Haiti Information and Communications Observations Trip Report for Visit 18 February to 1 March 2010 Larry Wentz Senior Research Fellow Center for Technology and National Security Policy National Defense University (<u>lwentz@verizon.net</u>) (<u>wentzl@ndu.edu</u>)

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Executive Summary

This paper recounts the observations of a visit to Haiti from 18 February to 1 March 2010, regarding the effects of the 7.0 magnitude earthquake on Haiti's information and communications (ICT)¹ infrastructure and capacity. In addition to detailing the degree of destruction dealt to the ICT sector, the paper also addresses the major actors and agencies involved in the effort to restore the ICT sector, and their actions. Finally, the role ICT played in the rescue and recovery effort, in both a traditional sense and in never-before-used capacities, is also explored.

This visit supported a research project that the Center for Technology and National Security Policy (CTNSP) at the National Defense University (NDU) is undertaking regarding the role of information and communications as an **"essential service"** and **"critical infrastructure"** in crisis response operations. The Haiti earthquake provided a chance to capture and document ICT lessons related to activities of the Government of Haiti and the International Organizations, Non-Governmental Organizations, and the US Government crisis response participants. The paper examines the use of ICT to enable communications, collaboration, and information sharing among deployed civilian and military responder elements, and the less common use of ICT to enable recovery of the other sectors such as governance, public safety, healthcare, education and economic growth.

It was evident there was no agreed ICT crisis response architecture after the earthquake, no overall spectrum manager and coordinator among the crisis responders to work with the Haitian regulator Conatel. There also were few agreed processes and procedures to guide the implementation and possible integration of independent networks to supply a federated network to support responder mission activities. Furthermore, it seemed that ICT is still not viewed as either an essential service or a critical infrastructure by many of the USG and International responder community elements. There was no broad assessment of responder communications and information needs and there was little evidence of actions to assess ICT needs of other sectors such as healthcare. There also was no visible thought leader who was focused on uses of ICT as an enabler of crosssector recovery and reconstruction.

The advent of new ICT tools, including open source software, coupled with social networking tools, received significant attention during the Haiti recovery effort. Although these tools proved useful, and appear very promising in the future, pitfalls to implementing new technologies during a disaster were evident. Difficulties included the accuracy of information from these sources, discovering the right source of needed information, and problems with changes to new software during the crisis itself. Keeping user interfaces and activities simple during high stress operations is extremely important, as well as carefully building and sustaining trust with the end user. Many responders also were overwhelmed by the volume of information available, so "sensemaking" capabilities will be essential.

¹ The international community uses ICT instead of IT (Information Technology) because of the critical role that radio communications plays in many parts of the developing world.

Situation

The earthquake that struck Haiti on 12 January 2010 affected an estimated 3 million people. The most impacted areas included Port au Prince, Carrefour, Gressier, Leogane, Petit Goave, Grand Goave, and Jacmel. As of mid-February 2010 the Haitian government estimated that there were over 220,000 deaths and more than 1.2 million left homeless, forcing many to live in tent cities on the streets, in park areas and fields and elsewhere in Port au Prince (PaP), Leogane (epicenter), Jacmel and other affected areas. Over 460,000 people moved from PaP to other regions outside of the affected areas. The earthquake decimated the Government's response capacity by destroying a large number of the government buildings, including the Presidential Palace and killing nearly 40% of the government workforce. The UN Mission for Haiti Stabilization, MINUSTAH, also suffered serious disruptions with the collapse of the headquarters building in PaP, killing some 150 members including the Head of Mission and destroying the UN command and communications center. Early aid response was impacted by the lack of transportation and gasoline, debris in the streets, and road congestion at the airport and other major areas.



The earthquake temporarily impacted telecommunications and the electricity infrastructure. Many of the GSM towers were located on the roofs of buildings and when the buildings collapsed the towers were destroyed. Other impacts were from telecom facilities that were severely damaged and/or collapsed due to poor construction. The five-story state owned Teleco building housing the wireline central office equipment in Port au Prince and international fiber cable head was reduced to a one-story building. Its collapse destroyed the wireline service in Haiti. The emergency communications network and the metropolitan fiber optic ring serving the financial system were destroyed with the collapse of the Presidential Palace that destroyed critical communications nodes and control centers. The Ministry of Public Works, Transportation, Communications (MTPTC) and Conatel (the regulator) buildings were damaged or destroyed and a large number of their staff left homeless and some killed. The destruction of Conatel impacted its ability to conduct spectrum management and address other related telecommunication sector recovery activities. The Director General, Conatel (DG, Conatel) requested international assistance immediately after the earthquake to help recover the telecom sector. The Organization of American States (OAS) Inter-American Telecommunication Commission (CITEL) responded to help plan the recovery of the telecom sector. The US Federal Communications Commission (FCC), International Bureau, responded and sent a team to Port au Prince on 26 Jan to evaluate status of communications and services. They also helped with telecom sector recovery planning as part of the US Agency for International Aid (USAID) response. The International Telecommunications Union (ITU) sent technical personnel to help as well.

In spite of damage, the private sector cell networks functioned intermittently after the earthquake and the cell providers demonstrated reasonable disaster recovery. Most cell operators quickly took measures needed to ensure continuity of service and rapidly repaired or replaced essential elements with earlier than expected recovery of cell phone service to nearly pre-earthquake levels. Early recovery was also enabled by telecom industry donations and provision of repair teams.

Internet service survived somewhat better since the Internet Service Providers (ISPs) used satellites to connect to the Internet. Challenges for the ISPs included some damaged towers on roofs of buildings that collapsed, limited network coverage pre-earthquake, loss of customer premise equipment due to building damage, lack of spare repair and replacement equipment, reduced availability of staff traumatized or killed by the earthquake, and inability to extend service quickly to crisis areas due to lack of equipment, installation teams and ability to move around physically due to heavy road traffic and facility access challenges due to large amounts of debris and damaged buildings.

Purpose and visit coverage

The Center for Technology and National Security Policy (CTNSP), at the National Defense University (NDU), is conducting a research project on the role of information and communications (ICT) as an **"essential service"** and **"critical infrastructure"** in crisis response operations. The Haiti earthquake provided an opportunity to capture and document ICT lessons related to activities of the Government of Haiti (GoH) and the International Organizations (IO), Non-governmental Organizations (NGO) and US Government (USG) crisis response participants and, in particular, to gain a more informed understanding of:

• Actions related to the use of ICT to enable communications, collaboration and information sharing among deployed civilian and military responder elements and with the GoH supporting the associated search and rescue, recovery, stabilization, and reconstruction activities, and

• Responder community, GoH and Haitian private sector ICT provider approaches to enable recovery of the Haitian ICT sector (Telecoms and IT) and the use of ICT to enable recovery of other sectors such as governance, public safety, healthcare, education and economic growth.

A trip was made to Haiti from 18 February thru 1 March 2010 to observe and document communications and information challenges, lessons and opportunities through discussions with the following sample of civilian and military participants and visits to selected facilities and related ICT installations:

- US Government civilian and military elements
 - US Embassy Deputy Stabilization Coordinator and Office of U.S. Special Coordinator for Relief and Reconstruction, USAID/Haiti team, USAID/Disaster Assistance Response Team (DART), USAID/Office of Transition Initiatives (OTI), Joint Task Force Haiti (JTF-H) J6 and the Deployable Joint Command & Control (DJC2) and Joint Network Node (JNN) facilities, and JTF-H J9, Humanitarian Assistance Coordination Center (HACC)/HACC-Fwd, and 98th Civil Affairs Battalion
- UN LogBase elements
 - Office of the Coordination of Humanitarian Affairs (OCHA), On-Site Operations Coordination Center (OSOCC) facility, Civil-Military Coordination (CMCoord) officer, MINUSTAH Joint Operations Tasking Center, MINUSTAH ICT facilities, and World Food Program (WFP)/Emergency Telecom Cluster and related ICT facilities
- GoH Ministry of Economics and Finance (MEF)
 - Director of IT and the MEF financial network server area
- University of Miami temporary field hospital and Haitian Community Hospital
 - ICT support facilities
- NGOs
 - Cure International, Télécoms Sans Frontière (TSF), and NetHope/Inveneo, Innovative Support To Emergencies Diseases and Disasters (INSTEDD), and related ICT facilities
- Private sector
 - CISCO and Voila, a Haitian cell provider
- Port au Prince, Leogane, and Jacmel
 - Tour of damage areas with JTF-H J2 and J6

The views expressed herein are those of the author and are based on a snapshot in time of ongoing ICT-related activities in Haiti that were personally observed in preparation for the trip and during the visit to Haiti, they are based on unclassified material, discussions, and observations and in some case, experience-based perceptions. This is a continuing research project and some additional observations have been included based on follow-on research interviews at the FCC International Bureau, the National Communications System National Coordination Center and the OAS, CITEL. Discussions are planned with others such as Office of Science and Technology Policy (OSTP), Department of

State (DoS), USAID Response Management Team and Haiti Task Force, Federal Emergency Management Agency (FEMA), and USSOUTHCOM.

Setting the stage

The Congressional Research Service report, dated 6 May 2010, titled "Haiti Earthquake: Crisis and Response," provides in Appendix E the following overview description of US government emergency response mechanism for International disasters:

The United States is generally a leader and major contributor to relief efforts in response to humanitarian disasters. The President has broad authority to provide emergency assistance for foreign disasters and the U.S. government provides disaster assistance through several U.S. agencies. The very nature of humanitarian disasters—the need to respond quickly in order to save lives and provide relief—has resulted in a rather unrestricted definition of what this type of assistance consists of at both a policy and an operational level. While humanitarian assistance is assumed to provide for urgent food, shelter, and medical needs, the agencies within the U.S. government providing this support typically expand or contract the definition in response to circumstances. Funds may be used for U.S. agencies to deliver services or to provide grants to international organizations (IOs), international governmental and nongovernmental organizations (NGOs), and private or religious voluntary organizations (PVOs). The U.S. Agency for International Development (USAID) is the U.S. government agency charged with coordinating U.S. government and private sector assistance. It also coordinates with international organizations, the governments of countries suffering disasters, and other governments.

The Office of Foreign Disaster Assistance (OFDA) in USAID's Bureau for Democracy, Conflict and Humanitarian Assistance (DCHA) provides immediate relief materials and personnel, many of whom are already abroad on mission. It is responsible for providing non-food humanitarian assistance and can quickly assemble Disaster Assistance Response Teams (DARTs) to assess conditions. OFDA has wide authority to borrow funds, equipment, and personnel from other parts of USAID and other federal agencies. USAID has two other offices that administer U.S. humanitarian aid: Food for Peace (FFP) and the Office of Transition Initiatives (OTI). USAID administers emergency food aid under FFP (Title II of P.L. 480) and provides relief and development food aid that does not have to be repaid. OTI provides post-disaster transition assistance, which includes mainly short-term peace and democratization projects with some attention to humanitarian elements but not emergency relief.

