Using Drone Imagery for real-time information after
Typhoon Haiyan in The Philippines

In late 2013, Danoffice IT used its Huginn X1 quadcopter drone during the emergency response to the worst ever Typhoon to hit The Philippines. This initiative — a pilot project conducted in partnership with humanitarian response teams on the ground — provided useful insights into the type of operational infrastructure needed to deploy drones effectively in emergencies. The drones were deployed later than anticipated, which limited the impact of the use of drones in decision-making or planning.

Background

Typhoon Haiyan (known locally as Yolanda) affected The Philippines in early November 2013. With a death toll of over 6,300 and 14 million people affected, it was the most severe typhoon on record for the Southeast Asian island state. The city of Tacloban, in Leyte province, was one of the worst affected areas and was at the epicenter of the emergency response. Widespread flooding and destruction blocked and destroyed roadways, making it challenging or impossible to reach some communities and presented significant logistical challenges to delivering supplies to those in need.

To help support the response, Danoffice IT, a private company and distributor of the Huginn X1 Quadcopter, sent an unmanned aerial vehicle (UAV) and one of their UAV experts to Tacloban. Danoffice IT partnered with the American search and rescue NGO Team Rubicon and assisted several other NGOs and organizations over a 2-½ week stay in The Philippines.

Figure 1 The Huginn X1 quadcopter drone flies in typhoon-ravaged Tacloban, The Philippines in November 2013.

Implementation

To assist the humanitarian relief efforts and to showcase the benefits of civil UAV (or drones) in a disaster relief context, Danoffice IT offered their services to different organizations when typhoon Haiyan struck the Philippines. Team Rubicon happily accepted the offer. About three days after the typhoon struck the islands, the Danoffice IT UAV expert and a Danish Huginn X1 quadcopter UAV were on the ground liaising with other NGOs to assess their needs and to determine how drones could help in their relief efforts.

Before the drone could be deployed, it was necessary to first get local authorities' permission to fly. In the midst of the emergency response, obtaining the required approval proved to be a slow process, as local authorities were fully engaged in the disaster response. With precious time passing, Danoffice IT contacted the United Nations Disaster Assessment and Coordination (UNDAC) and presented its case. With UNDAC support, Danoffice IT was able to obtain the necessary paperwork to fly.

The Huginn X1 quadcopter UAV came equipped with two cameras, one with high definition colour and one with thermal bands, which allowed live, on-screen observation of the area captured by the camera lens. The Huginn X1 quadcopter can fly as far as 2 kilometers from its controller and has a maximum flight time of 25 minutes.

Danoffice IT provided support for disaster response activities in Tacloban in cooperation with NGOs such as Team Rubicon, and organisations, such as a South Korean search and rescue team and the Canadian Red Cross, and in collab-

Figure 2   Here the quadcopter drone flies over to survey damage to the local Carigara District Hospital in Tacloban, The Philippines in November 2013.

oration with UNDAC. The Huginn X1 quadcopter was flown for a number of missions in and around Tacloban and provided an aerial view of roadways, damaged buildings and other important real-time information. One such mission included flying over the Carigara District Hospital, west of Tacloban, which had reportedly been damaged by the storm. Roadways to reach the hospital were difficult to access and there was concern for the security of teams that would be sent out to assess the state of the building. The deployment of the Huginn X1 quadcopter provided aerial imagery of the hospital and allowed Team Rubicon to assess the damage from the air and provided accurate information on the needs for repairs and materials without setting foot on the ground. This was one of a handful of useful examples of UAV deployment in the context of Typhoon Haiyan and provides a framework for further use of drones in emergency response activities moving forward.

Evaluation

Impact

One of the central lessons learned from this deployment, however, is the time sensitivity of deployments. The Huginn X1 quadcopter was deployed too late to be useful to UNDAC for search and rescue activities.[1] By the time the Huginn X1 quadcopter was authorised to fly, most of the roads had already been cleared and the major search and rescue work was coming to an end. UNDAC had already moved on to a phase of the emergency where the benefits of the drone were less clear. Nevertheless, the UNDAC teams welcomed the use of the drone as a pilot to better determine if and how drones could be useful in disaster response. The flights proved useful to evaluate the possible benefits of such assets as part of the emergency response toolkit.

