Hala Systems Inc.

Technology for Protecting Civilians in Crisis

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Introduction

Tens of thousands of civilians die every year in conflicts and other crises around the globe, and millions more suffer injury, hunger, sickness, and trauma. Public, private, and social entities dedicate significant resources to saving lives and reducing suffering, but the need frequently outpaces resources. Furthermore, these humanitarian crises are often large in scale and complicated to manage, and the response to them is often fragmented, inefficient, and even fruitless, despite best intentions.

Technology can help by increasing the efficiency and effectiveness of humanitarian efforts, even when other resources remain constrained. Hala Systems is founded with this purpose: develop technology that saves lives and reduces trauma. We are leveraging information technology, communications, remote sensing, and innovative architectures to greatly enhance the safety of civilians in crises and the effectiveness and efficiency of responders.

Technology Applications

Hala Systems is developing a suite of related technologies with multiple derivative applications. At the core of this technology suite is the Crisis Response System (CRS). CRS is a net-centric, service-oriented architecture for information sharing and management. It enables civilians, responders, and other stakeholders to increase situational awareness and enhance collaboration. It connects the civilians themselves, tactical-level responders, and strategic-level planners and decision makers, through a common understanding of information gathered from myriad sources. These sources include remote sensors, databases, social media, and a variety of mobile apps. The system also hosts a range of algorithms, from machine learning, location and tracking services, image recognition, and various analytics, to validate, combine, and make sense of that information, to provide the clearest and most actionable information to those who need to take life-saving action.

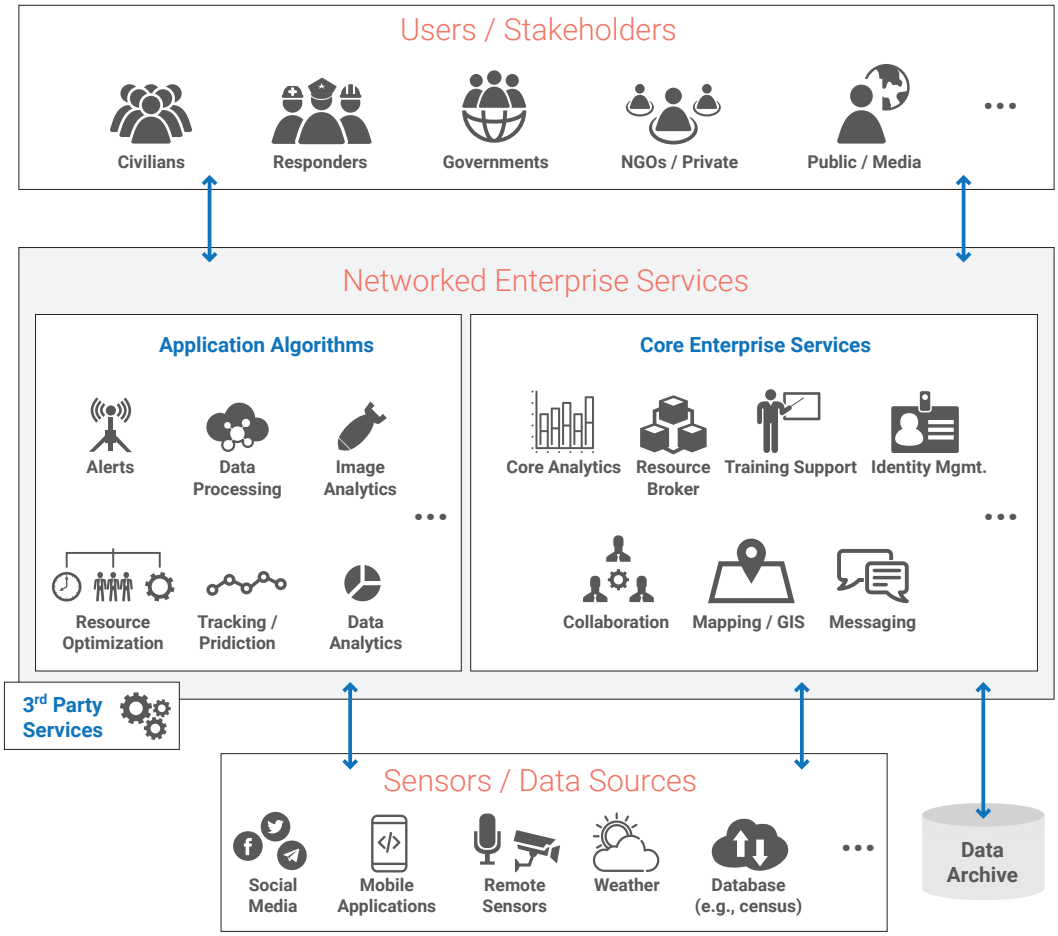

Figure 1: Net-centric design of Hala's Crisis Response System

There are four near-term applications derived from the CRS suite that are either deployed or being developed at Hala Systems.