The Department of Defense (DOD) Overseas Humanitarian, Disaster and Civic Aid (OHDACA) funds three Dodd humanitarian programs: the Humanitarian Assistance Program (HAP), Humanitarian Mine Action (HMA) Program, and Foreign Disaster Relief and Emergency Response (FDR/ER). OHDACA provides humanitarian support to stabilize emergency situations and deals with a range of tasks including providing food, shelter and supplies, and medical evacuations. In addition the President has the authority to draw down defense equipment and direct military personnel to respond to disasters. The President may also use the Denton program to provide space-available transportation on military aircraft and ships to private donors who wish to transport humanitarian goods and equipment in response to a disaster.²

Generally, OFDA provides emergency assistance for 30 to 90 days after a disaster. The same is true for Department of Defense humanitarian assistance. After the initial emergency is over, assistance is provided through other channels, such as the regular country development programs of USAID.

The State Department also administers programs for humanitarian relief with a focus on refugees and the displaced. The Emergency Refugee and Migration Account (ERMA) is a contingency fund that provides wide latitude to the President in responding to refugee emergencies. Assistance to address emergencies lasting more than a year comes out of the regular Migration and Refugee Account (MRA) through the Population, Migration and Refugees (PRM) bureau. PRM assists refugees worldwide, conflict victims, and populations of concern to the United Nations High Commissioner for Refugees (UNHCR), often extended to include internally displaced people (IDPs). Humanitarian assistance includes a range of services from basic needs to community services.

USAID had the lead role for the USG Haiti response and the DoD a support role. As part of USAIDs ability to borrow resources and personnel from other federal agencies, there were personnel from other federal agencies temporarily assigned to USAID as part of the Civilian Response Corps actions and there were several USG agencies which do not normally participate in International crisis responses that engaged in various ways, including some that deployed teams and capabilities to Haiti. Whether USAID reached out to these non-traditional organizations for help, or whether these agencies offered to help in response to the President's request for the USG to step up is a moot point. Agencies such as the FCC International Bureau, Department of Homeland Security (US Coast Guard (USCG), FEMA, and National Communications System), US Department of Agriculture Forest Service, and Department of Commerce National Telecommunications and Information Association (NTIA) engaged at the national level in support of the USAID Haiti mission. Additionally, the FCC, USCG, FEMA and the Forest Service deployed personnel and ICT crisis support capabilities to Haiti.

There was also an unusually large international responder element to the Haiti crisis. In addition to the UN peacekeeping mission, MINUSTAH, and other UN relief and reconstruction activities already on the ground, other UN elements such as the Office of the Coordination of Humanitarian Affairs (OCHA), along with international urban search

² Section 402 of Title 10, named after former Senator Jeremiah Denton, authorizes shipment of privately donated humanitarian goods on U.S. military aircraft provided there is space and they are certified as appropriate for the disaster by USAID/OFDA. The goods can be bumped from the transport if other U.S. government aid must be transported.

and rescue teams, such as Virginia Task Force 1 (Fairfax County), deployed to help with the search and rescue mission. UN OCHA also helped with coordination of other humanitarian assistance and relief activities. They set up an Emergency Telecommunications Cluster (ETC) to coordinate and provide VHF voice and Internet services for MINUSTAH, UN responder agencies and NGOs as appropriate. The International Telecommunications Union (ITU) emergency telecoms branch responded to support Haiti ICT recovery needs and some ICT support to IDP camps. There were regional players such as the OAS, CITEL, and a large contingent of NGOs that deployed to help across all sectors. Additionally, other national government civil-military elements, industry and private sector volunteers participated. A large number of professional experts volunteered personal time from their home locations to support crowd sourcing and social networking product development. There were also private volunteers and companies helping with emergency response fund raising and with donations of ICT equipment and other relief supplies and services. Some companies also deployed installation teams and technical expertise.

Most of the responder elements deploying into Haiti brought their own communications and IT capability packages that ranged from 2-way, walkie-talkie-like, radios to VHF/UHF radios to cell phones and laptops to Broadband Global Access Network (BGANs) and WiFi to Very Small Aperture Terminals (VSATs) and WiFi/WiMax and to all of the above for some of the larger elements. Power sources such as solar panels, batteries and generators were brought as well. There was, however, no agreed ICT crisis response architecture, no overall crisis responder spectrum manager and coordinator to work with the Haitian regulator Conatel, and no agreed process and procedures to guide the implementation and possible integration of independent networks to establish a federated network to support responder mission activities. Additionally, there was a perception that ICT continues to not be viewed or adequately treated as an essential service by many of the USG and International responder community elements. Most responders agree ICT is important in helping save lives and to help coordinate relief efforts but few treat it as an essential service beyond meeting their own needs.

At the outset of the crisis response, there seemed to be only limited emphasis on the urgency to assess the status of the Haitian ICT sector and its ability to provide services. There was no broad assessment of responder communications and information needs and there was little evidence of actions to assess ICT needs of other sectors such as healthcare—still today a shortfall in Haiti. For example, neither the UN Disaster Assessment and Coordination (UNDAC) Teams nor the USAID Disaster Assistance Response Teams (DART) included ICT expertise or procedures to assess ICT sector recovery needs and to explore its use to enable recovery of other sectors such as governance, public safety, healthcare, and education and explore its use to help improve quality of life in general in IDP camps and elsewhere. A Télécoms Sans Frontière (TSF) member interviewed in Port au Prince expressed concern that ICT was not given more attention during the early assessments and felt strongly this should be made part of the initial assessment team activities.

One area of early attention occurred when the Haitian government regulator, Conatel, requested help from the USG and International community to assess the status of the telecom infrastructure and to help start planning for the early recovery of the ICT sector. In spite of this interest, there was little evidence of exploring ICT use for other sector recovery such as healthcare. No visible thought leader was focused on uses of ICT as an enabler of cross-sector recovery and reconstruction. There were fragmented NGO initiatives focused on ICT services for sectors such as healthcare and to support missions in these areas. The US FCC International Bureau, OAS/CITEL and ITU responded to the DG, Conatel's request for assistance to help and the FCC conducted a quick look telecom sector assessment and made recommendations. There was also an ICT-based community effort to help with recovery planning but, again, the amount of effort focused on the use of ICT by other sectors to help enable recovery was less clear. Even the GoH-directed Post-Disaster Needs Assessment report only loosely referenced the use of ICT in governance, emergency services, and economic growth.

As those who have participated in crisis response know, activities tend to be chaotic in the early stages of deployment. In the case of Haiti, the overall civil-military response was overwhelming and the level of chaos was commensurate. There likely will be lots of noise in the system, making it difficult to do simple tasks such as develop an accurate contact list in real time. The improved ability to share information instantly from multiple sources anywhere in the world proved problematic for many on the ground who had only a limited ability to communicate and generally poor quality access to Internet (which itself was a source of frustration). There were also challenges related to open source knowledge management and quality and dissemination control that resulted in responders receiving duplicate, conflicting and sometimes outdated information. Information overload made it a challenge to sort through massive numbers of emails and other data and to surf the proliferation of portals on the Internet to find the nuggets of information needed. Power was a challenge as well. There were reports of users turning off computers and resorting to clipboards and other manual modes of operation. Interviews with some users in the civilian operations centers suggested they had neither the time nor interest to process that much email or search so many web sites. In spite of its poor quality of service, commercial voice communications remained the norm for many to conduct business and coordinate actions on the ground.

Web 2.0 and social networking tools can empower responders, but can also confuse them. There are numerous examples of the use and benefits of SMS, such as the 4636 text messaging code that was used to help route information to disaster support centers to improve the ability to find trapped individuals and help save lives.

Mission 4636³



In the wake of the January 12th, 2010 earthquake in Haiti a free phone number (4636) was established to meet the urgent needs of the Haitian people through SMS messaging. People on the ground could text their requests for medical care, food, water, and shelter from any Digicel / Comcel-Voila device and receive aid.

Through the "Mission 4636" service, the SMS request data is collected and accessed by thousands of volunteers. Volunteers enter English translations of Creole and French messages into a unique online form which sorts the information by need and priority, and distributes it to various NGOs including Ushahidi Inc., International Red Cross [ICRC], Person Finder, InSTEDD, [and] the Thomson Reuters Foundation.

Another example of using the cell network for supporting search and rescue is reported in excerpts noted below that were derived from a draft press release⁴ about Daniel Kedar's Israeli Search & Rescue support activities that used a combination of Voila mobile phones and Haitian radio outreach.

³ Samasource, <u>http://www.samasource.org//haiti/mission4636</u>

See also: Scherer, John. Crisis Mapping and the 2010 Haiti Earthquake. http://star-tides.net/node/671

⁴ Draft press release provided by Lara Coger, a consultant working in Haiti for Voila.

Voila mobile phones and Haitian radio outreach

Daniel Kedar is an Israeli who is married to the Haitian director of the NGO ProDev. In response to the earthquake, Kedar contacted the Israeli military and pro-offered his help. As a former Israeli soldier in Haiti who speaks Kreyol and with an intimate knowledge of the city, the Israeli military immediately drafted Kedar to coordinate Israeli search and rescue efforts.

Word was spreading that survivors were texting family from under the rubble. Kedar reasoned that if he could somehow capture those calls that he could verify victims' whereabouts and coordinate successful rescues. A few radio stations managed to survive the quake. Kedar visited one and announced a Voila number to call with information about trapped loved ones. And then the flood of calls began.

"I realized that this was uncoordinated chaos, not only on the medical side, but also on the search and rescue. There was not one number to call. "It was not coordinated, it was completely random." Kedar drove down to one of the few working radio stations in Port Au Prince.

"I said, 'Listen, I'm here with the Israeli search and rescue. We don't know where there are survivors." And I said, "Call this number and I gave my Voila number." The phone started ringing, he says, "and I don't have to tell you it rang until I couldn't even take it anymore. That number became the number to get in touch with us. The phone rang all day and all night and still even now sometimes it rings."

The amazing part for Kedar: "People came holding their phones saying, I got a text from my husband or my daughter, she's still under the rubble and she has enough power to send texts."

"I keep telling people, 'You know, these little phones saved lives when they work. ' And they worked, well, with Voila, it worked. They really saved the day those first two or three days which were really critical. "

The Voila phones, he says, was the only way he could manage control and command with this during the critical first 72 hours. As the best communications command center working in the initial days Kedar dispatched not only Israeli forces, but also Russian, French and Greek rescue teams. Without the Voila phones, Kedar says, rescuers would have been "totally lost."

Improved map products using open source and GIS methods to provide more informed insights for use by those on the ground were most helpful—OpenStreetMap became the

maps of choice by responders on the ground in Haiti. On the other hand, accuracy of information, the ability to understand what is needed and available, the ability to discover where one might get the needed information and to get the right information to the right place and person at the right time was a challenge. Keeping user interfaces and operations simple during high stress operations is extremely important. It remains unclear to what extent the good work and results of social network tools and crowd sourcing methods were actually used by responders on the ground and the degree of impact the products had on enabling decision making and achieving useful outcomes. Lots of good anecdotal stories have been told, but a detailed study and analysis of what worked and what did not, and why, on the ground in Haiti has not yet surfaced.

