



OTIS OPERATIONS 23

13 EXPERTS
deployed

42 RESPONDERS
trained

142 GB DATA
collected

51 SQ KM
mapped

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EXECUTIVE SUMMARY

Help.NGO in partnership with Amazon Web Services Disaster Response Team, part of the company's Social Responsibility & Impact programme, has a multi-year history of assisting vulnerable communities in the immediate aftermath of catastrophic natural disasters around the world.

In each emergency cloud and edge solutions play a critical role in the response as the team rapidly works backwards from first responders challenges and rapidly prototypes solutions that can be immediately fielded. Post emergency, these solutions are matured into open-source production and banked into a library of tools that can be immediately deployed for future use.

The following outlines outcomes and lessons learned in the wake of Help.NGO operations in Guerrero State, Mexico after Hurricane Otis, as well as the associated UAS and cloud computing resilience activity delivered to local partners. Help.NGO in partnership with AWS deployed across two phases of the recovery effort.

The initial activation was within 24 hours of the response where Help.NGO subject matter experts were in touch with Mexico Civil Defense followed by a second response one month into the emergency where the team focused on skills transfer and cloud upskilling to localize data response capabilities for the future.



OPERATIONS OVERVIEW

On 25 October Hurricane Otis was sitting in the Pacific Ocean only as a minor tropical storm. Within less than 6 hours of its projected landfall, it would rapidly form and intensify into the most major storm to ever hit Guerrero State. This rapid intensification left little time for rescuers and first responders to prepare and evacuate critical areas. Hurricane Otis made landfall over Acapulco as a brutal Category 5 hurricane, bringing heavy rains and winds that caused widespread floods and landslides to both the urban center and the surrounding municipalities.

More than 296,000 children in the five municipalities most affected needed humanitarian assistance, and there was significant damage to critical infrastructure – including hospitals, schools, ports, and airports – and residential properties. Significant parts of Acapulco experienced extensive infrastructure damage, power outages, and loss of telecommunication. Geographically vulnerable, Acapulco's densely populated hills intensified the extent of the disaster.

After discussions with the AWS Global Social Impact Team, within 48 hours of the crisis Help.NGO intervened with a focus on the provision of emergency connectivity, UAS mapping, and cloud computing resources including the immediate deployment of Snow edge computing devices; the latter in support of UAS data processing, data visualization, and data distribution to support rescue and recovery operations.



INITIAL OPERATIONS

In the initial phase, Help.NGO deployed 6x SMEs to Guerrero State. Upon arrival, Help.NGO SMEs established productive working relationships with Mexican government officials, including the Comision Federal de Electricidad (Federal Electricity Commission), Gobierno Estatal de Chilpancingo (State Government of Chilpancingo), and Secretaria de Gestion de Riesgo y Proteccion Civil (Mexican Civil Protection), who requested further UAS and connectivity support. Initial UAS operations were focused on fulfilling immediate requests from first responders, USAR teams, and other authorities in Guerrero State for high-resolution UAS imagery. Help.NGO SMEs leveraged AWS edge resources for data transfer, as well as cloud resources like EC2 and S3 to establish a database of gathered UAS imagery for immediate assessments as well as for use in ongoing reconstruction efforts.

Meanwhile, connectivity provision (via VSAT deployment by Help.NGO SMEs) supported first responder SOC's to ensure responders were able to effectively communicate amidst ongoing rescue and recovery operations. Connectivity was also provided to NGOs operating on the ground, including at World Central Kitchen's main distribution point in Acapulco.



CONTINUED OPERATIONS

Drawing on established relationships with Mexican authorities – in particular, with Civil Protection and local Fire Departments in Guerrero – Help.NGO provided further UAS and connectivity support with the support of AWS GSI. From the initial engagement in late October to the conclusion of Mexico related field operations in mid-December, the following areas in Acapulco were mapped by Help.NGO SMEs: Playa Pie de la Cuesta, Jardín, Roca de Oro, Nueva Jerusalén, La Nueva Era, Guadalupe Victoria, Francisco Villa, San José Cacahuatpec, Nicolás Bravo, Renacimiento, Colonia Acapulco 2000, Pavel Ernesto Alarcón Ávila.

