

# Leveraging Humanitarian Technologies for Crisis Management

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## Abstract

Over the last decade, the number of humanitarian crises that emerge has increased, requiring innovative approaches to crisis management. This paper aims to explore the important role of technology in addressing humanitarian crises, emphasizing the potential to revolutionize response and recovery efforts. It provides an analysis on how technology empowers decision-makers with analytical insights and improves coordination among diverse stakeholders. Case studies from the real world from recent crises, including the Mediterranean refugee crises, the Ukrainian conflict and the global response to COVID-19 pandemic are demonstrated to point out the transformative potential of technology in crisis response.

A range of technologies being used in humanitarian crisis management is being explored as well as Ethical and operational challenges and limitations in humanitarian settings. Concerns regarding data privacy and the ethical use of AI in crisis decision-making are being investigated. Furthermore, the paper proposes future directions in regard to potential advancements in humanitarian technology, highlighting the use of blockchain and drone technologies as tools to further enhance crisis management.

In conclusion, the paper emphasizes the significance of the most important technologies employed within the humanitarian sector to mitigate the impacts of crises. Moreover, it provides a glimpse into forthcoming strategies and directions for tackling intricate humanitarian emergencies.

**Keywords:** Humanitarian technologies; Crisis Management; AI technologies.

## 1 Introduction

In today's era, as the number of humanitarian crises of increased complexity is constantly increasing, the role of technology in crisis management has become more crucial than ever. The use of cutting-edge technologies can transform the capacity to respond to emerging crises to save lives, enhance coordination, and optimize resource allocation. However, in the process of embracing these advances, we also face ethical concepts such as data privacy, algorithm biases, and ethical AI applications to ensure that innovation aligns with humanitarian principles. Ethical review and risk assessment must be conducted with the same urgency that encourages the continuous development of AI based solutions (Tzachor et al.,2020).

## 2 Humanitarian Crisis Management Technologies

The latest innovation in the technological sector revolutionizes humanitarian crisis management in several ways. A large scale of different technologies is deployed in crisis management:

**Data Analytics:** Real time data analysis can provide insights to inform decision-making across all phases of crisis management, from crisis prediction to response planning. It can aid in mapping affected areas and identifying vulnerable populations. For example, data analytics can be retrieved to identify areas that are at high risk of flooding, to predict climate change conditions that can cause a wildfire, or to get informed from satellite imagery to develop wildfire containment strategies.

**Artificial Intelligence and Machine Learning:** AI technologies, though the development of predictive models, can be used to identify potential crises, such as disasters, disease outbreaks and optimize resource allocation and aid delivery. For example, AI technologies can predict the path of a hurricane or the spread of a disease outbreak.

**Communication and Dissemination Technologies:** These technologies such as mobile applications, satellite communication, and digital platforms are vital to crisis management, as they enable rapid dissemination of information and allow better coordination among responders. They can be used to reach affected populations with vital information, such as shelter locations and evacuation routes. Communication tools can also be used to enable real-time coordination among humanitarian parties and government agencies.

In addition to the above technologies, there are a number of other emerging technologies with the potential to revolutionize crisis management, such as blockchain technologies that can be used to improve efficiency and transparency of the humanitarian aid delivery procedures and technologies such as drones that can be used to assess damage in disaster areas.

### 3 Case Studies and Examples

#### 3.1 Case Study 1 – The Ukrainian Conflict (U-Report)

During the war in Ukraine, the United Nations Children’s Fund (UNICEF) implemented a U-Report program to reach people in affected areas and allow them to voice their opinions and concerns on a variety of issues.(UNICEF, 2022) The mobile-based platform was created to provide an important communication channel for young people to report on the situation, express their needs and receive vital information about all available support services provided. U-Report collected real-time data on the impact of the conflict on young people with the aim of being used by UNICEF and other humanitarian organisations to target aid effectively and identify the needs of young people. As an example, the report data was used to identify areas where there was a shortage of schools and mental health services.

#### 3.2 Case Study 2 – The Mediterranean Crisis (Refugee Aid App)

The Mediterranean crisis was an enormous European immigration crisis that began in 2015, leaving the international community trying to address ways to propose actions that would mitigate the impact of social consequences for migrants lives. Some of these were the sharing of accurate information at all stages of migration to improve bilateral, regional, and international cooperation and to provide migrants with adequate information and documentation at all stages to prevent stateliness (Turakova, 2019). During the Mediterranean refugee crisis, a nonprofit organisation developed a smartphone application, called RefAid, designed to provide crucial information to refugees and migrants arriving on European shores. RefAid was one of 1500 mobile applications created for refugees in a 12-month period. It was designed specifically for refugees and was translated into all languages that represented the refugee population served (Kaurin,2020). The application provided information on many topics such as asylum procedures, legal rights, safety and security information, access to healthcare and education and transportation and accommodation options. Humanitarian organisations made use of the application to coordinate activities and rescue efforts, reducing response time and saving lives. The application is a valuable example of how the right use of technology can be utilized to support refuges and migrants to access valuable information and services to rebuild their lives. The case reflects that smartphone applications can play an important role in supporting refugees and migrants in safety and well-being issues and can also provide a tool to humanitarian organisations and government agencies to better coordinate activities.