The risks associated with introducing new technology in real world crisis environments needs to be managed carefully, as well as the change process into which the technology fits. New technology initiatives can have down side risks and unintended consequences if user interfaces are not simple and if the capability does not work properly or fails. Users in stressed environments do not respond well to anomalies in operation and performance and are likely to stop using a capability when things don't work properly. Additionally, if real time changes need to be made to fix faults in deployed operational capabilities that make changes in the way the capability operates, this can result in user resistance to using the capability. Once a user decides to not use the capability anymore it is very hard to win them back.

For example, the All Access Network-Haiti (APAN-H) access required a registration process to obtain authorization, user name and password and this was viewed by some to be too cumbersome to use in high stress situations. Many users on the ground resorted to easier web sites to use such as the UN OCHA OneResponse and ReliefWeb and the NATO Allied Command Transformation CIMICWEB. During the visit there were many users who said they had never heard of APAN-H and for those that did, most did not use it. Other US military users spoke of Common Access Card (CAC) access timeouts that created unnecessary lockouts and similar frustrations during high stress periods and created reluctance on the part of some of the users on the ground in Haiti to continue to use APAN-H as the portal of choice. Knowledge management, Requests for Information (RFI) and response management needed some changes during the operation as well. You only get one chance to make a good first impression. During high stress periods of the early phases of the response operations it is important to keep things simple and to carefully build and sustain trust with the end user.

In order to improve responsiveness, the UN OCHA established mechanisms such as the On-Site Operations Coordination Center (OSOCC, see photo below), Civil-Military Coordination Officers and, for ICT, the Emergency Telecommunications Cluster (ETC) to provide a capability and process to coordinate and harmonize response activities. For ICT, the ETC provides a means to coordinate ICT deployments among responders and to create an ICT network to provide initial radio, voice and information services for UN responder elements and access for NGOs and others as appropriate. In the case of Haiti, there was a perception that the demand for ICT services and complexity of the operation exceeded the capacity and speed of response of the ETC to provide needed radio, voice

and data services at the outset, and then to evolve into a VSAT network to support longer term voice and information needs. Not only did the ETC need to set up a network to support UN responder elements such as WFP and UNICEF but it also had to help restore services for the ongoing UN peacekeeping operations, MINUSTAH. In some cases, the ETC also had to restore services for other UN elements that were already in Haiti at the time of the earthquake and whose ICT capabilities were severely disrupted and offices and/or living quarters were destroyed. Many of the affected UN elements relocated to the UN LogBase. Voice and Internet services had to also be extended to multiple UN LogBase locations around Haiti, e.g., Leogane and Jacmel. An IT help desk and other support services that were not normally part of ETC response activities had to be established and manned.



UN On-Site Operations Coordination Center (OSOCC)

Additionally, there was an overwhelming NGO responder community which also needed ICT support services. In some cases, the ETC needed to obtain additional funding to provide unanticipated Internet services specifically for NGOs. It became an increasing challenge for the ETC to engage the NGO community adequately and eventually they had to explore alternative approaches. It was decided to engage World Vision to function as the NGO coordinator and to represent the NGO interests at the ETC.

Further complicating the situation on the ground was the fact that there was no shared situation awareness of the status of the Haitian telecommunications sector and who in general was doing what, where, in the ICT sector recovery and in the uses of ICT to enable other sector recovery. A shared perspective of the ICT networks implemented to

support the responder community mission needs was lacking. In military terms, there was no Common Operational Picture for ICT. There also seemed to be limited general knowledge about the extent of the damage to the telecom sector. There were those who did not know that many of the government and private sector telecommunications staff were killed or displaced and that the telecom and government office buildings and other buildings collapsed or were damaged, including the loss of towers that were located on top of the facilities that collapsed.

There was no focal point for collecting, documenting, visualizing and sharing information on who was implementing what ICT capabilities where. Some information was shared with the ETC but there was no overall perspective of the status of ICT activities that could be shared with the responder community in general. The only status shared was that captured by the weekly ETC meetings (see meeting tent below) and documented in their situation reports. The situation became a particularly difficult problem when the GoH began to receive large donations of telecom equipment and there was no process to determine what equipment to accept and where to use it. The OAS CITEL and FCC and USAID provided assistance to GoH and developed a donation matrix and conducted assessments to try to help sort out what made sense to do where.



ETC Meeting Tent

The initial conditions for access to telecommunications services and spectrum were major challenges. Network interference and spectrum application procedures were major issues. This was compounded by the massive arrival of independent ICT capability packages that included radios and large quantities of satellite terminals that created an unprecedented demand for satellite bandwidth and the potential to misuse of spectrum and satellite capacity. There was also some lack of discipline and reluctance to apply for spectrum. Complicating this was the fact that the Conatel spectrum application procedure

was not well known to the responders. Often one could see several BGANs and VSATs within eye sight of each other and there were many cases of radio link interference on both voice and data networks. There was certainly a need for a GIS capability to map the spectrum and use it to de-conflict likely interference points. In the early stages of response there was also a large media contingent with a large appetite for bandwidth and this caused peak satellite usage during East Coast prime network broadcast times (1700 to 2200). Power also proved to be a major challenge. Commercial power service was intermittent and lacked coverage due to damage. Most communications facilities relied on generators but this proved to be a challenge as well in terms of obtaining and delivering fuel to the generator sites. During the early stages, finding fuel was a challenge and debris made movement a problem. Later vehicle traffic became excessive and created major movement problems. In the early stages of the response it also became necessary to help the GoH regulator and telecom organization staffs to find food, water and shelter for them and their families many of whom had been displaced. There was also a need to help find fuel for generators for these organizations as well.

Stove-piped deployment of ICT capability packages to support independently deployed civilian and military responder elements and the rapid proliferation of independent crisis response web sites was once again the norm, although at increased levels and with significantly increased responder participation. As mentioned before, there was also no comprehensive, centralized, strategy or architecture guiding the deployment of ICT capabilities. There also appeared to have been little attempt made to establish and manage a federated network to serve the responder community in general. World Vision was challenged by UN OCHA to do something like this for the NGOs but progress in this area was not visible. UN OCHA ETC attempted to improve coordination among responder elements implementing ICT networks to support their missions but participation in the ETC is largely voluntary so there were limitations on what the ETC could realistically achieve.

A challenge observed in Haiti was one of responders first knowing that the ETC existed and what its role was and then getting to the UN LogBase where the ETC was located. In fact, awareness of the ETC and its role was not wide spread among responders in Haiti. JTF-H and USAID were most likely aware of the ETC, but did not appear to have assigned liaisons to the ETC or actively participate in its weekly coordination meetings. No interconnections were identified between UN networks and JTF-H and USAID networks. The Humanitarian Assistance Coordination Center-Forward (HACC-Fwd) at the UN LogBase, where the ETC was located, was aware of its existence but did not have an ICT expert on its team, nor was it apparent that ICT was an action area being actively tracked by them. It's not clear if HACC-Fwd ever attended an ETC meeting.

The large amount of vehicle traffic around Port au Prince complicated movement and made it hard for NGOs who lived and worked in the Petionville area to get to the LogBase near the PaP airport. Additionally, the UN base access procedures and sometimes unfriendly behavior of the security guards further complicated access to the compound. These frustrations negatively impacted NGO interests in making the trip for a one-hour meeting so attendance tended to be low. It might have made more sense to

locate the ETC, or hold the ETC meetings, closer to the center of gravity of the NGO community, e.g., in the Petionville area. There did not appear to be an NGO ICT cluster per se although, as has been noted, World Vision was asked by UN OCHA to act as the NGO representative to the ETC and coordinate the NGO needs. The extent to which such coordination was done and the effects of this initiative were not apparent at ETC meetings attended or in following ETC situation reports. Although some progress has been reported to improve harmonization of ICT response networks, much remains to be done. In general, it is still pretty much a come-with-what-you-have and plug-in-and-play as best you can. The internet becomes the "default" civil-military collaborative information environment and VHF radios and cell phones the communications life lines. Migration of the independent networks to a federated network to support responder ICT needs is more a dream than reality at this point.

The US military deployed the Deployable Joint C2 (DJC2) system and other ICT capability packages to provide the JTF-H C2 and related civil-military support elements voice, data, VTC and imagery services. This report does not go into detail on the military systems used, but sharing Global Hawk and Predator video, and use of Commando Solo airborne radio and TV to communicate to the public are examples of military capabilities that were brought to bear to support humanitarian assistance needs. Haitian radio and TV stations were destroyed by the earthquake, but the more affluent Haitians did have satellite TV and iDirect to provide internet access.



Deployable Joint C2 system next to US Embassy

Interestingly, the DJC2 (see picture above) was operated essentially as an unclassified environment but was located inside a protected compound next to the US Embassy. Also, although there is an NGO cell as part of the DJC2, it was not apparent that this capability

was implemented. USDA Forest Service deployed with VHF radio equipment, set up 5 repeaters and 5 remote base stations, and provided 320 handheld VHF radios for use by USG responder elements. USAID/DART deployed with its fly-away kits that contained BGANs, laptops, VHF radios and other capabilities to support DART team needs. MINUSTAH already had voice and data capabilities to support its peacekeeping mission but with the collapse of the Christopher Hotel, the site of the MINUSTAH Headquarters, the loss of UN leadership and ICT capabilities temporarily disrupted UN communications. UN DPKO took action to deploy ICT equipment (see photo below) and staff quickly to help restore service.



UN DPKO team deploying ICT equipment after MINUSTAH HQ was destroyed.

Within less than 24 hours a Télécoms Sans Frontière (TSF) team arrived and helped to start providing some ICT service to MINUSTAH. The UN WFP/ETC and its Fast IT and Telecommunications and Emergency Support Team (FITTEST) unit also arrived shortly after and helped jump start the MINUSTAH rebuild of essential communications and to start to set up voice and data services for UN responder elements and to support NGOs and other responders as appropriate. The ITU emergency telecoms branch took early action to provide 100 satellite phones, expertise and other capabilities to the GoH. A large number of NGOs deployed with ICT capabilities ranging from cell phones to BGANs to VSATs and related WiFi capabilities to support their mission needs. Additional TSF teams deployed with satellite phones, BGANs and WiFi capabilities to support UN, GoH, NGOs and Haitian Internally Displaced Person (IDP) camp communications needs. NetHope/Inveneo set up a WiFi network to support NetHope partners. NetHope is an organization that focuses on enabling collaboration between Humanitarian Organizations through ICT technology.

