



International Command and Control Research and Technology Symposium

June 22-24, 2010

Fairmont Miramar Hotel & Bungalows
Santa Monica, CA

Department of Defense
Office of the Assistant Secretary of Defense
Networks and Information Integration
DoD Chief Information Officer





Response to Haiti: **Complex Endeavors in Disaster Relief**

Richard E. Hayes, Ph.D.
President, Evidence Based Research, Inc.
Member, SAS-085 Research Study Group

Agenda

- Background
- Disaster Relief in Complex Endeavors
- Haitian Earthquake
- C2 Approaches of Response Communities
- Structures and Processes of Key Participants
- Comparisons with other Complex Endeavors
- Requisite C2 Maturity and Agility
- Acknowledgements
- Contact Information

Background

- NATO Studies, Analyses, and Simulation (SAS) Panel has chartered a series of Research Study Groups focused on Command and Control
 - SAS-026 (1999-2002) produced the NATO Code of Best Practice for C2 Assessment
 - SAS-050 (2003-2005) developed the NATO C2 Conceptual Reference Model (300+ variables, 3000+ relationships)
 - SAS-065 (2006-2009) generated and validated the NATO Network Enabled Command and Control Maturity Model to assess collective C2 in the context of complex endeavors
 - SAS-085 (2010-2013) is investigating Requisite C2 maturity and agility
- Requisite Maturity assumes that any given complex endeavor is best dealt with (most effectively and efficiently) by some level or mixture of C2 Approaches
- C2 Agility is defined as the ability to maintain mission effectiveness proactively in the face of changing circumstances and stresses, including the ability to conceptualize, design, create and deploy a successful endeavor.

Key C2 Approach Factors (SAS-065)

- Allocation of Decision Rights to the Collective
- Patterns of Interaction Among the Participating Entities
 - Movement from Organizational toward Functional Clustering
 - Degree of Inter-Cluster Connectivity
 - Frequency and Continuity of Interaction
- Distribution of Information Across the Participating Entities
 - Degree of Shared Awareness
 - Degree of Shared Understanding
 - Adaptability of the Collective Process
- Endeavor Effectiveness
 - Relative Effectiveness (Mission Accomplishment)
 - Efficiency, Given Effectiveness
 - Agility of the Collective Process

Disaster Relief in Complex Endeavors: What is Known

- Four Cases Considered by SAS-065
 - Hurricane Katrina
 - Tsunami Relief (Aceh Province)
 - Golden Phoenix '07 (LA Earthquake)
 - Pakistani Earthquake
- Analyses of all four were segmented
 - Across Time (Search and Rescue, Relief, Reconstruction)
 - By Community (Military, NGO, Civil Authority)
 - Sometimes by level (Local, National, International)
- Integrated analyses were built based on these segmented elements
 - Initial “shock” period characterized by conflicted C2
 - De-Conflicted C2 dominated search and rescue
 - Greater C2 Maturity (more network-centric) tended to emerge during Relief Phases
 - Military C2 tends to be more mature (network-centric) than civilian
- NGOs are seldom (and tend to be weakly) integrated into collective C2, often because of basic failures to share information

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Important Situational Factors -- Haiti

