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Putting Communities on the Map: How Open Data Transforms Disaster Response

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The Think Series showcases the creative and scholarly work of the UVA Humanitarian Collaborative's Summer Research Cohort. Each student explored a pressing issue in the humanitarian field and developed a final product that reflects their unique perspective, highlighting the diverse ways students are engaging with global challenges and imagining new solutions. The views expressed in these projects are those of the author(s) and do not necessarily reflect those of the Humanitarian Collaborative.

In the days after the 2010 Haiti earthquake devastated one of the Western Hemisphere's then most vulnerable countries, over 600 volunteers from around the world mobilized to map the disaster zone (Soden, Palen). Within three weeks, they had produced the most extensive map of Port-au-Prince in history. The reason remote mappers could digitize an entire community and accelerate recovery is simple: after the earthquake, mapping systems and critical geographic data were made public, turning local expertise and raw data into life-saving tools. The rapid, collaborative recovery process in Haiti demonstrated the ability of open mapping to empower local communities, rather than hindering recovery efforts as proprietary systems do.

An open map is a platform of freely available geographic information that can be edited collaboratively, often through crowdsourcing, to create a compounded, customizable product. Proprietary mapping systems, such as Google Maps, are privately owned or licensed and are contributed to by institutional entities, rather than individuals. When it comes to humanitarian mapping, the way data is shared, and the reliability of the data, are the foundation of effective recovery. Accurate, real-time data is vital for emergency responders accessing crisis-affected regions. Platforms like OpenStreetMap (OSM) enable international agencies, responders, and locals to operate from a live dataset, an openness that accelerates the speed and scale of recovery and builds long-term resilience in vulnerable communities. Conversely, proprietary platforms delay response time, reduce transparency in data collection methods, and impose on responders barriers such as paywalls and licensing restrictions, disempowering local communities in the long term.

Before 2010, few publicly available maps of Haiti existed, and those that did displayed only the main roads and highways of Port-au-Prince. By building a base layer map that would become the blueprint for organizations responding to the earthquake,

including the United Nations and World Bank, the OpenStreetMap community transformed crisis mapping. The mobilization following the 2010 earthquake also gave impetus to the formalization of the Humanitarian OpenStreetMap Team (HOT), which recognized the limitations of purely remote mapping. HOT initiated the transition from a short-term crowdsourced effort to a structured, responsive organization. Volunteers worked for over a year after the earthquake to make the baselayer map more useful, particularly by materializing a set of values that emphasized local ownership of the map's production as the best way to maintain it as a dynamic product. HOT's work in Haiti demonstrated that integrating local knowledge keeps maps accurate and relevant beyond the initial crisis.

In the same year that open mapping accelerated hurricane recovery in Haiti, 50 Nicaraguan soldiers were accidentally deployed on a Costa Rican island–a result of a Google Maps error that labelled the island as Nicaraguan territory. The mislabelling was reportedly due to flawed data sourced from the U.S. Department of State. Producers of digital maps–whether open or private–must grapple with how to represent disputed territories, as the reliance on many disparate sources for information tends to produce an excess of incongruous data. Proprietary systems, however, are even less representative of geographical boundaries. In the case of the accidental invasion of Costa Rica, the opacity of and restrictions around the map contributed to an error of about 3,000 meters, enough to elicit an international dispute (Johns 2023). Google Maps never fully disclosed where its border data originated from, or how that data was validated. Additionally, the map's ownership by a private corporation prevented locals from simply logging in and entering their own data. Open mapping, on the other hand, invites local knowledge, creating living maps that can prevent such border disputes or misinformation.

15 years after the earthquake, the focus of humanitarian mapping is no longer large-scale disaster response; rather, modern organizations such as the Missing Maps Project and HOT emphasize the need for anticipatory action driven by locally-sourced data. Open mapping in its current form can even be viewed as a decolonizing process, as it reduces geographic inequalities, empowers communities, and highlights local knowledge. Through Missing Maps, for example, remote volunteers upload satellite imagery into OpenStreetMap, locals add specific details such as roads and street signs, and humanitarian organizations use the finished maps for disaster planning and response. Previously, open mapping data contributions came primarily from external volunteers, but the streams of information deemed authoritative are increasing to include field-derived knowledge. Not only does this diversification of data give visibility to marginalized communities, but it challenges a historically Eurocentric view of geographic data. The acquisition of infrastructure data is just the first step in disaster preparedness; it is crucial

that vulnerable communities have the capacity to generate and maintain data in the long term. In other words, local ownership makes mapping sustainable.

Attuned to small-scale geographical details, locals are the best source of information for humanitarian mapping. In 2022, the World Bank partnered with HOT and OpenStreetMap Mali to train individuals to use a mobile mapping system that identified solid waste posing a threat to drainage systems. In less than two weeks, volunteers had mapped over 450 square kilometers and produced high quality data, which was then used to visualize where waste was generated and to plant treatment facilities in those areas (Johns 2023). More than just putting communities on the map, open source platforms should prioritize local perspectives in the long term. When local expertise drives the mapping process, the resulting data is more accurate and sustainable and, most importantly, builds resilience among the world's most vulnerable communities.

Sources

Johns, F. (2023, September 29). *Digital Humanitarian Mapping and the limits of imagination in international law - law and Critique*. SpringerLink. https://link.springer.com/article/10.1007/s10978-023-09361-6

Schrouder-Bergen, S., Glasze, G., Michel, B., & Dammann, F. (2021, November 23). *DE/Colonizing OpenStreetMap? local mappers, humanitarian and commercial actors and the changing modes of collaborative mapping - geojournal*. SpringerLink. https://link.springer.com/article/10.1007/s10708-021-10547-7

Herfort, B., Lautenbach, S., Porto de Albuquerque, J., Anderson, J., & Zipf, A. (2021, February 4). *The evolution of humanitarian mapping within the OpenStreetMap Community*. Nature News. https://www.nature.com/articles/s41598-021-82404-z

4 years on, looking back at openstreetmap response to the Haiti earthquake. World Bank Blogs. (n.d.). https://blogs.worldbank.org/en/latinamerica/4-years-looking-back-openstreetmap-response-haiti-earthquake

Soden, R., & Palen, L. (n.d.). The post-earthquake work of OpenStreetMap Haiti. https://cmci.colorado.edu//~palen/palen_papers/HaitiCOOP_Final.pdf