NetHope/Inveneo⁵

Inveneo's long-distance WiFi links connect NetHope member organizations. The long-distance WiFi network has a dozen nodes and to increase the network's Internet bandwidth availability and reliability, Inveneo partnered with two local Internet Service Providers (ISPs), Multilink and Access Haiti. Inveneo engineers connected to Multilink's network though a long-distance WiFi link from their Bouthillier communications tower, and to Access Haiti via their WiMax network. Both terrestrial connections add redundancy to the original VSAT satellite connection from ITC Global. As a result, Inveneo has been able to bring highspeed Internet access - critical communication capacity - to eleven relief agency locations with minimal equipment and installation time. The long-distance WiFi network has made huge improvements in connectivity for NetHope member organizations. Some had no connectivity before. Others had limited connectivity, like a 160 kbit connection that jumped to 1.6 Mbit. These leaps in access have immediate impact when 20-100 people are sharing bandwidth at each location. International staffs are able to make high-quality Skype video calls when before even voice calls were next to impossible, cutting resupply and rebuilding times by weeks or months.



Inveneo's long-distance WiFi network in Port-au-Prince, Haiti

⁵ Inveneo Haiti Emergency Deployment see <u>http://haiti.inveneo.org/</u>

Now that locals and aid workers in Haiti are starting to transition from initial emergency response to long-term rebuilding, Inveneo is seeking to expand its role from deploying communications for relief efforts to building local capacity. They hope to introduce their innovative Certified ICT Partner program and develop an ecosystem of ICT companies that provide skilled and cost-effective installation and support services for organizations in need of life-impacting ICTs. With programmatic support, Inveneo can train local partners to offer prospective clients local ICT installation and maintenance services supported by Inveneo's cutting edge research and development into appropriate ICT systems.

As noted, there were other independent responder elements that deployed with their own ICT capability packages and built separate networks as well.

The overview diagram-1 (OV-1) below illustrates the complexity of the ICT infrastructure and related portal environment supporting the civil-military response. The Internet and related portals, wikis and Web 2.0 and social networking tools became the "default" civil-military collaborative information environment. Commercial SATCOM, satphones, BGAN, VSAT, GATR SATCOM, WiFi, WiMax, cell phones/SMS, GPS, radios (HF/VHF/UHF) and ham radio operators were the primary means of network access and access to local, regional, and international communications.



With the advances in web, Internet and mobile technologies, new and innovative uses of ICT emerged to enable the crisis response effort and to improve collaboration and information sharing across civil-military boundaries. In particular, the unprecedented use of Web 2.0 and social networking tools, "crowd sourcing" that relied on volunteers, open source information, civilian knowledge sharing, distributed collaboration and shared UNCLAS imagery made dramatic contributions in Haitian earthquake relief. There were other unprecedented actions. DoD announced to all military personnel they were allowed to use Facebook, MySpace and other tools to post their thoughts and activities. Global Hawk and Predator video was released to non-DoD elements and P3 full motion video was posted on InRelief. Given the complexity of the information environment, an OV-1 like chart to capture information flow would have been useful on the ground to help understand participants and relationships and how information flowed and was used by whom, for what purpose.

Regarding commercial satellite use, Inmarsat noted it initiated early action to add channels and capacity to the Haiti coverage area, anticipating the huge demand for satellite service by media, relief organizations and military responders. There were a large number of satellite terminals deployed causing some satellite usage problems. The proliferation of portable satellite terminals (BGANs/VSATs), satellite phones (Iridium, Tharaya, etc), WiFi networks and various radio communications systems and some cell on wheels deployable packages caused communications congestion and interference. There were cases reported of 802.11 WiFi cloud interference and other spectrum interference issues.

Many responders did not properly apply for frequencies or licenses with GoH. At the outset of the response effort, procedures and process for applying for frequencies was either unknown to responders, opportunities were lacking (it took a while for Conatel, the regulator to restore operations), or responders just did not bother to try to apply to Conatel. In fact, in response to a request for assistance by the Assistant Secretary of Defense Networks and Information Integration (ASD/NII), the Naval Postgraduate School (NPS) Hastily Formed Networks (HFN) team leader along with the SkyVision, CTO, who was working with the team took action in the February timeframe to help organize the first frequency coordination meeting to be held after the earthquake. They gathered together organization representatives in Port au Prince such as the DG, Conatel, the UN Mission in Haiti (MUNISTAH), WFP/FITTEST who led the UN ETC, and others. Various U.S. Government organizations, such as USSOUTHCOM, the FCC, and National Defense University were also brought in via teleconference to help organizations understand how to work more effectively with the spectrum manager to be able to use their communications systems without interfering with each other, or with other relief agencies and/or Haitian businesses trying to re-establish their operations and businesses after the earthquake. Subsequent to this meeting, Conatel issued a directive on how to request frequencies and USSOUTHCOM/JTF-H and UN ETC followed up and both submitted their frequency plans.

Big players such as UN OCHA, ITU, USG and other national government elements, other IOs such as the World Bank, regional organizations such as the OAS Inter-American Telecommunications Commission (CITEL) and NGOs such as NetHope, TSF and World Vision tried to play leadership roles in providing strategic guidance of ICT sector initiatives; but ICT-related collaboration, coordination and information sharing was largely problematic. Efforts such as the UN ETC have not yet been successful in appropriately harmonizing and reducing the duplication of ICT capabilities deployed to support civil-military responders.

Some in the responder community were sensitive to uniformed military presence at UN meetings such as the ETC. Sensitivities were not limited to the ETC and appeared in other clusters and interactions with NGOs. There was strong civilian element opposition to soldiers showing up sporting sun glasses and carrying weapons—creating seemingly unnecessary vibes. There were also sensitivities to the military constantly bringing a large contingent to meetings when one person would have been adequate. The challenges are not just military. Other traditional civil-military sensitivities, such as organizational, cultural, and language differences were observed as well. On the civilian side, long hair, beards and sandals, lack of plans and structure, informality, and lack of willingness to collaborate with the military are factors that cause the military to react negatively. In many cases, overcoming the challenges is a matter of better understanding each others' strengths, weaknesses and capabilities, managing expectations and being more sensitive to people and organization cultural differences.

In discussions with the ETC leader about military participation, he was most interested in having the JTF-H J6 participate and extended an invitation to have the J6 come visit the WFP/ETC compound. Such a visit was arranged and occurred a few days after the discussion. Additionally, there did not appear to be active ICT-related interactions between the JTF-H and MINUSTAH. In response to discussions with the MINUSTAH ICT representative at an ETC meeting, an invitation was extended to the JTF-H J6 to visit. This visit was also arranged, taking place a few days after the discussion.

In both the ETC and MINUSTAH cases, the JTF-H J6 visit was very productive and uncovered a number of ICT areas of common interest, including similarities in challenges and lessons, and some initiatives for follow-on actions such as to explore possible interconnections between the MINUSTAH and JTF-H networks. In terms of NGO participation in the ETC, some were suspicious of intent and were reluctant to participate. Others did not participate frequently due to traffic delays that made driving to the UN LogBase for a one-hour meeting unfeasible. In order to try to help improve the situation, the UN OCHA Chair of the ETC in Geneva requested in a letter to World Vision International asking them to take on the ICT coordination responsibility on behalf of all of the NGOs operating in Haiti.⁶ World Vision is an ETC member along with others such as TSF, Ericsson Response, NetHope and Global VSAT Forum. In this role, World Vision International would work with the NGOs in Haiti to help coordinate ICT deployments and try to avoid duplication of efforts. Additionally, World Vision would

⁶ UN OCHA letter dated 27 January 2010 and signed by Cherif Ghaly, Chair IASC Working Group on Emergency Telecommunications and Chair Emergency Telecommunications Cluster.

explore the creation of a federated network that would support NGO needs and could be interfaced with the UN OCHA WFP/ETC network for expanded coverage. The extent to which these actions were addressed is unclear.

The UN OCHA OneResponse and USSOUTHCOM APAN-Haiti portals offered a onestop-shop for requests for information, coordination tools and crisis response information such as situation reports, maps, and assessments. The UN OCHA ReliefWeb was also a favorite "go-to" site for information. In spite of USSOUTHCOM mandate to use APAN-H, other portals were used by US military elements on the ground. The JTF-H Humanitarian Assistance Coordination Center (HACC) posted its assessments, briefings, situation reports and other information on the CIMICWEB portal hosted by the NATO Allied Command Transformation (ACT) Civil-Military Fusion Center. In the opinion of the HACC, this portal was used instead of APAN-H since it offered needed functionality and the HACC wanted to keep access simple-a user name and password were not required. The Marines also used CSHADO.org to post HA/DR information. As noted earlier, P3 full motion video was posted on InRelief and Facebook, MySpace and other tools were used for posting information. There were multiple portals on the civilian side as well, some of which tried to improve information discovery. The ICT4Peace wiki linked multiple sources of vital crisis response information. CTNSP's TIDES (Transformative Innovation for Development and Emergency Support) helped catalyze knowledge sharing for Haiti relief between USSOUTHCOM and the civilian technology community in the first days after the quake. InSTEDD coordinated inputs from the civilian technology community and disseminated a daily technology report that provided assessments and links to Haiti-related social networking sites. Finding the right portal to use and then discovering the information of interest on the portal was a significant challenge. Information search and knowledge management are also challenges needing additional attention.

Commercial power was problematic, as was mentioned earlier. Generators were the main power source for telecoms and fuel for generators was hard to find in the early stages of the response effort. In discussions with Voila, one of the cell phone providers, it was noted the cell phone equipment was working after the earthquake but a lack of fuel for generators caused them to shut down sites selectively even those with back up batteries, since there was no power to run the air conditioning and equipment was heating up. Shelter and housing for the GoH telecom sector employees and families whose government buildings and homes had been destroyed was also a challenge.

It must be noted that the Haiti crisis is not over and is likely to get worse with the impending hurricane season. A challenge for the mid-to-longer term is sustaining the temporary deployments of ICT capabilities that focused initially on search and rescue and now on recovery and reconstruction needs. Many responder networks have either been left in place "as is" or are being transitioned to local NGOs to meet ongoing Humanitarian Aid/Disaster Relief (HA/DR) and reconstruction needs. With the lack of shared ICT situational awareness, ICT initiatives to prepare for the impending hurricane season are unclear, especially for the healthcare sector. In addition to the ICT infrastructure, the ability to sustain the volunteer-dependent "crowd sourcing" social

networking platforms is a concern. Other challenges that materialized in the Haiti response included managing expectations, lack of formal complaints mechanism, absence of downward accountability, and coordination and clarity of messaging.⁷ Finally, the security situation in February was reasonably safe but recent reports from Port au Prince suggest it has started to deteriorate with increased rioting, robberies, kidnappings and other unrest. The status of public safety communications and emergency response ICT is unclear but is certainly something that should have high priority.