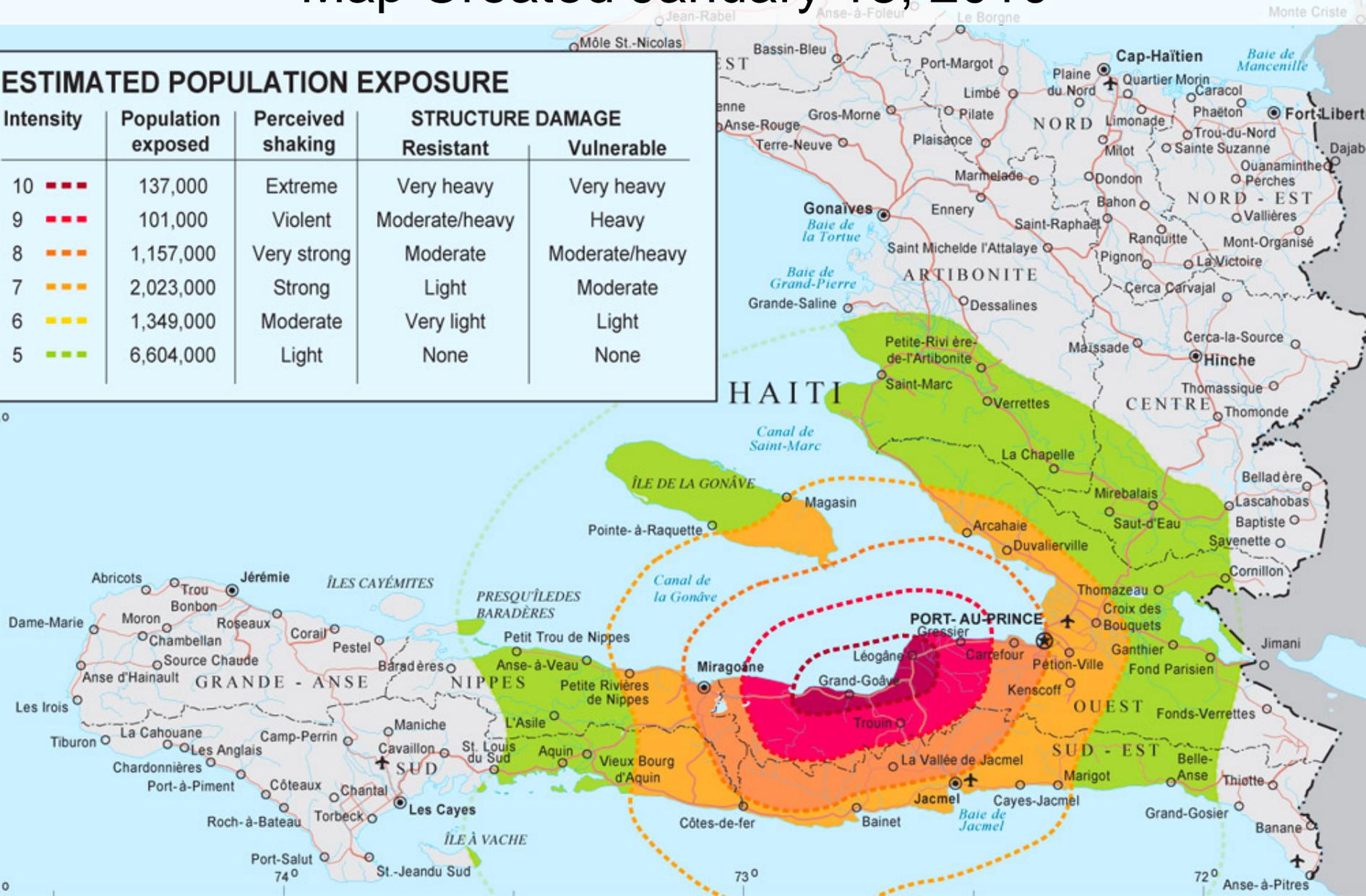
- Heavy International Presence Before the Earthquake
 - UN Development Assistance
 - MINUSTAH (United Nations Stabilization Mission in Haiti)
 - IO/NGO Development Activities
 - USAID Activities
- Geographic Closeness to Potential Relief Sources
 - Dominican Republic
 - United States
 - Caribbean, Central and South America
- Large Expatriate Haitian Community
- US SOUTHCOM Awareness
 - Deputy Commander of SOUTHCOM (LtGen Keen) in Haiti preparing for hurricane response exercises
 - LtGen Keen and MajGen Peixoto (the MINUSTAH force commander) met in 1984 in Brazil and had worked together in several situations.
 - Defense Information Systems Agency (DISA) at SOUTHCOM in Miami testing web portal for disaster relief

Haiti Damage Zones

Map Created January 13, 2010

ESTIMATED POPULATION EXPOSURE

Intensity	Population exposed	Perceived shaking	STRUCTURE DAMAGE	
			Resistant	Vulnerable
10 	137,000	Extreme	Very heavy	Very heavy
9 	101,000	Violent	Moderate/heavy	Heavy
8 	1,157,000	Very strong	Moderate	Moderate/heavy
7 	2,023,000	Strong	Light	Moderate
6 	1,349,000	Moderate	Very light	Light
5 	6,604,000	Light	None	None



Key Earthquake Damage

- Most communications infrastructure destroyed or heavily damaged
- Many buildings, government and private, collapsed or uninhabitable (More than 4000 physical structures were destroyed or damaged in Port-au-Prince)
- Debris made many roads impassable
- Airport closed
- Security situation fragile
- Population devastated
 - Many trapped under rubble
 - Massive injuries
 - Families separated
 - No access to water, food, or shelter
- Most medical facilities (hospitals, clinics) damaged or destroyed
- UN Leadership decapitated
- Haitian Government severely impacted