1 | Monitoring Areas at Risk of Violence

There are many locations that are experiencing or at risk of experiencing significant violence. Examples include regions trying to rebuild and reconcile after wars, dealing with a violent insurgency, or which have very fragile treaties or cease-fires in place—these include places such as Libya, Yemen, South Sudan, Myanmar, Nigeria, or Iraq[1]. In these regions, the accurate detection, geo-location, and detailed characterization of violent acts is important in order to credibly hasten and improve local response; help identify and hold accountable the perpetrators; act as a deterrent; and help local and international leaders understand the true situation on the ground and how to improve it.

Hala Systems is developing a system that combines real-time feeds from networks of sensors, monitors open-source data channels, and validates first-hand reporting. In near real-time it will analyze available data and generate geolocated reports that alert cognizant and distributed authorities. It is often critical that this information is not owned by any single government, police, or military, but is shared multi-laterally to ensure proper accountable and justifiable reactions to any violence.

2 | Early Warning System

Civilians are often not only caught in the cross fire of hostilities, but are increasingly becoming targets of direct military aggression. Hala has deployed technology to warn civilians before attacks happen so that they can take life-saving action. For additional information about these systems, please contact Hala Systems directly.

3 | Responder Coordination System

Large-scale disasters, whether natural or man-made, cross governmental jurisdictions and traditional organizational boundaries. The Incident Command System (ICS) is a framework and process developed by first responders in the United States to organize their response to large scale disasters[2]. It is an example of a crisis management system which is being adapted and adopted internationally by various governments, and promoted by the United Nations[3]. However, coordinating across responding organizations and with the civilians they are trying to serve still proves challenging[4].

Hala is building on a disaster response system developed originally by MIT Lincoln Laboratory[5], to develop a system that helps responders and civilians gain a common situational awareness, coordinate resources and efforts, and collaborate in responding and recovering. It moves to the next level beyond current information sharing systems

(such as ReliefWeb, Kobo Toolbox, or Ushahidi), and provides near real-time data and compartmentalized spaces for established or ad hoc teams to collaborate with chat, maps, whiteboard, and other tools within the same environment as dynamic data layers and field reports. The system is designed to operate even in disadvantaged communication environments, as a thin web client or mobile app. This enables much faster, more accurate, and more comprehensive data sharing and collaboration between ad hoc and loosely coordinated responders at the tactical level in the field, and all the way up to strategic planning and policy levels around the globe.

4 | Unexploded Ordnance (UXO) Mitigation

Humanitarian experts estimate that if the conflict in Syria ends today, it will take more than 30 years to remove all of the explosive remnants of war[6]. These clearance operations are necessary to allow civilians to safely move back to their homes, schools, and businesses. Over 6 million people in Syria live in areas littered with at least tens of thousands of these remnants, including unexploded bombs, rockets, artillery shells, and internationally-banned munitions, such as barrel bombs, cluster bombs, and incendiary munitions[7]. Much of this unexploded ordnance (UXO) did not detonate as intended, but lies armed and dangerous -- ready to maim or kill indiscriminately if mishandled. Conducting interviews in Syria, the Center for Civilians in Conflict found that half of the civilians knew someone who had been killed or critically injured by UXO[8]. And Syria is just one example.

The process of proper handling and disposing of UXO first requires accurate identification of the munition. There is currently no way to provide high-confidence identification of UXO without an enormous amount of training to individuals making extremely dangerous, life-threatening decisions. Training explosive ordnance disposal teams to correctly identify UXO type, payload, risk of accidental activation, and safe distance is costly and time-consuming under optimal circumstances.