In addition, SnowBall Edge Devices (SBE) was employed for on-site data processing, allowing for quick analysis and interpretation of the drone-collected data. This resulted in a total of 16,404 photographs and over 142 GB of data collected. After 42 drone overflights, 21 maps were successfully created, equivalent to an area of 51 square kilometers. This data was used not only for ongoing USAR operations, but will also have significant value in planning the reconstruction and rebuilding of areas in Acapulco. 6x VSAT were distributed, with five going to Civil Protection and Fire Department SOCs, the nerve center of ongoing disaster response operations, ensuring high-bandwidth capacity as well as redundant capacity in case of outages.



TRAINING (CLASSROOM)

In addition to continued operations, AWS GSI also generously supported a resilience and capacity-building activity with a focus on UAS flight operations and cloud computing upskilling.

From December 11th to 15th, in collaboration with Guerrero Civil Protection and the Universidad Autonoma de Guerrero, Help.NGO trained 42 students from government agencies on a variety of technical competencies related to AWS and UAS operations.

Agencies in attendance included: Civil Protection of Guerrero State; UAGRO (Universidad Autonoma de Guerrero); Secretariat of Urban Development, Public Works and Territorial Planning of the Government of the State of Guerrero; Secretariat of Public Security of the State of Guerrero; Secretariat of Environment and Natural Resources; Secretary of Welfare; Acapulco Fire Department.

Students were introduced to the main concepts involved in cloud computing as well as specific AWS solutions, including EC2, S3 storage, and Edge Computing devices. Students received hands-on experience, practicing processing and data distribution on sample data sets. A particular focus was on the advantages of leveraging cloud computing in the wake of crisis contexts.

Students were also introduced to key UAS flight concepts. Topics covered included safety, flight coordination, deconfliction, and mapping, as well as the various applications of high-resolution imagery (UAS & Satellite) as it relates to storing, processing, distributing, and visualizing data, emphasizing how these tools can function to digitize emergency response operations more broadly in a post-crisis context.



TRAINING (FIELD)

After the 42 participants completed the classroom portion, participants and instructors went to the field to practice their skills live. This included two components; 1.) the familiarization of fixed and rotor wing uncrewed aircraft systems, 2.) a field simulation exercise integrating the incident command system and real-world mission tasking conducted by teams of 5 rescuers.

During the first component, students practice their flight skills by navigating obstacle courses, practice spot assessments of damaged buildings using UAS, and produce their own assessment maps in 2D and 3D via edge compute devices and cloud instances of open-source workloads.

During the second component, students integrated with government units different from their regular team and received hands-on practice in a live field scenario that mimics an actual response. This includes assessing locations for safe helicopter landing zones, using thermal imaging to detect live victims in debris fields, assessing critically damaged buildings for safety, and assessing road damage for first responder crew movement.



NEXT STEPS

In 2024, Help.NGO plans to conduct a high-level working backwards session in Guerrero State with key leaders from departments engaged during the training in partnership with the AWS country team and Solutions Architects with the aim of enabling first responders to leverage cloud workloads ahead of future responses. This has the potential to open up opportunities for further engagement with AWS Social Responsibility and Impact (Health, Education, & Disaster Response) through preparedness initiatives across other states in Mexico.

There were several key outcomes to this training, including the need to allocate additional time (perhaps two 4-day weeks instead of one 5-day week) as well as the need to integrate account teams and Solutions Architects where possible to assist in answering specific agency questions as they arise.

Help.NGO envisions working with AWS SRI on a new iteration of this module to standardize it into a scalable and replicable programme while also looking into the possibility of including sister cities and municipalities to enable south-south collaboration.

Given local relationships, this could potentially begin in Madagascar and in coordination with the Southern Africa Development Community (Angola, Botswana, Comoros, DRC, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, and Zimbabwe). Once a standardized module is created, the activity could be leveraged in 7 key regions including: Puerto Rico, VITEMA, and associated CDEMA Members; Mexico States and Central American Partners; Colombia and South American Partners; Brazil and Partner States; Poland and the Baltic States; Kenya and the East Africa Community; The Philippines and the Association of Southeast Asian Nations.





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