Both the Danoffice IT drone pilot Liam Dawson [2] and UNDAC team leader Sjaak Seen [3] agreed that such a UAV could provide a great deal of support to search and rescue activities, especially for conducting assessments in the immediate aftermath of an emergency. Both cited the added value of a UAV in expediting evaluations of road conditions, a time-consuming task normally undertaken by a group of people who walk the road assessing the amount of debris. Flying a drone over the same area is much faster and allows the assessment of a much larger area based on real-time information. The information acquired can prove vital in choosing the best pathway to a given location. Other applications include finding bodies and debris floating in water, as was the case in Tacloban Bay, assessing building

....

1   Sjaak Seen, Interview 11 March 2016

2   Liam Dawson, Key Account Manager and Drone Pilot for The Philippines deployment at Danoffice IT, Interviewed by Friederike Alschner, 14 January 2016

3   Sjaak Seen, Multidisciplinary Operational Team Leader at UNDAC, Interviewed by Friederike Alschner, 11 March 2016

Figure 2 An image from above, taken by the quadcopter drone that was provided by Danoffice IT in support of the humanitarian response in The Philippines. The drone was used to survey damage of the Carigara Hospital in typhoon-hit Tacloban in November 2013.

damage or detecting survivors in forests or under debris by using the thermal bands of the camera.

Social acceptance

No known independent research has analysed the social acceptance of UAVs use in the emergency response to Typhoon Haiyan. During the pilot, neither Danoffice IT nor UNDAC [4] encountered criticism or disapproval; rather Danoffice IT reported that the general reaction to their drone flights seemed rather positive [5]. Danoffice reported that local populations expressed a great interest and curiosity about the new technology and its application rather than disapproval.

According to UNDAC, the ease with which they received permission to fly the drone might indicate a general public willingness to approve the use of all possible tools to facilitate the work of the international team. On the other hand, permission for a pilot mission may be easier to obtain than blanket authorization to use drones for search and rescue and emergency response work.

....

4   Sjaak Seen, Personal Correspondence 11 March 2016
5   Liam Dawson, Personal Correspondence 14 January 2016

Plans for adaptation

Neither UNDAC nor Danoffice IT has concrete plans for adaptation. Team leader Sjaak Seen of UNDAC highlighted the importance of a framework (standard operating procedures) for implementing drone use, and the need for defining the benefits that drones can bring to the operation. According to Seen, "If you want to use drones more efficiently then you have to plan in what phase of the emergency what information is valuable" [6] and whether or how drones can provide this information. Especially in search and rescue, any new tool has to be an asset — not a burden — for the team on the ground. The wider use of drones in search and rescue requires additional planning and the creation of a strategy and standard operating procedures. In addition, any drone deployment should be connected to the disaster response coordination mechanism (governmental, international or both) and governed by a memorandum of understanding among the partners. Having a clear structure and the necessary contacts and permissions in place in advance creates the right environment for the effective use of drones.

....

6 Sjaak Seen, Personal Correspondence 11 March 2016

Resources

Team Rubicon's use of drones in response to Typhoon Haiyan, as outlined by partner organization Direct Relief:
http://www.directrelief.org/2013/12/civil-drones-improve-humanitarian-response-philippines/

From NetHope, a consortium of NGOs dedicated to technological innovation: "The Huginn X1 was not only valuable in terms of structural assessment but also as a way to scout locations in advance to determine the best possible routes of approach and assistance."
http://nethope.org/2013/12/17/civil-drone-helps-nethope-haiyan-relief-efforts-in-the-philippines/

Danoffice IT speaks for itself on the deployment of one of its drones to support the emergency response to Typhoon Haiyan:
www.danoffice.com/Admin/Public/DWSDownload.aspx?File=%2fFiles%2fFiler%2fPress+release+Huginn+X1+helps+in+Philippines+Typhoon+-+English.pdf

Acronyms

NGO   Non-governmental organization
UAV   Unmanned aerial vehicle
UNDAC   United Nations Disaster Assessment and Coordination

The views expressed herein should not be taken, in any way, to reflect the official opinion of the European Union, and the European Commission is not responsible for any use that may be made of the information it contains.

Technical Specifications & Credits

Type of system: Huginn X1 Quadcopter
Deploying Agency: Danoffice IT (with support from Team Rubicon and Palantir)
Piloting Agency: Danoffice IT
Dates of Deployment: November 2013
Author: Friederike Alschner, Jessica DuPlessis, Denise Soesilo, ed.

With special thanks to:
Sjaak Seen (UNDAC) and Liam Dawson (Danoffice IT) for their input and comments