Agenda

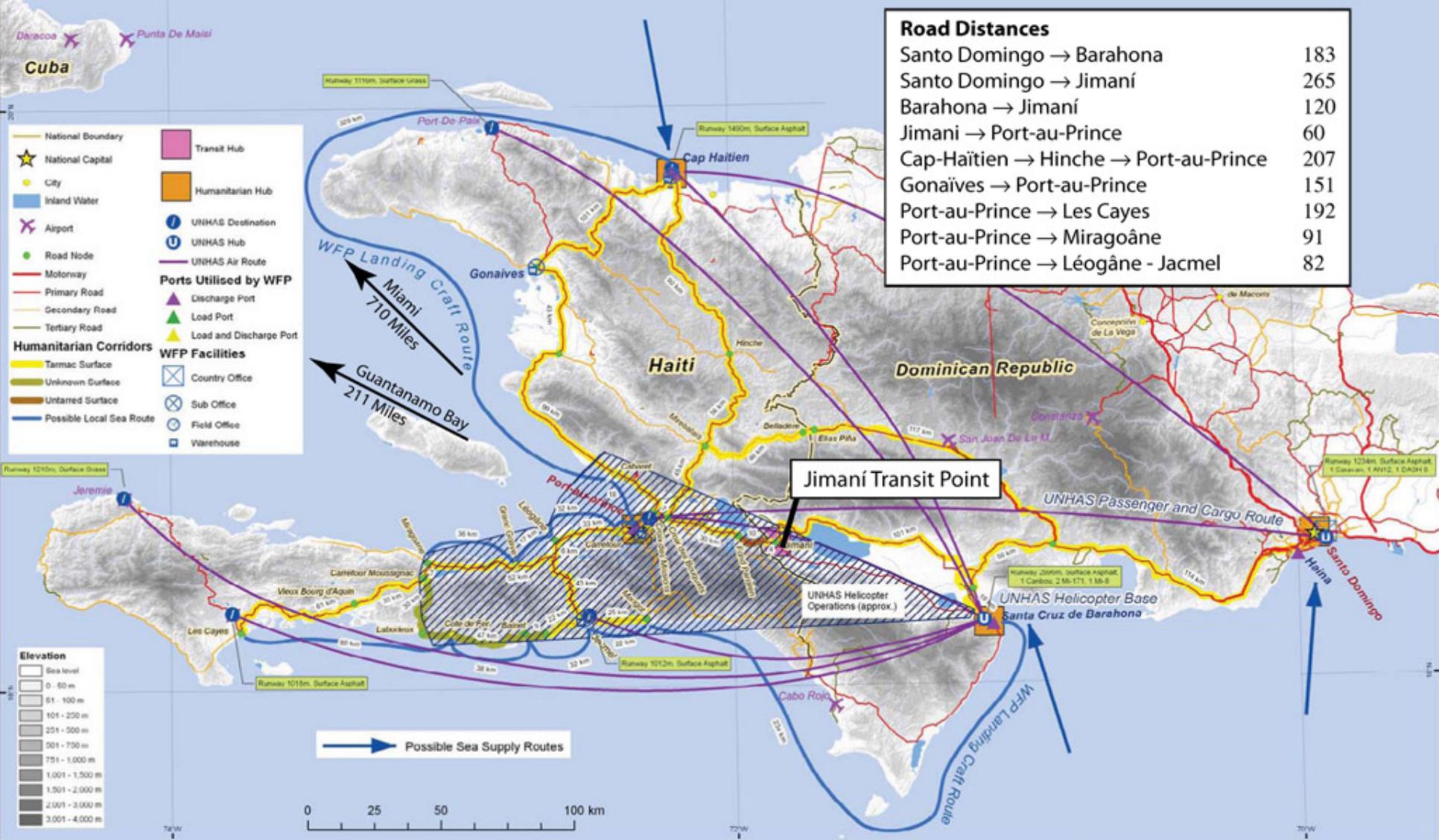
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C2 Approaches of Response Communities