Comparing U.S. and international aid is also difficult because of the often dramatically different forms the assistance takes (in-kind contributions vs. cash, for instance). As the situation in Haiti stabilizes, and attention turns to early recovery and reconstruction, sustaining donor interest in Haiti (and commitment to honor existing pledges) could be a challenge. Moreover, this challenge is compounded by the need to maintain funding priorities and secure funds needed for other disaster areas, such as the earthquake in Chile.⁸

Haitian ICT situation

The collapse of the National Palace destroyed the public safety ICT network and the hub for the metropolitan fiber ring that support the Ministry of Economy and Finance (MEF) financial network. The MEF building that housed the servers for the financial network suffered severe damage but the servers survived and were relocated to the old US Consulate building (see server room below) which became the temporary offices for MEF. Some of the other key government buildings that were part of the financial network that supported the MEF network suffered damage and interconnecting cables of the metropolitan area network were destroyed. Of the 48 buildings that were part of the financial network, 18 were found to be in operational condition and 13 did not suffer significant damage. Early efforts were initiated to get a manual process in place and the servers moved and brought back up and running so that payroll and GoH budget process could be brought back on line.

⁷ iRevolution, Patrick Meier, Ushadidi, Haiti and the Tyranny of Technology, March 2, 2010.

⁸ Congressional Research Service report to Congress on "Chile Earthquake: U.S. and International Response," dated 11 march 2010.



Servers that survived the destruction of the MEF building.

In order to get financial information to the Central Bank, which did not suffer damage including its IT systems, so that government financial transaction could start and money could be put into accounts to pay employees, CDs were hand carried several times a day to the Central Bank until a electronic transfer link could be set up between the MEF and the bank. It was important to start to print checks as soon as possible as an indicator of the government functioning again. In response to a request for assistance from the MEF Director of IT, USAID/Economic Growth and Trade (EGAT) responded early to provide the resources needed to help start the recovery of the GoH MEF integrated financial management system and the metropolitan area network (MAN). A WiFi network was being put in place to re-establish the MAN. During the February visit to the MEF and discussions with the Director of IT, the link from the temporary MEF building to the Central Bank was in operational test and evaluation and expected to be operational within in a day or so. There was a plan to try to restore about 50% of the financial network sites by June 2010.

It has been reported that some 40% of the GoH employees were killed and most ministries and other government buildings destroyed or damaged, such as the Ministry of Public Works, Transportation, and Communications (MTPTC) building (see picture below). The regulator's (Conatel), building was also destroyed, along with important records such as spectrum licenses. Conatel also suffered loss of personnel. Immediately after the earthquake the DG, Conatel requested international assistance to help plan the recovery of the telecom sector. The Minister of MTPTC, on the other hand, seemed to be less visible and it was not clear what the real role and relationships were with the regulator since the DG, Conatel took the leadership role in Haiti telecom recovery activities.



The Ministry of Public Works, Transportation, and Communications building.

An additional element of confusion was the role of the MEF and Central Bank, given that they owned the still state-owned enterprise Teleco that was destroyed by the earthquake. Teleco was in the process of privatization, with Viettel being the interested buyer. The private sector expressed concerns about a level playing field given that Teleco, in addition to its landline and fiber cable capabilities that were destroyed by the earthquake, also apparently had ISP and cell licenses. Subsequently it was learned that Viettel purchased Teleco and that construction of a national fiber backbone to connect major cities was part of the deal.

There also seemed to be some concerns about the lack of a good public-private sector partnership, but the current DG, Conatel was perceived by the private sector to be better than the previous one. There was a perceived lack of cooperation among private sector providers. There seemed to be a lack of interest in the use of shared towers, power and security protection to save on operating costs. On the road from Port au Prince to Jacmel independent Digicel and Voila towers could be seen on the same hill tops. Little interest was expressed to integrate connectivity to help build a virtual national backbone and service provisioning capability.

The Organization of American States (OAS)/Inter-American Telecommunication Commission (CITEL) responded to DG, Conatel's request for assistance and set up a task force to help plan the recovery of the telecom sector. Other partners of CITEL, such as the US FCC, International Bureau, provided assistance. The ITU Emergency Telecoms branch provided technical support to DG, Conatel and the CITEL task force. Additionally, the ITU provided satellite phones to be used by GoH leadership. As noted, the US FCC, International Bureau, responded and sent a team to Port au Prince to support the DG, Conatel and to work with the CITEL telecom task force. Additionally, the FCC team, in response to the DG, Conatel request for help, conducted an assessment of the Haiti Telecom and IT sector and made recommendations for near and longer term actions. They also provided assistance to resolve some spectrum issues.

The GoH also led a post-disaster needs assessment (PDNA) with technical support from the UN, the Inter-American Development Bank (IDB), the Economic Commission for Latin America and the Caribbean (ECLAC), the World Bank and the European Commission. The PDNA report contains high level telecom recommendations that focus on strengthening the legal and regulatory framework and ICT governance, infrastructure development, and enabling social well-being and economic growth and job creation. In regard to the longer term development of the Haitian Telecom and IT sector, OAS/CITEL also has produced an agreed conceptual framework and guidelines for member states wishing to design and implement ICT appropriate to their needs and circumstances. The OAS "Agenda for Connectivity in the Americas Plan of Actions of Quito" will no doubt become a part of the guidance for developing a vision, strategy and plan for the recovery and longer term development of the Haiti ICT sector and its governance. CITEL is supporting a GoH-led initiative to develop a Haiti ICT plan.

Although the Haitian commercial cellular service was disrupted due to the destruction of some infrastructure (mainly towers on top of buildings that collapsed), the networks did provide some intermittent service immediately after the earthquake including SMS. The cell network (Digicel and Voila) service was actually restored to pre-earthquake performance levels faster than anticipated. The Haitian cell providers demonstrated a reasonable disaster recovery capability. For example, Voila has a cell company in the Dominican Republic and installers from there were used. The senior Haitian leadership of Voila was in Florida for a business meeting when the earthquake occurred so they were able to help quickly plan the response actions and a plane load of telecoms equipment was among some of the first aircraft to land at Port au Prince Airport. Additionally, the cell companies benefited from a quick International industry response that deployed telecom crisis response teams to help and donated telecom equipment. The Dominican Republic (DR) regulator was a big help to Conatel and other DR ICT organization personnel and equipment were employed to help recover the telecom sector. The Haitian ISPs suffered less disruption due to their use of satellite access and actually were able to maintain continuity in Internet service. Responder elements such as the UN and US JTF-H leased Internet service. The Haitian ISPs Multilink and Access Haiti initially provided free Internet access for the Inveneo WiFi network supporting NetHope partners. As the cell networks started to come back up, the cellular and SMS capabilities quickly became a critical source of communications in support of search and rescue and recovery operations. Initial service was marginal but it provided a means to communicate until other deployed ICT capabilities became operational and the damage cell network was restored. The SMS service worked reasonably well. As the responder population grew so did the demand for commercial cellular use which further impacted

the quality of voice service offered. While in Haiti in February timeframe, the quality of cell service was poor, requiring multiple call attempts to make a connection, frequently dropped calls and poor voice quality. Coverage was also spotty and many responders carried both a Digicel and Voila phone to improve the likelihood of having access.

Unlike the efforts to plan the restoration of the Haitian telecom sector, there were no visible efforts on the part of the GoH, the cell and ISP operators, and a large part of the responder community to provide comprehensive ICT support to other sector recovery such as healthcare and education. There were piecemeal efforts to provide selected connectivity. USG initiatives to provide ICT support to help enable sectors such as healthcare and education were not visible, but there were USAID efforts to help recover the GoH financial network and public safety services. Strategic ICT leadership on the part of the USG and the International response was lacking and ICT support to healthcare was a significant missing link observed during the Haiti visit. There were tactical initiatives such as NetHope/Inveneo implementation of a WiFi network with Internet access to connect NetHope partners working healthcare and the network also provide limited access for some Haitian healthcare facilities. The NGO, Cure International, support of the Haitian Community Hospital (HCH) included a satellite terminal. The University of Miami field hospital used 2 donated portable satellite terminals the size of a computer laptop—each device contained a satellite telephone, satellite Internet, and video camera. Other hospitals had intermittent local wireless access while others resorted to innovative measures such as using a camera on a cell phone to take photos of patients' Xray films and wounds and then emailing the images to stateside specialists.⁹ The Naval Postgraduate School (NPS) Hastily Formed Network Lab (HFN) team that deployed to Haiti to support Navy and USCG also provided some ICT help to local hospitals such as the HCH when local communications access failed. The International Organization for Migration initiative to increase Haitian access to healthcare through mobile services included an ICT capability package to support its mobile vans. Although there were a number of independent initiatives to provide ICT to the healthcare sector, there did not appear to be any leadership, focal point, strategy or plan to lead an effort to systematically assess healthcare information and communications needs and gaps and develop the way ahead and implement an ICT capability to provide reliable wide area coverage and sustainable service.

USG ICT Whole-of-Government Response

Non-traditional USG elements engaged in support of the USAID-led response, including deployments to Haiti. In addition to the FCC International Bureau team supporting Conatel and conducting a Haiti telecom assessment, the DHS deployed FEMA and its mobile emergency response support capability to support US search and rescue team incident management system activities and USCG deployed elements to support port security and MedEvacs to USNS Comfort, and USDA deployed a Forest Service team to install VHF repeaters and distribute VHF radios to support USG responder

⁹ Medscape Today, Kathleen Louden. "Telemedicine Connects Earthquake-Ravaged Haiti to the World," February 18, 2010

communications. At the Washington DC level, other USG elements such as NTIA supported spectrum issues and the National Communication System (NCS) set up a Haiti cell in the NCC to help coordinate USG actions and monitor and report on US response activities. DHS also provided liaisons from the NCS and USCG to USSOUTHCOM. USAID/OFDA setup a headquarters based Interagency-based Response Management Team (RMT) that included some non-USG elements, such as UN OCHA and the NGO InterAction. The RMT supported the deployed USAID/DART team and US Embassy team. A USAID-led telecom task force was set up with participants from DoS, USAID, NTIA, FCC, OSTP, NCS, ASD/NII and NDU CTNSP to help coordinate telecom response activities and to draft a Haiti telecom report. Clearly the engagement of the FCC International Bureau with support from NTIA to work with Conatel and the OAS/CITEL on Haiti telecom recovery planning and spectrum issue resolution were excellent examples of bringing appropriate elements and expertise of the USG to bear to help recover the ICT sector. However, this should not be an ad hoc response but a response driven by an agreed whole of government approach to crisis response such as the US National Response Plan and associated Essential Services Functions.

Certainly the approaches used in Haiti are worth reviewing and assessing in terms of possible approaches worth considering as part of future USG response approaches and plans. There is certainly a need for an "ICT smart business model" to guide ICT response actions for International crises. A notional example of such a business model is depicted in the following diagram that addresses approaches to supporting a smart intervention.



Approaches to addressing a smart ICT intervention.

One needs to overlay on the above diagram the USG elements that would be responsible for each section. As food for thought, for example, include the FCC for regulator, NTIA for spectrum and a mix of S/CRS and USAID for telecom sector recovery and ICT use as

an enabler of other sector reconstruction and development. DoD typically could be employed to support planning, assessments, and some initial initiatives to jump start recovery and reconstruction, especially if a hostile environment existed.

