

Human Security Forged by Digital Archives: From Inheriting Memories to Real-time Crisis Response

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Introduction

Conflict, disasters, human rights violations, and pandemics—our world constantly faces a multitude of complex, intertwined crises that threaten people's survival, livelihoods, and dignity. The concept of “human security,” which envisions a world where people are protected from such threats, free from fear and want, and able to live with dignity, is becoming increasingly vital today as a comprehensive approach to the challenges confronting the twenty-first-century international community (Commission on Human Security 2003). Realizing this philosophy requires not only top-down protection mechanisms by states but also a preventive approach to foresee and prepare for future crises, as well as empowering the people exposed to threats.

This essay discusses the new roles that digital archive technologies can play in addressing the challenges faced by human security. We have conducted practical research in this field while engaging in activities themed around war damage and disasters. Conventionally, archives have often been viewed as stock, physically or electronically preserving past records. However, the exponential evolution of information technology has opened the possibility of transforming archives from mere repositories of records into dynamic flows that generate social communication and connect memories to the future (Watanabe 2013).

The “Pluralistic Digital Archives we advocate—which reconstruct diverse data on geospatial information and in VR (Virtual Reality) spaces—and the citizen-participatory “memory communities” born around them can contribute in multifaceted ways to the core elements of human security emphasized by the JICA Ogata Sadako Research Institute for Peace and Development (hereafter the JICA Ogata Research Institute): “prevention,” “protection,” and “empowerment.” Through specific case studies ranging from the war damage in Hiroshima to the invasion of Ukraine, the Noto Peninsula earthquake, and the Gaza conflict, this essay will draw from the perspectives of specific technological and social implementation discussing how digital archives can serve as useful tools to prevent future crises by learning from past memories (prevention), protect people from ongoing threats (protection), and promote the proactive activities of civil society (empowerment).

1. From Stock to Flow: Cultivating Multilateral Perspectives through Pluralistic Archives

1.1. The Value of Information in the Digital Age and the Challenges of Archives

The “reality” of past events is inherently multifaceted and complex. However, in a modern society where information

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Figure 1 Hiroshima Archive

spreads instantaneously, shocking images and one-sided discourses tend to attract people's attention, often obscuring the diverse perspectives and historical contexts behind these events. Particularly in conflicts and disasters, specific narratives can become oversimplified and fixed, deepening the divide between people in different positions and even sparking future conflicts.

To foster the mutual understanding and coexistence that form the foundation of human security, it is essential to capture events from multiple angles and make efforts to pass on their full complexity to the future. Digital archives can serve as a crucial social infrastructure for this purpose, but merely digitizing and accumulating materials is not enough to fully deliver their value to society. As Kevin Kelly points out, what is important is the information design that transforms statically accumulated data (stock) into dynamic information (flow) that pours into people's daily lives and dialogues (Kelly 2016). In an era where the value of information is shifting from ownership to access, and from fixity to fluidity, the very nature of archives is also being questioned.

1.2. The Practice of Pluralistic Digital Archives

The Pluralistic Digital Archives we have been developing are attempts to facilitate this transition from stock to flow. In its representative example, the Hiroshima Archive,¹ pluralistic data such as survivor testimonies, photographs, maps, and

official documents—which were conventionally stored separately—are mapped onto the same temporal and spatial axes in a VR space called Digital Earth (Figure 1).

Users can access materials while freely exploring the city of Hiroshima, reproduced in the VR space. For example, zooming in on the location of a girls' school displayed on a 1945 map reveals a vast number of testimonies from female students along with their facial photos (Figure 2). Switching the map to the current cityscape shows that the school still exists in the same location today (Figure 3). Alternatively, a single photograph of the atomic bombing is displayed overlaid on the current landscape of the exact location where it was taken (Figure 4). Photographs become windows into the past, allowing users to intuitively grasp the continuity between past and present.

In this way, by mutually linking individual data within a geographical and temporal context, mere fragments of information are reweaved into meaningful narratives. Stock, like scattered particles, transforms into a unified flow, enabling users to grasp the overarching picture of an event in multidimensional terms. This is the first step in a preventive approach to learning the lessons of history while respecting diverse perspectives, without falling into one-sided interpretations. Furthermore, by expressing the movement of people hidden in the data as a flow, as seen in the Okinawa Peace Memorial Park Digital Archive² (Figure 5) and the

¹ https://hiroshima.mapping.jp/index_en.html

² <https://okinawa.mapping.jp/> (Japanese only)