- As in past Complex Endeavors for Disaster Relief, response activities were largely organized around functional activities
- Functional Activity Communities of Interest (Clusters)
 - Search and Rescue Teams
 - Medical
 - Airport and Air Transportation
 - Physical Security
 - Food and Water
 - Shelter and Non-Food Items
 - Separated Families and Children
 - Telecommunications and Information Technology
- Assessment is discussed in terms of the Search and Rescue Phase (January 12 – January 23) and the Disaster Relief Phase (January 23 – ongoing)
- Assessment of the reconstruction phase would be premature at this time

UN/WFP Approach

Map Created January 26, 2010



Road Distances	
Santo Domingo → Barahona	183
Santo Domingo → Jimaní	265
Barahona → Jimaní	120
Jimaní → Port-au-Prince	60
Cap-Haitien → Hinche → Port-au-Prince	207
Gonaïves → Port-au-Prince	151
Port-au-Prince → Les Cayes	192
Port-au-Prince → Miragoâne	91
Port-au-Prince → Léogâne - Jacmel	82

Jimaní Transit Point

UNHAS Helicopter Base
Santa Cruz de Barahona

Search and Rescue

- Dozens of Search and Rescue Teams from around the world
 - First in – Iceland via Boston. Arrived January 13
 - More than 50 international search and rescue teams
 - Approximately 180 lives saved, many injured pulled from the rubble
- Function under established international protocol
 - Team alerts by World Food Programme (WFP)
 - Deployed upon request of host government
 - Teams selected by WFP
 - First team on site coordinates activities (fire fighter model)
 - WFP deploys to take charge
 - Actually heavily self-synchronized
- Support needed
 - Mapping of requirements
 - Physical Security
 - For many teams, transportation
- Functional Assessment – Coordinated C2

Medical

- Medical Response
 - Medical capacity extremely limited, primitive treatment “civil war medicine”
 - Countries respond with field hospitals – Israel, Russian, Nicaragua, Mexico, Turkey, France, Indonesia, and others. Some urgent cases treated aboard naval vessels
 - Many countries and NGOs sent medical teams
 - NGO community treated thousands of survivors in dozens of facilities
 - Many patients had to be evacuated to Dominican Republic, Guantanamo Bay, Jamaica, Martinique, Miami and elsewhere
- Established international protocol (rely on local capabilities) severely challenged because health infrastructure was destroyed
- Decision making (location, transportation, support, patient assignment) conducted through Humanitarian Assistance Coordination Center (HACC), UN, and Haitian Ministry of Health
 - Considerable self-synchronization
 - Challenges included medical supplies, sanitization, post-op care, and patient load
- Support needed
 - Ground transportation
 - Physical Security
- Functional Assessment – from De-Conflicted to Coordinated C2

Airport and Air Transport

- Port-au-Prince (10,000 foot runway) tower and terminal heavily damaged, with few paved alternatives Cap-Haitien (4000 ft), Jacmel (3300 ft.), and Le Cayes (3300 ft.)
- US Special Forces team took control on the evening of January 13
 - Initial capacity 25-40 flights per day, later up to 100, 125
 - No initial mechanism to coordinate in-coming flight plans
 - Many flights diverted to Dominican Republic
- NGO (Doctors Without Borders) complained of lack of priority January 16
 - Major media attention
 - Improved coordinate mechanism established
- Airport facilities quickly overwhelmed
 - Limited storage for offloaded goods
 - Road access blocked by debris, Cap-Haitien poor road access
 - Logistics base established adjacent to airport
- Coordination required
 - Flight Planning
 - Road clearing
 - Transportation of goods
 - Linkages to distribution system (NGO, US, UN, Haiti)
- Functional Assessment – Conflicted to De-Conflicted during search and rescue, improved to Coordinated C2 during Disaster Relief

Physical Security

- Security was a persistent concern from beginning, however situation remained relatively calm.
 - MINUSTAH had successfully cleaned out violent gangs and Haitian Police functioning well when quake hit.
 - Jails collapsed and gang leaders/members escaped.
 - First counts showed half of police in Port-au-Prince absent.
- Widespread violence, looting failed to materialize (only scattered incidents)
- Government imposed curfew until February 14. Security situation remained stable
- Population's response
 - Focused on rescue and recovery of bodies. Police involved in clearing bodies.
 - Desperation increased with slow delivery of food and water; military escorts were required for early distribution of food and water.
- Security force response
 - Crowd control handled by MINUSTAH and US military.
 - US ceased convoy escort as police reappeared (80% strength by January 30)
 - Police become more visible: escorting water trucks, guarding banks and Western Union while working without pay and with one meal per day.
 - Arrivals of goods and changes in distribution practice reduced pressure on convoys by end of January
- Functional Assessment – De-Conflicted to Coordinated, some Collaborative C2