As a complement to a business model, there needs to be a whole-of-government timeline that identifies the roles, relationships and responsibilities of the participating USG elements and identifies who has lead and support roles during the various phases of operation. The chart below is a notional depiction of USG elements participating in support of the lines of operation in Haiti. For example, the chart illustrates, for the Haiti situation, that the transition from emergency operations to reconstruction involves a host of agencies, each on different timelines, most transitioning operations to a steady state under the USAID mission with implementing partners (NGOs and contractors), several with anticipated continuing involvement but sporadic "footprints," all requiring a combination of policy and funding decisions, many of which need to be apportioned and harmonized through donors' conferences and oversight bodies.¹⁰



Less clear at the moment is the USG's long term vision for Haiti, and the ICT strategy and plan for enabling the Haitian longer term multi-sector reconstruction. Although there are common operating pictures (COPs) for these sectors, there does not appear to be a

¹⁰ Based on discussions with HACC team at US Embassy Port au Prince.

COP of ongoing Haiti ICT reconstruction activities, or how ICT is utilized in these other sectors. Initiatives such as the FCC "Haiti Communications Sector Assessment" report and the USAID-led "Inter-Agency Haiti Telecommunications Task Force Paper" are useful inputs for formulating a USG vision, strategy and plan for Haiti but an initiative to take this to the next level as part of the USAID-led Haiti Task Force to develop a USG ICT strategy and plan for Haiti reconstruction and development is unclear. Likewise, the Haiti-led "Post-Disaster Needs Assessment" report that contains high level ICT recommendations is a start and useful input for developing a Haiti vision, strategy and plan for the way ahead which in the end should be the guiding principles for Haiti ICT reconstruction and development. It is understood that the GoH and OAS/CITEL are developing a long term telecom development plan but the USG role and who in the USG is supporting this effort is unclear. It's also not clear how much of the USG assessment has been shared with GoH and will be used as part of developing a Haiti ICT vision, strategy and plan. It would appear that the FCC International Bureau in their role as a member of CITEL would participate but it is not clear if USAID ICT elements are, or will be, engaged as part of the USAID-led Haiti Task Force.

A continuing perception is that the USG and International community do not yet really view or treat ICT as an essential service and critical infrastructure—we are not yet walking the talk. ICT was not part of the HACC activities and no USAID country team plan for ICT could be identified. There were various USAID ICT initiatives related to the MEF financial network, public safety, and radio and TV, but it is not clear what framework or plan was being used to guide these initiatives. Although new DoD policy such as DoDD 3000.05 and DoDI 3820.05 allows for ICT leave behinds as part of crisis response actions, there was no evidence of US military initiatives to take advantage of this opportunity for the ICT sector and its uses for other sectors such as healthcare. ICT was not evident in UN activities such as the Joint Operations Task Force (JOTC) and reconstruction and development activities of the various clusters. The ITU was implementing some ICT capabilities but it was not clear what ICT plan was guiding these implementation activities.

Furthermore, there was no comprehensive baseline of the "as is" ICT network that provided an overview of USG, UN, NGO and other ICT networks supporting the Haiti response, including the public and private sector networks. There was no overall view that captures the independent ICT networks deployed by the civilian and military responder elements. There were multiple views, including a JTF-H view, an Inveneo view of the network supporting NetHope partners, and no doubt other independent network views yet to be discovered. Attempts to obtain a MINUSTAH ICT network overview were unsuccessful. While visiting the WFP/ETC it became clear they had not yet put together a high level overview of their network. The use of GIS maps for developing a COP would have been most useful in helping de-conflict spectrum interference problems and to identify cross sector needs and gaps.

There was a JTF-H J9 initiative, in cooperation with the US Embassy, S/CRS and USAID, to develop a COP of the progress of reconstruction and assessment of related effects. The team was developing measures of improvement metrics for the sectors of

interest, a data collection plan, and a process to collect, assess, monitor, and visualize reconstruction progress across sectors of interest and estimates of the effectiveness of the efforts. At the time of the visit, ICT was not one of the sectors being considered, nor did the metrics being developed include ICT indicators of contribution. Additionally, the collection plan did not address ICT elements. Finally, at a recent roundtable sponsored by the GWU Center for Latin American Issues, "Rethinking Haiti: Illuminating a Path toward Sustainable Growth and Develop," ICT was only mentioned in passing as being important but not voiced as a key enabler across all sectors. Some young members of the Haitian Diaspora in the audience did express concern about the lack of attention to improving Internet access and services in Haiti. The challenge of treating ICT as an "essential service" and "critical infrastructure" is not a USG-unique phenomenon. The International community needs a mind-set change as well.

Who is really in charge in USG ICT response activities? The ad hoc response actions noted earlier to address ICT sector challenges clearly illustrates there is a gap in USG ICT-based thought leadership, policy, concept of operations, and definition of responsibilities for a whole-of-government approach to responding to an international crisis. For the ICT sector, response leadership assignments and planning seem to be ad hoc and reactive as opposed to being proactive and pre-assigned responsibilities as part of an agreed strategy and plan. For US disasters there are assigned responsibilities and a vision, strategy and plan, the US National Response Framework. This plan might serve as a useful framework for developing a USG International Response Plan to help guide whole of government approaches in future crisis response operations. For ICT related actions in particular, the Emergency Support Functions 2 (Communications) and 5 (Emergency Management) and the Support Annexes "International Coordination" and "Science and Technology," plus the Incident Annex "Cyber" might serve as starting points for helping define civil-military organization roles, relationships, responsibilities and shared CONOPS for the ICT related crisis response and information management activities. In sum, incident management systems, assessment tools and ICT response capability packages employed by FEMA and the National Communications System (NCS) might serve as models for international response ICT capability packages; it's more than ICT fly away kits.

In addition to a response strategy and plan, there is also a need to develop an ability for the USG civilian and military responder community to have a more informed understanding of the affected nation's information and communications culture, the ICT governance structure and laws and regulations, the "as is" ICT infrastructure and services, as well as ICT business processes. These are important insights and considerations to support smart crisis response operations, but the USG tends to institutionalize these insights after the fact as the part of the response actions. In the case of Haiti, the FCC International Bureau and the US Embassy played important roles in helping work with their Haitian ICT counter parts.

There is plenty of evidence to suggest ICT can significantly increase the likelihood of success in crisis response operations *if engaged* as part of an overall strategy that coordinates the actions of outside interveners and focuses on generating effective results

for the affected nation. However, systematic metrics need to be developed to make this case convincingly. Properly used, ICT can help create a knowledgeable intervention; help organize complex activities; integrate crisis operations responders with the affected nation; and integrate the affected nation and make it more effective.

The USG civil-military elements working ICT response actions need to be better informed of the roles, responsibilities and capabilities of International ICT actors participating in crisis response and how to deal with the organizations such as the ITU Emergency Telecoms Branch and the UN OCHA Emergency Telecom Cluster and Regional ICT actors such as OAS/CITEL, CTU, and CANTO in the case of Haiti. Needed insights and skills often already reside in government elements such as DoS, FCC International Bureau, NTIA and other USG elements, but the USG does not seem to have an agreed process to reach out and leverage this expertise as a whole-of-government response to international crisis response, in spite of USAID having the authority to do this. Haiti was an exception but maybe there are lessons to be learned that can be applied to future International crisis response operations.

It was a challenge to capture and document experiences and lessons in Haiti. Participants of interest to interview were geographically dispersed around Port au Prince. The heavy traffic made it hard to navigate around town and hold multiple meetings in one day. It could take hours to move from place to place. Additionally, responders were busy and could only offer short periods of time to discuss experiences. Often one had to schedule meetings at breakfast, lunch or dinner or meet in the evenings. Multiple follow-up visits tended not to be well received. Hence, the best shot was to get insights on first visit. Security was not a major issue but one still needed to be street smart and sensitive to possible threats since kidnappings and attacks on relief workers were being reported.

Observations and Perceptions

On the good news side, Haiti was a global community response that stood up quickly and employed innovative approaches and capabilities to facilitate improved situation awareness, collaboration, coordination and information sharing. There was also an early Regional and International telecom-oriented response, including industry, to help Haitian telecom recovery. Some examples follow:

• Civil-military collaboration, coordination and information sharing across the civil-military and public and private boundaries was much better than observed in other real world operations

USSOUTHCOM responded quickly and effectively to incorporate the insights flooding in from open source efforts. The command designated POCs for unclassified information sharing ("Open Source Team"), fell in on a platform (All Partners Access Network— APAN) to facilitate collaboration "outside the wire," and worked to share their data with the civilian technology community on a reciprocal basis. They were also willing to evaluate improvements to APAN based on operational experience. It is important to note that some systems that worked in Miami at USSOUTHCOM headquarters were less useful in the constrained bandwidth on the ground in Haiti.

UN OCHA's OneResponse website enhanced coordination of humanitarian response by providing collaboration tools and a common access point for UN Cluster/Sector information. It offered a one-stop shop for humanitarian operational information (situation reports, assessments, maps, meeting minutes, templates, etc).



The Joint Operations Tasking Center, established by MINUSTAH

The UN Mission in Haiti, MINUSTAH, established the Joint Operations Tasking Center (JOTC) pictured above to bring together and coordinate the efforts of all actors in the delivery of humanitarian assistance at different levels – political, humanitarian, and military. The UN Cluster-validated requests for assistance were submitted to the JOTC to determine how best to meet them using MINUSTAH, US or Canadian resources. If MINUSTAH was unable to assist, the request was offered to the US (USAID) and Canadians. If the USAID accepted, they decided whether to pass the request to the JTF-H for action or use other means. The JOTC requests for assistance forms and request procedures were posted on the UN OCHA OneResponse portal.

A U.S. inter-agency Humanitarian Assistance Coordination Center (HACC) was established by the JTF-H with participation of USAID, S/CRS, and other USG elements. The HACC was located at the US Embassy and a HACC-Fwd was collocated at the UN LogBase with the UN clusters and JOTC, other UN elements and some NGOs. The HACC mandate was to coordinate, synchronize, track and assess Humanitarian Assistance operations; create and maintain a Humanitarian Common Operational Picture; integrate with all stakeholders in order to develop a prioritized list of support requirements; and serve as the primary JTF interface with UN, NGO, and inter-agency partners. The HACC Civil Information Management (CIM) Cell coordinated activities of a working group consisting of the HACC CIM Cell, National Geospatial-Intelligence Agency (NGA), UN/MINUSTAH ArcGIS representatives and XVIII Airborne Corps terrain analysts. This activity significantly decreased redundant data, streamlined map product development and identified key areas of civil vulnerabilities in the Humanitarian Common Operational Picture (HCOP). Additionally, NGA had direct access to and timely coordination with UN Clusters regarding JTF-H key areas of focus. The HACC CIM Cell analysis was fed directly into JTF-H command group and to representatives to



Nodal Integration of Humanitarian Assistance Coordination Center (HACC) USAID provide recommendations regarding displaced populations, resolution of reporting conflicts and development of mapping products to

support the HCOP. As noted earlier, the HACC used NATO's CIMICWEB portal to post its crisis response information. Additional coordination elements included the UN OCHA CMCoord officer and USAID/DART civil-military teams that were employed to facilitate civil-military coordination and information sharing.