Figure 2 Overlaying a 1945 city map with testimony materials

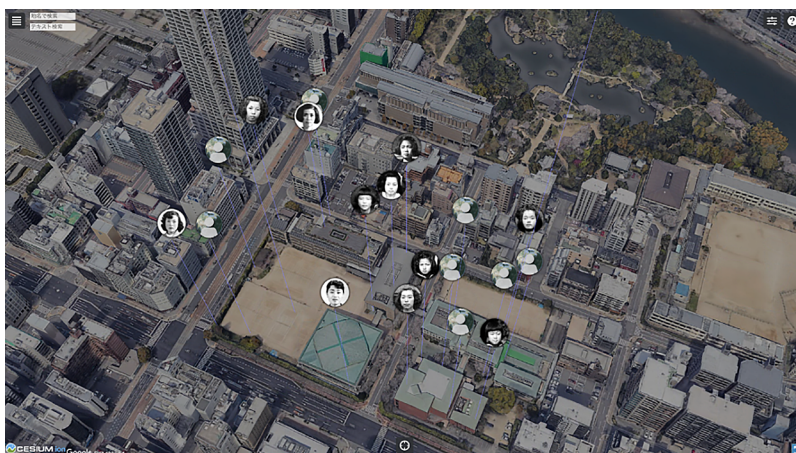


Figure 3 Overlaying the current cityscape with testimony materials

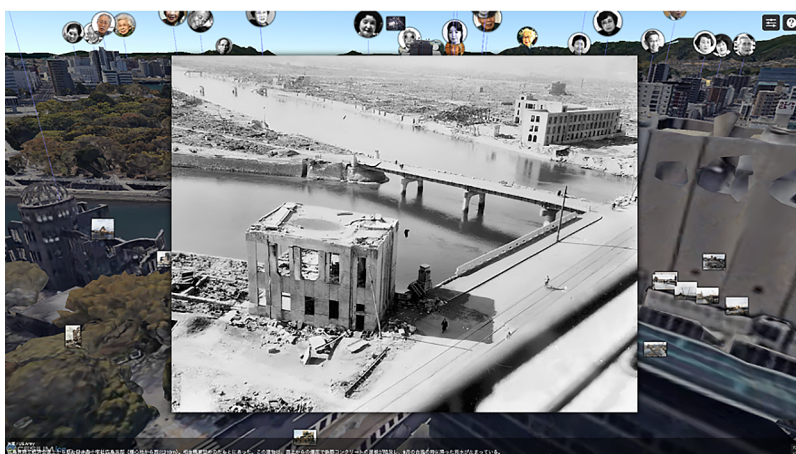


Figure 4 Overlaying a photographic image onto the current cityscape



Figure 5 Visualization of people's movements during the Battle of Okinawa

Behavioral Records of Earthquake Victims³ (Figure 6)——which visualize people's movement trajectories with animations——it becomes possible to re-experience past events as more vivid, human experiences.

2. Memory Communities and Empowerment: The Case of Hiroshima

2.1. Forming Communities Centered on Digital Archives

The flow of information generated by Pluralistic Digital Archives is not an end in itself. Its true value lies in the fact that the flow acts as a catalyst to induce communication

³ <https://en.wasurenai.mapping.jp/>

between people and create new activities. Just as human security emphasizes empowerment——where people forge their own future——rather than just protection from the outside (Sen 1999),⁴ digital archives also possess the power to transform people who were once passive recipients into proactive bearers of memory inheritance.

A prime example is the memory community born in Hiroshima. Students from Hiroshima Jogakuin Senior High School have been deeply involved in the construction and operation of the Hiroshima Archive. They are not only users

⁴ Amartya Sen views human security as a process of protecting and expanding the capability of people to choose the valuable lives they wish to lead. The empowerment fostered through the memory community discussed in this paper can be positioned precisely as an attempt to expand such capabilities through citizens' proactive involvement in the interpretation and inheritance of history (Sen 1999).