#### 3.3 Case Study 3 – The Covid-19 Pandemic (Contact Tracing and Data Analytics)

Contact tracing and data analytics were widely used during the Covid-19 Pandemic, by various countries and organisations to monitor the spread of the virus and inform public health responses. Between May 2020 and November 2021, 180 contact tracing applications were identified across 152 countries, states, or territories. (Bardus et al., 2022) Contact tracing is the process of detecting and contacting people exposed to the disease through an infected person, manually or through the use of tracing applications. Data analytics is the process of collecting and analyzing data to obtain real time insights such as the spread of a virus, identify trends and predict future outbreaks to enable health authorities to make informed decisions on strategies to decrease the Pandemic effects. Some examples of how contact tracing and data analytics were used during Covid-19 pandemic included the case of South Korea where contact tracing such as location data from mobile devices, credit card transactions and circuit television footage was used to identify and isolate infected individuals at the early stages of the pandemic (Kang et al., 2021) and also the United States case where data analytics was used to identify high-risk areas and populations, where the information was used to public health interventions, like testing and vaccination programs. Furthermore, China used data analytics to track movement of the virus and predict future outbreaks. The information was used to inform the public on lockdowns and travel restrictions.

## **4 Ethical Concerns**

The emerging humanitarian technologies can revolutionize the approaches used to respond to crisis, but on the other hand it is important to be aware of the ethical concerns connected with the development and use of these technologies. The biggest ethical concern is data privacy. A large proportion of data about displaced people and people affected by crises is collected by humanitarian organisations, such as personal information, location and health data. Surveillance is another ethical concern. There are emerging technologies that are used to track and monitor people that are affected by crises. This raises concerns about civil liberties and the potential for abuse.

The use of AI in decision making during crises raises concerns about the accountability and transparency of AI technologies. Technology can be biased and used in a non-responsible and ethical manner, and this can affect disproportionately marginalized groups. Thus, humanitarian organisations need to implement activities and take steps to mitigate it.

Humanitarian actors need to address these concerns associated with the development and use of technology in many different ways such as implementing data privacy measures, developing ethical guidelines of the use of AI and algorithmic technologies, auditing algorithms for biases and employ mitigation strategies and involving affected communities in decision making. Additionally, they can develop ethical guidelines for the development and proper use of technology and provide training to their staff on the ethical implications of technology.

By taking the above actions, the humanitarian organisations can ensure that the technological advancements will be used to a responsible and ethical manner towards the support of vulnerable groups of people that are affected by future crises.

## **5 Future Direction in Humanitarian Technologies**

The future of Humanitarian Technologies relies on global collaboration, innovation, and emerging technological integration to respond to future crises. The key directions include:

### **5.1 Advancement in Humanitarian Technology**

Collaboration between humans and AI is one of the most promising areas of AI development. AI systems would have to be designed in a way that will support human experts in work. As an example, AI systems can be used to analyze large datasets of data to identify patterns that would be difficult for humans to detect, allowing for better resource allocation and targeted interventions. Furthermore, predictive analytics can be used to analyze vast amounts of data to predict future disasters and conflicts. Data sharing platforms can help humanitarian organisations to improve coordination and collaboration among different humanitarian actors. For example, the Humanitarian Data Exchange (HDX) is a data sharing platform that is used by over a thousand humanitarian organisations and provides access to a large number of humanitarian data on the location of displaced people, their needs, and the availability of resources. Remote sensing, such as the use of satellites and drone technologies will be used in a wide range of humanitarian activities, such as damage assessment, disaster response and

environmental monitoring. As an example, the United Nations High Commissioner for Refugees (UNHCR) is using drones for the delivery of aid to refugees in remote areas of South Sudan by providing medicine, food and supplies to refugees who are of need and cannot reach out otherwise.

## 5.2 International Collaboration and Innovation

There are many ways for international collaboration and innovation to develop and use humanitarian technology efficiently and effectively. Humanitarian actors, such as NGOs, tech companies and governments can work together to develop new technologies that can improve the lives of people affected by future crises. Global data sharing is crucial for these actors to have real-time data on locations of affected populations to better coordinate response and aid delivery. Technological innovation hubs will play their role in providing the technologies and space to humanitarian organizations, technological companies, and similar stakeholders to accelerate the development and testing of new technologies and build capacity among them to use all these technologies effectively.

## 5.3 Emerging Technologies

Blockchain and drone technologies can revolutionize the way that humanitarian organizations deliver aid. With the use of the above technologies, the humanitarian system can be more effective and transparent. Blockchain as a distributed ledger technology can help in reducing fraud and corruption in the humanitarian field by creating a transparent and secured record of transactions and by doing so, humanitarian aid offered can be distributed fairly. An example of a good use of the mentioned technology is the World Food Program (WFP) using blockchain technology to distribute food aid to refugees in Jordan, Bangladesh, Lebanon and Ukraine. WFP makes use of the technology to track the food aid movement from the point of origin to the distribution point. By that, it ensures that the food aid reaches the people that need it most, and it is not stolen or used for other purposes. Biometrics can also play a vital role in identity verification, tracking and border controls. (PWC, 2016) Governments and international organizations can make use of biometrics technology to establish unique identities of asylum seekers to enable identification and tracking.

## 6 Conclusion

In recent years, the role of technology in humanitarian crisis management has become increasingly important as the number and the complexity of humanitarian crises is on the rise. New technologies are revolutionizing the way the humanitarian sector responds to and recovers from crises, improving coordination and optimizing resource allocation.

Today but also in future times, humanitarian crises will rarely be isolated events, but often interconnected. Therefore, to address them properly, a multidisciplinary approach is required that combines community and multi-actor engagement, policy expertise along with the use of innovative technologies. A collaborative approach of all engaged humanitarian parties, tech providers, government and the local communities is crucial for success.

However, it is crucial to be aware of all ethical concerns associated with the proper development and use of humanitarian technologies, such as data privacy, surveillance, and AI bias. Steps have to be taken to mitigate these risks and make sure that technology is used in a responsible and right manner.

The future of humanitarian technology is promising, and the use of new innovative tools and the collaboration between associated parties, the humanitarian sector can be better prepared to respond to future crises and create a more just and equitable world for more people.

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