USAID-led telecom task force set up several daily teleconference calls among various representatives from DoS, USAID, Commerce, FCC, OSTP, USSOUTHCOM, DHS and others including Conatel and CITEL as appropriate to coordinate telecom response actions.

DoD and the Intelligence Community shared much more information than before (Global Hawk, Predator and satellite). Other providers such as Google Earth, World Bank, UN-SPIDER and other open sources shared imagery and assessments.

Ham radio operators from NGOs, Red Cross and Salvation Army and a hand full of Haitian operators engaged early on to help connect rescuers, aid workers and recovery personnel within country and with the outside world and helped coordinate some MedEvac helicopter flights to the hospital ship USNS Comfort.

Social media, "crowd sourcing," distributed collaboration and shared UNCLAS imagery made impressive contributions in Haitian earthquake relief, especially early on, but the long term import is less clear.

• US Government Non-Traditional and Ad hoc approaches employed for Haiti response have potential to be institutionalized as best practices for future crisis response models and response capabilities

USAID/OFDA HQs setup a Response Management Team (RMT) that consisted of USG Interagency partners and included some non-USG elements such as UN OCHA and the US NGO community spokesperson InterAction. The purpose of the team was to support the USAID/DART.

Through international partnership arrangements, USG elements such as the FCC International Bureau supported the OAS/CITEL task force helping Conatel with planning for the recovery of telecom. USAID/EGAT provided help to the FCC team to help sort out contributions of telecom equipment. Additionally, DG, Conatel invited the FCC to send a team to Haiti to assess the status of the telecom sector, and help with spectrum management issues. The NTIA provided spectrum support to FCC team working with Conatel. The NCS provided advice on approaches to recovering the Haitian public safety network.

A USAID-led telecom task force was set up among DoS, USAID, NTIA, FCC, OSTP, NCS, ASD/NII and NDU CTNSP participants and held teleconference calls (initially daily and then weekly) to discuss telecom actions and to coordinate development of a Haiti telecom report that was subsequently finalized as an Inter-Agency Haiti Telecom Task Force Paper.

USAID/EGAT responded early to provide resources need to help recover the GoH Ministry of Economy and Finance integrated financial management system destroyed by the earthquake. The metropolitan area network interconnected 48 government offices.

At the US Embassy in Port au Prince an Ambassador-level U.S. Special Coordinator for Relief and Reconstruction was established. The HACC was also established here.

In support of USAID, DHS activated equivalent elements of National Response Plan such as:

- The National Response Coordination Center was activated at Level II.
- FEMA activated LNOs for DoD and DoS, US Coast Guard (USCG) and IMAT-West.
- FEMA deployed a field response team and its Mobile Emergency Response Support (MERS) capability.
- The National Communication System (NCS) employed National Response Plan ESF-02 like processes and capabilities and enable USG coordination and monitoring actions through the National Coordination Center
- USDA Forest Service deployed a team to set up a VHF repeater network and distribute VHF radio equipment to USG responder elements.

DHS elements such as USCG and NCS also sent liaisons to USSOUTHCOM HQs.

The Naval Postgraduate School (NPS) Hastily Formed Network (HFN) Lab team deployed to Haiti and employed its ICT fly kits (satellite phones, BGANs, VSATs, and WiFi). The team set up wireless networks with Internet access to support MedEvac communications between the USNS Comfort and helicopter landing zones, to provide ICT support to USCG elements located at the Port au Prince dock area, and to also provide temporary help to local hospitals such as the Haitian Community Hospital (HCH) when its local communications access failed.

• Regional and International Organizations, NGOs and industry reacted quickly, taking actions to help recover the telecom sector and provide services to other sectors such as healthcare

Regional Organizations such as Organization of American States (OAS)/Inter-American Telecommunication Commission (CITEL), Caribbean Association of National Telecommunication Organizations (CANTO), Caribbean Telecom Union (CTU), Caribbean Disaster Emergency Management Agency (CDEMA) and Caribbean Community (CARICOM) mobilized partner nation's response actions. CITEL had staff in Port au Prince and met with Conatel immediately after the earthquake to set up a task force to help figure out what needed to be done to recover the telecom sector. The Dominican Republic Regulator provided help to DG, Conatel.

The UN OCHA Emergency Telecom Cluster did not engage in Haitian ICT sector recovery, this is not in their mission. They did interact with the regulator on spectrum needs and leased services from the ISPs as well as the cell providers. On the other hand, the International Telecommunications Union (ITU) emergency telecoms branch did support Haitian ICT sector recovery. They initiated early actions to provide technical support and loan ICT equipment to the GoH. A Qualcomm Deployable Base Station to support GoH and humanitarian assistance agencies was sent to Haiti and they took action to put on contract an effort to implement emergency ICT support such as WiFi hotspots at 100 IDP camps. However, the coordination of ITU activities with the ETC were limited, suggesting there needs to be better interaction to enhance the ETC ICT coordination role and to improve the overall ICT situation awareness.

The day after the earthquake a three-person team from the NGO Télécoms Sans Frontière (TSF) based in Nicaragua was on the ground in the Port au Prince Airport area and set up a BGAN to support voice and data services at the makeshift reception center. As the team grew, they also provided early ICT support to UNDAC team, the UN OCHA OSOCC search and rescue coordination center at the airport, and at the MINUSTAH camp near the airport, they also provided limited ICT support to NGOs, International Organizations, and other UN elements that moved onto the UN LogBase after the earthquake destroyed their facilities. In addition, the TSF team provided early satellite phone help to GoH leadership, visited IDP camps and provided free calling for Haitians.

UN OCHA led the Emergency Telecommunications Cluster (ETC) coordination efforts at the global level to prepare for the deployment of the WFP Fast IT and Telecommunications Emergency and Support Team (FITTEST) who deployed staff from Dubai to Haiti within 48 hours after the earthquake (FITTEST was the lead element in the ETC). In addition, ICT staff from WFP headquarters and Country Offices around the world deployed to support the operation. Less than 72 hours after the earthquake, the ETC had established a communication center at the MINUSTAH LogBase in Port au Prince. The FITTEST team started setting up communications support for UN elements and NGOs and the ETC held its first local meeting in Port au Prince on 17 Jan 2010. UN OCHA assigned the NGO World Vision (a member of the ETC) the mandate to be the focal point for the integration of NGO requirements and access to ETC services.



Organizations such as the International Organization for Migration (IOM) and NGOs such as NetHope/Inveneo, MediShare, Cure International and others stepped in to try to improve the ICT support to healthcare services, a significant missing link in the overall

International and USG response effort. Inveneo installed and operated a wireless network to serve NetHope partners such as IFRC, CARE, CHS, CHF, Save the Children, and others operating in Haiti. The IOM initiated a project aimed at reducing morbidity and mortality among earthquake survivors by increasing access to medical care and facilitating hospital discharge to emergency housing for the most vulnerable survivors including pregnant women, children, the elderly, those disabled by earthquake related injury, and those with special needs. An ICT capability package was part of this initiative. Other NGOs were installing BGANs, VSATs and WiFi nets at hospitals to support telemedicine and basic communications.

The CTIA wireless industry trade body worked with its members within the wireless industry, the US State Department, USAID and the NCS to provide assistance to Haiti. CTIA members, including the four largest carriers and the primary supplier companies, sent equipment such as mobile phones, satellite phones, generators, mobile sites (Cell on Wheels) and microwave gear to aid those working on the relief efforts with the Haitians. Through their leadership in arranging for texting donations, they enabled "instant philanthropy" that raised millions of dollars in relief for Haiti.

Industry also deployed crisis response teams and donated equipment. Ericsson Response sent a technical support team and its portable GSM network and Wireless LAN In Disaster Emergency Response (WIDER) package. CISCO, Google, Microsoft, IBM and others provided equipment, software, networks and/or technical support. Verizon provided free long-distance calling and others provided free satellite airtime or reduced rates for Haiti relief operations. CapRock Government Services and Iridium provided satellite phones. GATR Technologies® supplied communications support through the use of its inflatable antenna systems and technical support personnel. One such example, GATR established a satellite link near the Mission Aviation Fellowship (MAF) hanger and supported InSTEDD's search and rescue base at the Port au Prince airfield.

The Haitian cell providers demonstrated reasonable disaster recovery and most cell operators quickly took measures needed to ensure continuity of service and rapidly restored network services. Private sector providers T-Mobile, AT&T, and Sprint donated equipment to the Haitian cellular company Voila.

These are only a sample of the ICT community response to the Haiti crisis. The donation of telecom equipment was somewhat overwhelming and it became necessary to provide assistance to GoH to help Conatel understand what equipment was available and how it could be used in the telecom recovery effort. CITEL, along with USAID, helped Conatel put together a matrix of who was donating what type of equipment to help them develop a more informed understanding of what to do.

• Open source civilian technology community and social networking support unprecedented¹¹

¹¹ STAR-TIDES portal, http://star-tides.net/, Lin Wells report "Using Open Source Information to Enhance Situational Awareness and Operational Effectiveness"

Although not addressed during Haiti visit, it is important to note herein the unprecedented role that the Open Source Technology community and related reachback support played in support of the search and rescue and early recovery phases of the response operation. Large numbers of individuals donated a lot of their personal time to try to make a difference. Most had normal day jobs but, in some cases, their companies allowed them to work on Haiti activities during business hours. The following is a sample of their contributions.

Within hours after the earthquake, individuals and teams from open-source civilian technology communities,¹² as well as large and small businesses, began leveraging a wide array of distributed expertise through global networks of volunteers. Crowdsourcing¹³ and open-source capabilities were used to a greater extent than in any previous disaster to accelerate insights into what happened where, who needed help, and who could provide it. An example of the use of the cell network and social networking for supporting Haitian request for help is Mission 4636. Many organizations, public and private, commercial and non-profit, collaborated to set up the SMS 4636 code to provide information and bring help quickly to the Haitians. The service allowed survivors to report their needs and location by simply texting on their cell phones. 4636 also pushed vital news and information back to the survivors, and provided translations. There was no cost associated with the service. The individuals and companies who brought this together deserve great credit, and the use and integration of such technology should be researched for expansion in future disasters, both in the US and abroad.¹⁴

Enough examples have emerged to suggest a new model of public-private and transnational cooperation (notionally termed C2G – citizen to government) to enhance situational awareness and target responses is needed. For example:

Mission 4636: Relief workers received messages in Kreyòl which they didn't understand. Using Skype, text messaging and other tools, they reached out to Kreyòl speakers around the world for translation support. To interpret messages like, "People trapped in building by school next to fountain," a distributed network with local knowledge of Port au Prince converted such information into street addresses, which were converted to GPS coordinates, which were passed to search & rescue teams. The Ushahidi social networking tool (developed in Kenya) takes information from multiple sources and allows one to visualize information on a map. For Haiti, it allowed users to crowd source crisis information from a multitude of sources

¹² These included: CrisisMappers, InSTEDD, Google, Ushahidi, Sahana, Open Street Maps, SMS, UN-SPIDER, ICT4Peace Foundation, etc.