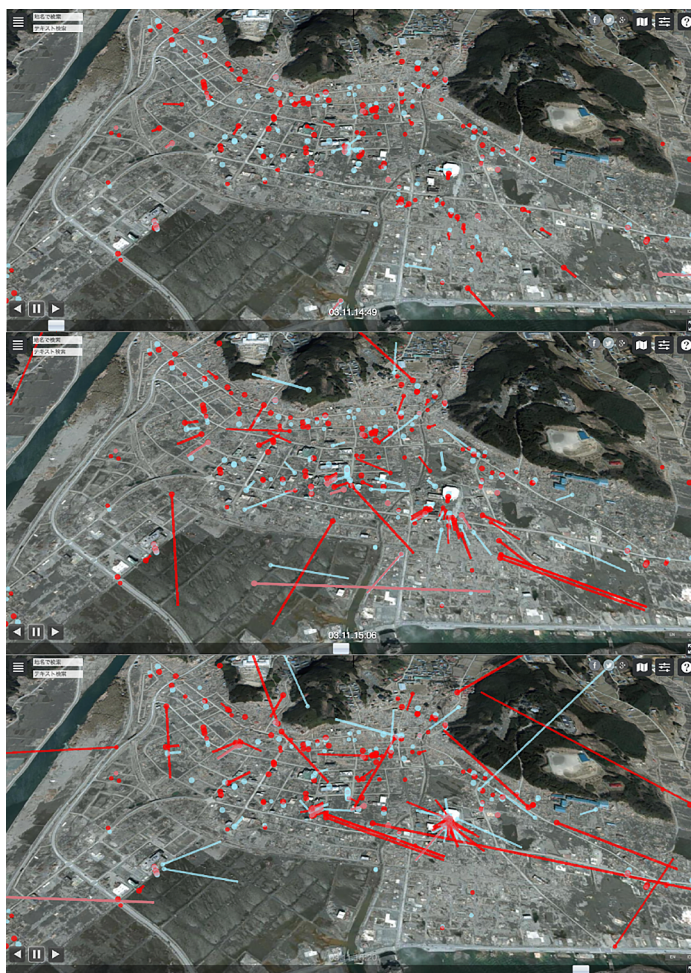


Figure 6 Visualization of people's movements during the Great East Japan Earthquake

of the archive but also active collectors of materials, having interviewed more than 40 atomic bomb survivors (*hibakusha*) to gather and record their testimonies.

2.2. Inheriting Memories and Expanding Capabilities through Dialogue

In the dialogue between these students and the *hibakusha*, the roles of listener and narrator are not one-sided. The high school students engage with the *hibakusha* as equal partners, sharing the common goal of the archive. Sitting side by side, they converse and carefully draw out the memories that have been stored deep in their hearts (Figure 7). Through warm communication with the youth, the memories of the *hibakusha* become a new flow, giving birth to new narratives. This experience is also deeply etched into

the memories of the high school students, who then become the next generation of inheritors, passing on the story of Hiroshima in their own words.

This is precisely the process of empowerment. The digital archive serves as a hub, generating cross-generational dialogue and collaboration. The new testimonies obtained through the community's activities are fed back into the archive, enriching it further and strengthening the flow. In this way, Pluralistic Digital Archives and memory communities interact with each other to form a sustainable ecosystem that connects memories to future security. This is nothing less than an activity to deeply root the will of prevention—learning from past tragedies and not repeating the same mistakes—within society.



Figure 7 The Memory Community in the Hiroshima Archive

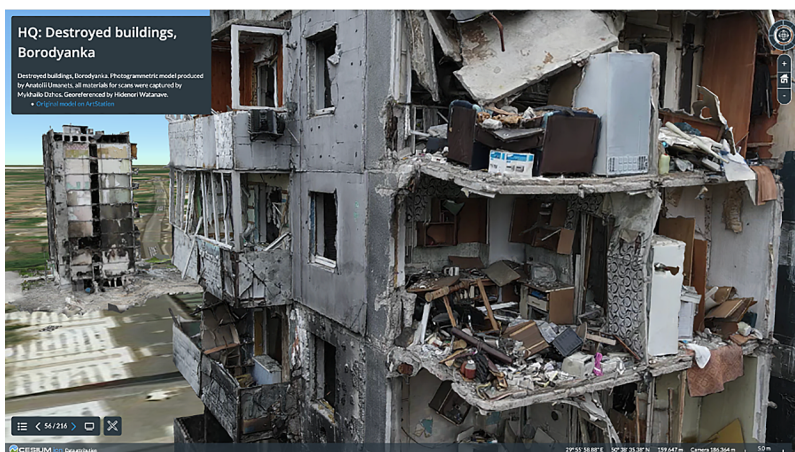


Figure 8 3D data of Borodianka, Ukraine

3. Archives Responding to Crises: From the Frontlines of Ukraine, Noto, and Gaza

3.1. The Practice of Protection in Real-time Archives

The role of digital archives is not limited to inheriting past memories. In recent conflict and disaster sites, they have evolved into tools for protection, collecting, analyzing, and disseminating information in near real time to shield people

from ongoing crises.

In the invasion of Ukraine by Russia that began in 2022, satellite imagery provided by private companies played a decisive role in conveying the war situation and damage. However, such information was often reported in fragments, making it difficult to grasp the overall picture. The Satellite Image Map of Ukraine⁵ we constructed integrated these satellite images, heat source data, SAR (Synthetic Aperture Radar) data, and 3D models (photogrammetry) generated from photos taken by citizens onto a digital map using a no-code GIS tool that requires no programming (Figure 8).

⁵ <https://ukraine.mapping.jp/>



Figure 9 Visualization of the upheaval at Nagahashi Fishing Port, Noto Peninsula

As a result, it became obvious at a glance when, where, and what had happened, allowing for a multidimensional analysis of the situation in destroyed cities. This directly contributes to concrete protection activities for safeguarding people's lives and safety, such as assessing humanitarian aid needs, preserving evidence of war crimes, and providing a foundation for fact-checking to counter fake news. Furthermore, the movement in which 3D models created by citizen creators inside and outside Ukraine are shared online and added to the archive reveals the contours of a new cross-border memory community.