Food and Water

- Responses
 - Need for food and clean water resulted in large flows from outside the country
 - Serious difficulty coordinating arrivals
 - Ports inoperable
 - Air transport not well-organized
 - Dominican Republic airfields opened immediately
 - Over time, improved coordination including using Miami and other nearby airports as staging areas
 - Distribution was also a challenge
 - Limited storage at airports
 - Road networks blocked
 - Distribution points required planning and coordination
 - Physical security of stockpiles and distribution locations required attention
- Alternative mechanisms explored
 - Air drops of food and water (safety of drop zones, control of desperate population)
 - Unescorted vehicles and convoys (physical security challenges)
 - Police and military organization of victim population, controlled distribution
 - NGO driven system involving ID cards, family needs and physical security
- Functioned largely under established international protocols
 - WFP leads the Food Aid Cluster and is responsible for the food distribution in Haiti
 - Coordinated through HACC, UN, and Haitian government
- Support needed for local storage, inventory management (barcode technology), ground transportation, and physical security
- Functional Assessment – Coordinated C2

Shelter and Non Food Items

- Responses
 - Massive damage to housing, fear of aftershocks and further collapses put the population in the streets (more than 1.3 million people displaced)
 - People occupied parks, golf courses, and other open areas
 - International Organization for Migration (IOM), already present, initiated shelter coordination
 - International Federation of Red Cross and Red Crescent Societies (IFRC), the formal Emergency Shelter Cluster lead, arrived on January 14 to assess situation
 - First IFRC-coordinated supplies arrived via convoy from Santa Domingo on January 16
 - Continuous shortage of shelter materials and tents
- Function under established international protocol
 - The Emergency Shelter Cluster is comprised of nearly 70 humanitarian agencies
 - Protocol calls for a single coordination structure, led by government, with the support of the humanitarian community, and including the capacities of the armed forces and commercial contractors.
- Varying degrees of local organization and security for different displaced persons camps
 - Government encouraged groups to move out of damaged areas to other areas in the countryside to relieve population pressure
 - Many desired to stay near their homes to protect property and in the hope of rescues from the rubble
 - Considerable self-synchronization for food, water, child care, local security, and community activities
 - NGOs were active in camps
- Functional Assessment – Coordinated C2

Separated Families and Children

- US and International reactions expediting adoptions
 - Strong international concern about children—existing orphanages and ad hoc arrangements emerged promptly
 - Netherlands sent plane for 100 children (44 with incomplete paperwork) on January 19
 - Homeland Security, State Department and Department of Health and Human Services created a team to work on and expedite adoptions on January 22
- Aid to children in country
 - Aid workers set up “child friendly zones”
 - “Humanitarian parole” expedited visas for up to 900 orphans whose adoptions were already under way (January 21)
 - Moratorium on adoptions to prevent children from being taken before family could reclaim them (January 22)
 - 700 children were registered with UNICEF and placed in camps for reunification (January 26)
- Function under established international protocol
 - UN refugee and human rights organizations led the Protection Cluster
 - Key organizations: Save the Children, UNICEF, World Vision, SOS Children
 - Organizations urge EU to ban all adoptions from Haiti (January 26)
- Functional Assessment – Conflicted C2 to De-Conflicted C2 to Coordinated C2

Telecommunications and Information Technology

- Responses
 - Communications infrastructure heavily damaged
 - Cell towers down, landlines heavily impacted Telco HQ collapsed
 - Widespread power outages
 - Banking sector and GofH unable to communicate
 - Communications restored piecemeal with text messaging and spotty internet leading the way
 - MINUSTAH assigned responsibility for infrastructure in main areas
- Function under established international protocol
 - WFP leads the emergency telecommunications cluster
 - UN IT emergency responders from Dubai and Rome arrive January 15
 - UN OCHA implemented OneResponse, website for responders
 - US established independent telecommunications system
 - Private sector firms contributed to restoration of commercial capacity
- Functional Assessment – From De-Conflicted C2 to Coordinated C2