¹³ Crowdsourcing, here, is shorthand for a variety of open-source, social-media-enabled, approaches to take advantage of the collective wisdom of large groups. Technologies used range from blogging to SMS text-messaging, from social media platforms (Twitter, Facebook, hi5, others) to the integration of open source data onto satellite base maps.

¹⁴ <u>http://star-tides.net/files/SMS_4636_Code_for_Haiti_Relief_3-8-10.doc</u>, Lin Wells article "Development of the SMS 4636 Code for Haiti Relief A First-Month Overview," 1 March 2010

including text messages from Haiti and map urgent and actionable reports on the Ushahidi-Haiti platform.

- The Coast Guard launched medical evacuation (MedEvac) helicopters based on data compiled by graduate students in Boston, using Ushahidi for situational awareness, based on data transmitted and translated as described above, superimposed on imagery processed at San Diego State's Visualization Lab, and overlaid with Open Street Maps.
- Imagery (satellite and aircraft) was rapidly distributed, updated with on-the-ground mapping capabilities and fed back to the responders to help target high-need areas. Shared imagery was invaluable.
- Sahana (a Sri Lankan developed crisis response collaboration tool), used "crowd sourcing" to collect information about the Haiti medical infrastructure and plotted locations on a map and provided related situation assessment information.
- The volunteer-driven web-based initiative Crisis Commons within days created the most comprehensive and up to date maps of Haiti through the site Open Street Maps. These were the maps of choice by responders on the ground.

There were also other open source and social network tools were also used. For example, Web 2.0 tools such as Skype, Twitter and Facebook and social media and civilian community crisis response capabilities such as InSTEDD Emergency Information Service, MapAction, Frontline SMS, Google, UN-SPIDER, Crisis Mappers, the ICT4Peace Foundation and others were employed in various ways from raising donations over the Internet, to helping find missing persons. They also provided sector related assessments and annotated maps and imagery to wikis that linked sources of vital information. In some cases, such as the ICT4Peace wiki, these rendered the critical data locked inside closed databases and proprietary formats more easily accessible.

The "need to do better" side of the story

The Haiti response once again exposed lessons experienced (but not learned) in previous crisis responses, as well as some new ones. Examples include:

- Inconsistent treatment by the international community and USG of ICT as an "essential service" and "critical infrastructure." Generally speaking, in terms of emphasis and prioritization of investments and actions, ICT is not viewed or treated as such during the recovery and reconstruction phases
- A need to strengthen whole-of-government preparedness and crisis information management supporting USG and international crisis response actions, both civilian and military

- Lack of adequate USG understanding of affected nation information culture, ICT governance, and ICT business culture—need the equivalent of, in military terms, an IPB for the information and communications space
- A lack of a coherent USG and multinational ICT strategy and plan that is focused on supporting affected nation ICT sector recovery and its uses as an enabler by other sectors, such as healthcare and education
- Stove-piped implementation of responder ICT capabilities and proliferation of web portals impede relief efforts by adding unnecessary duplication, fragmentation and complexity to information discovery, management and sharing
- International and USG senior leadership for the ICT sector crisis response actions is fragmented, making it hard to determine who has actions to do what. Generally there is a lack of ICT strategic leadership and oversight and overall coordination and management of the ICT response activities
- Lack of adequate overall USG (civilian and military) understanding of how to deal with the UN (ETC in particular) and ITU Emergency Telecom Branch, as well as with other players. These include affected nation public sector ICT governance and private ICT sector providers and global, regional and local industry participants. They all need to be partners in crisis information management and related actions
- For social networking tools, challenges included management of expectations, the lack of a formal complaint mechanism, an absence of downward accountability, and coordination and clarity of messaging. Also, there are legitimate concerns about how to sustain the voluntary social networking capabilities so they'll be available in future crises.
- A lack of emphasis on capturing, documenting and assessing lessons and best practices related to the role information and communications as an enabler of "knowledgeable" crisis response operations and approaches to enabling the recovery of the affected nation ICT sector and as an enabler of other sector recovery and engine of economic growth and job creator

Thoughts on a way ahead

Progress has certainly been made in the use of ICT in support of crisis response, however, civil-military collaboration, coordination and information sharing remain a challenge and much more needs to be done to strengthen the USG preparedness to apply the whole of government capabilities, coordinate their efforts within the International response community, and treat ICT as an essential service and critical infrastructure. This is needed not only to support the responder's ability to perform but to also enable the recovery of the affected nation's ICT sector and to leverage its ability to enable other sector recovery. Communications, light, and power need to be treated as integrated, critical elements in any plan. Thoughts on the way ahead include:

- Revise appropriate DoD Policy and other USG guidance to designate ICT as an **Essential Service** and **Critical Infrastructure** for Crisis Response Operations and take necessary actions to trigger the change process to incorporate into Doctrine and other appropriate guidance documents
- Develop a USG ICT strategy for crisis response that focuses on improving the ability to operate in austere, high stress environments with key stakeholders such as UN agencies, to manage and share crisis information across the civil-military boundaries and trans-national boundaries, and to focus on enabling the recovery of the affected nation's ICT sector and its use in enabling other sector recovery
- Explore the development of a whole-of-USG International Response Plan patterned after the US National Response Plan and its associated Emergency Support Functions, leverage whole of US government in support of International response actions
- Develop a more informed understanding of, and working relationship with, UN OCHA and ITU emergency ICT response elements and regional ICT organizations that may be partners in crisis response. The USG needs to engage in the UN OCHA working group on emergency telecommunications (WGET) and participate as appropriate in UN OCHA Emergency Telecom Cluster concept and process development and during crisis response actively participate in ETC meetings and related activities.
- Develop improved procedures and capabilities to work together with the International response community (the IOs and NGOs), including education and training programs focused on improving USG civilian and military responders awareness and a more informed understanding of the complexities of the environment in which crisis operations take place.
- Explore approaches to improving the USG's preparedness for crisis response though a more informed understanding of the affected nation information culture, ICT governance, and ICT business culture. The US government needs to develop the skill sets and organization arrangements to conduct an "IPB-equivalent" for the crisis response information and communications space.
- Recognize the value of unclassified open source information and distributed collaboration and explore the use of new models of public-private and transnational cooperation (notionally termed C2G citizen to government) to enhance situational awareness and focus crisis responses actions.
- Develop a more informed understanding, based on metrics, of how the new social networking tools were applied by responders on the ground and the impact of the

use of these tools. There is also a need to capture the information flow to help understand user needs and behaviors in terms of who uses what information for what purposes and how to better connect the end user and the producer of information to achieve a more informed understanding of needs and how to provide the appropriate insights.

• Enhance the focus of the lessons learned process to address the role of information and communications as an "essential service" and "critical infrastructure" for crisis response, as well as USG approaches to enabling the affected nation's ICT sector recovery and its use as an enabler of other sector recovery

Summary of Abbreviations

Allied Command Transformation (NATO)
All Partner Access Network-Haiti (USG)
Assistant Secretary of Defense Networks and Information
Integration (USG)
Broadband Global Access Network
Caribbean Association of National Telecommunication
Organizations
Caribbean Community
Caribbean Disaster Emergency Management Agency
Civil Information Management
Inter-American Telecommunications Commission
Civil-Military Coordination (UN)
Common Operational Picture
Center for Technology and National Security Policy
Caribbean Telecom Union
Disaster Assistance Response Teams (USG)
Democracy, Conflict and Humanitarian Assistance (USG)
Director General of Conatel
Deployable Joint Command & Control (USG)
Department of Defense
Department of State (USG)
Dominican Republic
Economic Commission for Latin America and the Caribbean

EGAT	Economic Growth & Trade (USAID, USG)
ERMA	Emergency Refugee and Migration Account (USG)
ETC	Emergency Telecommunications Cluster
FCC	Federal Communications Commission (USG)
FDR/ER	Foreign Disaster Relief and Emergency Response (USG)
FEMA	Federal Emergency Management Agency (USG)
FFP	Food for Peace (USG)
FITTEST	Fast IT and Telecommunications and Emergency Support Team
GIS	Geographic Information Systems
GoH	Government of Haiti
HA/DR	Humanitarian Aid/Disaster Relief
HACC	Humanitarian Assistance Coordination Center (USG)
HAP	Humanitarian Assistance Program (USG)
HCH	Haitian Community Hospital
HCOP	Humanitarian Common Operational Picture
HFN	Hastily Formed Networks
HMA	Humanitarian Mine Action (USG)
ICT	Information and Communication Technology
IDP	Internally Displaced Person
IO	International Organization
IOM	International Organization for Migration
ISP	Internet Service Provider
ITU	International Telecommunications Union
JNN	Joint Network Node (USG)
JOTC	Joint Operations Task Force (USG)
JTF-H	Joint Task Force – Haiti (USG)
MAF	Mission Aviation Fellowship
MAN	Metropolitan Area Network
MEF	Ministry of Economics and Finance (GoH)
MERS	Mobile Emergency Response Support
MINUSTAH	United Nations Stabilization Program in Haiti (UN)
MRA	Migration and Refugee Account
MTPTC	Ministry of Public Works, Transportation, and Communications
	(GoH)
NCS	National Communication System
NDU	National Defense University
NGA	National Geospatial-Intelligence Agency
NGO	Non-Governmental Organizations
NPS	Naval Postgraduate School (USG)
NTIA	Department of Commerce National Telecommunications and
	Information Association (USG)
OAS	Organization of American States
OCHA	Office of the Coordination of Humanitarian Affairs (UN)
OFDA	Office of Foreign Disaster Assistance (USG)
OHDACA	Overseas Humanitarian Disaster and Civic Aid (USG)
OSOCC	On-Site Operations Coordination Center (UN)

OSTP	Office of Science and Technology Policy (USG)
OTI	Office of Transition Initiatives (USG)
PDNA	Post-Disaster Needs Assessment
PRM	Population, Migration and Refugees bureau (USG)
PVO	Private or Religious Voluntary Organizations
RMT	Response Management Team
TSF	Télécoms Sans Frontière
UNHCR	United Nations High Commissioner for Refugees (UN)
UNICEF	United Nations Children's Fund (UN)
USAID	US Agency for International Aid (USG)
USCG	US Coast Guard (USG)
USG	US Government
USSOUTHCOM	United States Southern Command (USG)
VSAT	Very Small Aperture Terminals
WFP	World Food Program (UN)
WGET	working group on emergency telecommunications (UN)
WIDER	Wireless LAN In Disaster Emergency Response