3.2. Citizen-Participatory Crisis Response and the Improvement of Resilience

This real-time archiving method also demonstrated its power during the Noto Peninsula Earthquake that occurred in January 2024. Using photogrammetry technology to convert aerial photographs released by the Geospatial Information Authority of Japan into 3D data, we published a digital map that three-dimensionally visualized damage situations such as landslides and port upheavals within just a few hours of the disaster (Figure 9) (Watanabe 2024). This map was utilized to visualize the situation of severed roads and isolated settlements and was widely shared through news organizations.

Notably, a team of reporters from the Yomiuri Shimbun used the techniques they had acquired in advance through our training sessions to publish a disaster damage map using

photos they had taken themselves on the very day of the disaster (Yomiuri Shimbun 2024). This became an innovative case study demonstrating that even without being experts, citizens and journalists can gather and disseminate information from the bottom up and contribute to crisis response. This can also be seen as a practice of empowerment that enhances the resilience of society as a whole against the threat of disasters.

Moreover, in the digital archive of the Gaza conflict, attempts have begun to reconstruct 3D spaces from news footage and other sources using a cutting-edge technology called 3D Gaussian Splatting (Figure 10). This technology, which converts a massive amount of video data (stock) into a 3D space (flow) where it can be experienced by anyone as if they were there, holds great potential for deepening empathy and understanding of the plight of people in distant places and encouraging the involvement of the international community.

4. Future Prospects and Challenges as a Tool for Human Security

4.1. Applicability to the Field of International Cooperation

As we have seen, digital archives can contribute to various phases of human security, from the inheritance of memory in peacetime (prevention) to real-time crisis



Figure 10 3D data of a destroyed truck in the Gaza Strip

response during emergencies (protection), and the formation of civil societies that shoulder both (empowerment). This approach also has considerable potential in the fields of development cooperation and peacebuilding promoted by the JICA Ogata Research Institute.

For example, in post-conflict reconciliation processes, it is conceivable to visualize the respective memories held by different communities as a pluralistic digital archive and use it as a platform for dialogue. It could also be utilized as a knowledge management tool by archiving the results and lessons of development projects, along with spatiotemporal information, to inform future project formulation. In areas with high disaster risks, initiatives to archive hazard maps and evacuation experiences through resident participation to enhance community disaster prevention capabilities (resilience) are also effective.

4.2. Technological and Ethical Challenges

On the other hand, there are several challenges in popularizing this approach. The first is the issue of the digital divide. Access to and literacy in the latest digital technologies vary greatly across regions and communities. To ensure that archives do not belong only to a select few, it is essential to devise ways to ensure inclusivity, such as enabling offline use and developing interfaces tailored to local needs.

Next, there are ethical considerations when handling traumatic memories. Records of conflicts and human rights violations, in particular, carry a risk of causing secondary

victimization for victims. Careful guideline design to protect human dignity is required, including consideration of the scope of data disclosure, privacy protection, and psychological care for testifiers.

Furthermore, there is a need to ensure the sustainability of the archives themselves. Although digital data does not physically deteriorate, long-term preservation requires ongoing costs and effort, such as addressing format obsolescence and server maintenance. Creating organizational and financial mechanisms to make bottom-up community activities sustainable will be a major future challenge.

Conclusion

This essay has argued that digital archives can contribute to human security in a multifaceted manner by evolving from static stocks of records into dynamic flows that generate social dialogue and action.

First, by presenting the complex realities of events in multidimensional ways, Pluralistic Digital Archives play a preventive role in preventing one-sided understanding and conflict and in rooting lessons in society to avoid future crises.

Second, real-time archives utilizing satellite imagery, 3D technology, and no-code tools directly protect people's lives and safety by rapidly visualizing damage at conflict and disaster sites and supporting humanitarian aid and fact-checking.

Third, memory communities centered on archives serve as platforms for empowerment, encouraging citizens, especially youth, to proactively engage in passing down history and addressing social issues, thereby enhancing the resilience of society as a whole.

The evolution of information technology will undoubtedly continue to expand the possibilities of digital archives. AI-driven data analysis and automated content generation may enable even faster and more precise archive construction. However, the most important aspect is not the technology itself, but the perspective on how to use it to protect the dignity and safety of each individual human being.

In an era where anyone can participate in bottom-up information dissemination, digital archives become a more powerful means than ever to record the voices of people suffering from conflicts and disasters, share their experiences with the world, and utilize them as lessons for the future. In the field of international cooperation as well, it is expected that this approach will be applied to weave memories together with local communities and build future safety. I believe that

beyond the empathy and solidarity fostered by digital technology lies the vision of a world where human security can be realized.

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