promoting the steady and rapid development of the urban economy. ITAECS will have a good application prospect in urban safety production emergency management in the hazardous chemical industry and smart city construction.

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