Innovative Uses for Telecommunications and IT

- Broad use of Crowd Sourcing, Open Source and civilian technology
 - GIS Mapping of damage and relief needs
 - Text messaging of specific needs for rescue
 - Facilitating family reunification
 - Wireless networks deployed rapidly
 - Commercial Supply Chain Management (Barcode, Just in Time)
- Messages in Creole could not be understood by most responders
 - Networks established to move requests for help offshore and return translations
 - Universities and NGOs staffed translation centers in the US and elsewhere
 - Created on the fly
- Largest and most rapid humanitarian fundraising campaign
 - ICRC raised \$35 million in 48 hours via text message donations
 - \$560 million in donations made by individuals and corporations worldwide by January 29
- Assessment -- States of the Art Capabilities Provided Agility in a Number of Areas

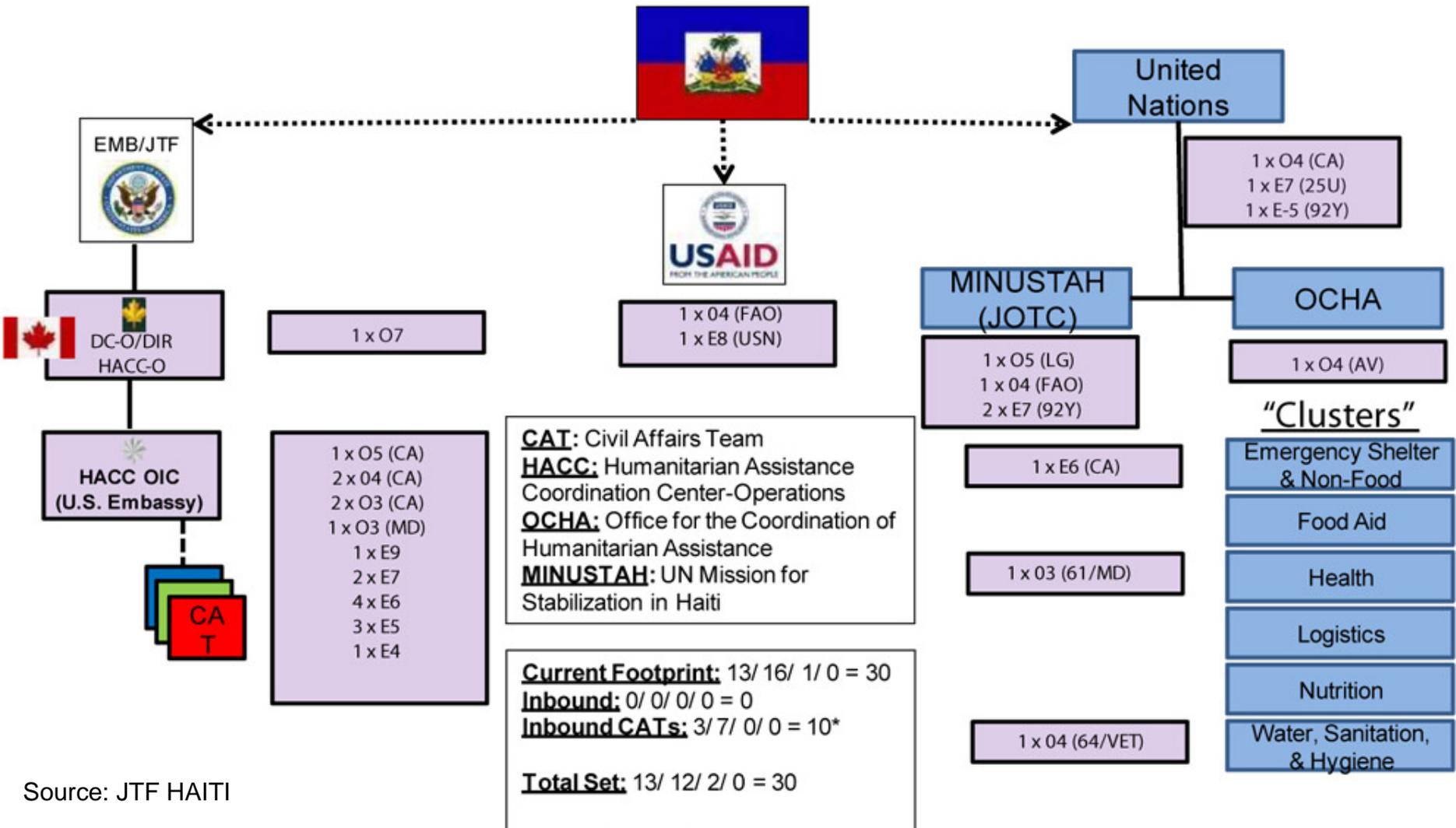
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HACC Partnering Concept