Hala Systems seeks to utilize computer-aided vision, image processing, and machine learning to help explosive ordnance disposal teams in Syria and other war zones, empowering them with the information they need to make vital decisions. Hala Systems will develop a mobile application to allow civilian organizations in Syria to locate, identify, tag, and track UXO. As UXO is located and properly identified, humanitarian and civil authorities can use this data for geospatial analysis and mapping to improve coordination, situational awareness, and decision-making when deploying limited human resources to the field. An advanced version of the tool will also provide explosive ordnance disposal teams with in-field technical guidance on the safe disposal of UXO.

Way Ahead

These near-term applications have the potential to save thousands of lives every year, and yet they represent only a beginning. As the system matures and grows the sensors, analytics, and the collaborative community sharing this common platform, its potential realm of application also grows. Monitoring refugee camps or travel routes,

expanding to public health monitoring and management, and even monitoring environmental or climate conditions in a unified common operational picture will become a reality. This will help decision-makers cross organizational or jurisdictional boundaries, to work together in a more efficient and effective manner. It will empower civilians around the globe with tools that will help them help themselves.

There are many technologies which can be further harnessed in this pursuit. The advancement of new platforms, such as UAVs or CubeSats, opens new opportunities for remote sensing, while the Internet of Things (IoT) provides a whole different, but complimentary, world of in situ information collecting and communication. The growing world of social media can be harnessed to provide remarkable human insight on problems. And as the volume of raw information continues to grow, analytics and machine learning can help with the processing and extraction of useful knowledge. Block chain technologies will improve data surety, especially as we seek to overcome misinformation and hidden activities with full multi-lateral exposure in these environments. These tools will unlock unprecedented understanding of complicated and complex environments. And with understanding comes the chance to finally solve many of these problems.

Conclusion

Proper application of new technologies offers hope to solve problems that seemed intractable in the past. But sustainable, robust, life-saving technology does not just appear overnight; it requires deliberate and consistent investment of time and money. This is true in the government and private sector; it remains true in the humanitarian. While Hala brings operational and technical expertise to these problems, we continue to seek leaders who can direct the resources to support that development and deployment process. Partnerships will be the key to saving lives and building a safer and happier world for all.

For more information, contact Dr. Franz Busse, Chief Technology Officer of Hala Systems (franz@halasystems.com)

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[1] One such example is South Sudan: after a unilateral ceasefire was declared by the South Sudanese president in March 2017, it was stated just a month later that there "no concerted effort has been made by any of the warring parties in South Sudan to adhere to a ceasefire," which included the government forces. (UN Mission in South Sudan, ""No concerted effort" to Adhere to Ceasefire in South Sudan as Conflict Intensifies," 2017). Another example is Syria, see https://www.nytimes.com/2017/05/08/world/middleeast/syria-un-de-escalation-zones.html?_r=1

[2] https://www.fema.gov/incident-command-system-resources, accessed May 9, 2017.

[3] http://www.unocha.org/publications/asiadisasterresponse/ToolsAndServicesForDisasterResponsePreparedness.html. See also EMSI, "A WORKING HISTORY OF THE INCIDENT COMMAND SYSTEM," 2016. [Online]. Available: http://www.emsics.com/history-of-ics.

[4] A review of emergency and crisis management in the UK identified education, awareness, and recognition of vulnerabilities will help create more resilient communities (P. Naim Kapucu, "Emergency and Crisis Management in the United Kingdom: Disasters Experienced, Lessons Learned, and Recommendations for the Future"), while an IEEE report classified lessons learned into three key categories: response timeliness, communication and coordination, and technological infrastructure for more effective humanitarian assistance and disaster relief (T. Bui and R. Subba, "A Tale of Two Disasters: Assessing Crisis Management Readiness," IEEE, 2009).

[5] MIT Lincoln Laboratory, "About NICS," [Online]. Available: https://public.nics.ll.mit.edu/nicshelp/articles/about.php. See also: https://www.dhs.gov/science-and-technology/news/2016/08/08/news-release-nics-communication-platform-first-responders-now

[6] http://www.handicap-international.us/30_years_needed_to_clear_syria_of_explosive_remnants_of_war

[7] Nearly 90% of sub-districts are affected. In 57% of sub-districts, agricultural lands have been rendered unusable. UNMAS (Feb. 2017), http://www.mineaction.org/programmes/syria.

[8] Center for Civilians in Conflict (2016), "Waiting for No One: Civilian Survival Strategies in Syria," http://civiliansinconflict.org/uploads/files/publications/Syria_Civilian_Survival_Strategies.pdf