Operation UNIFIED RESPONSE

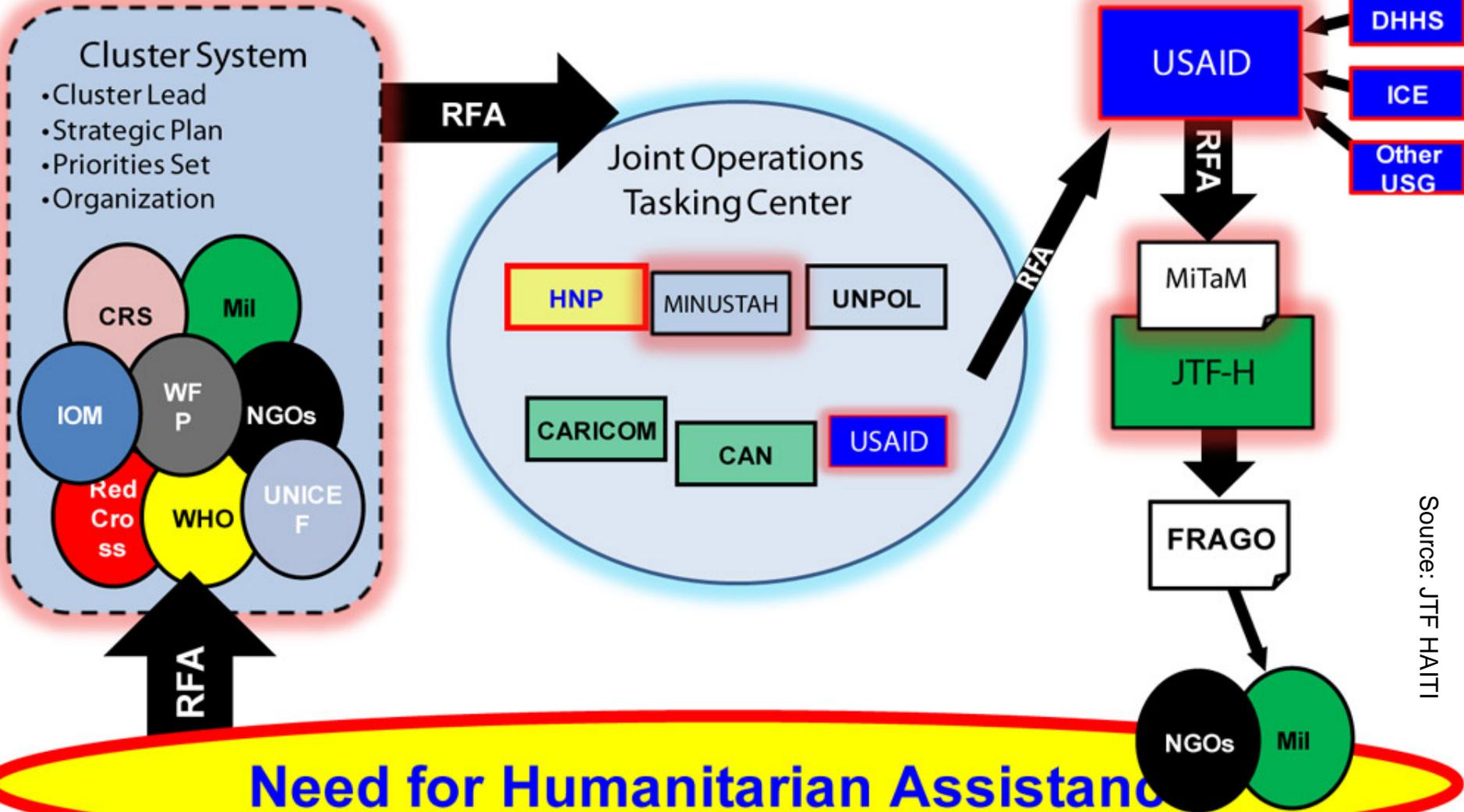
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JTF HAITI HACC

Request for Assistance Process

Operation UNIFIED RESPONSE

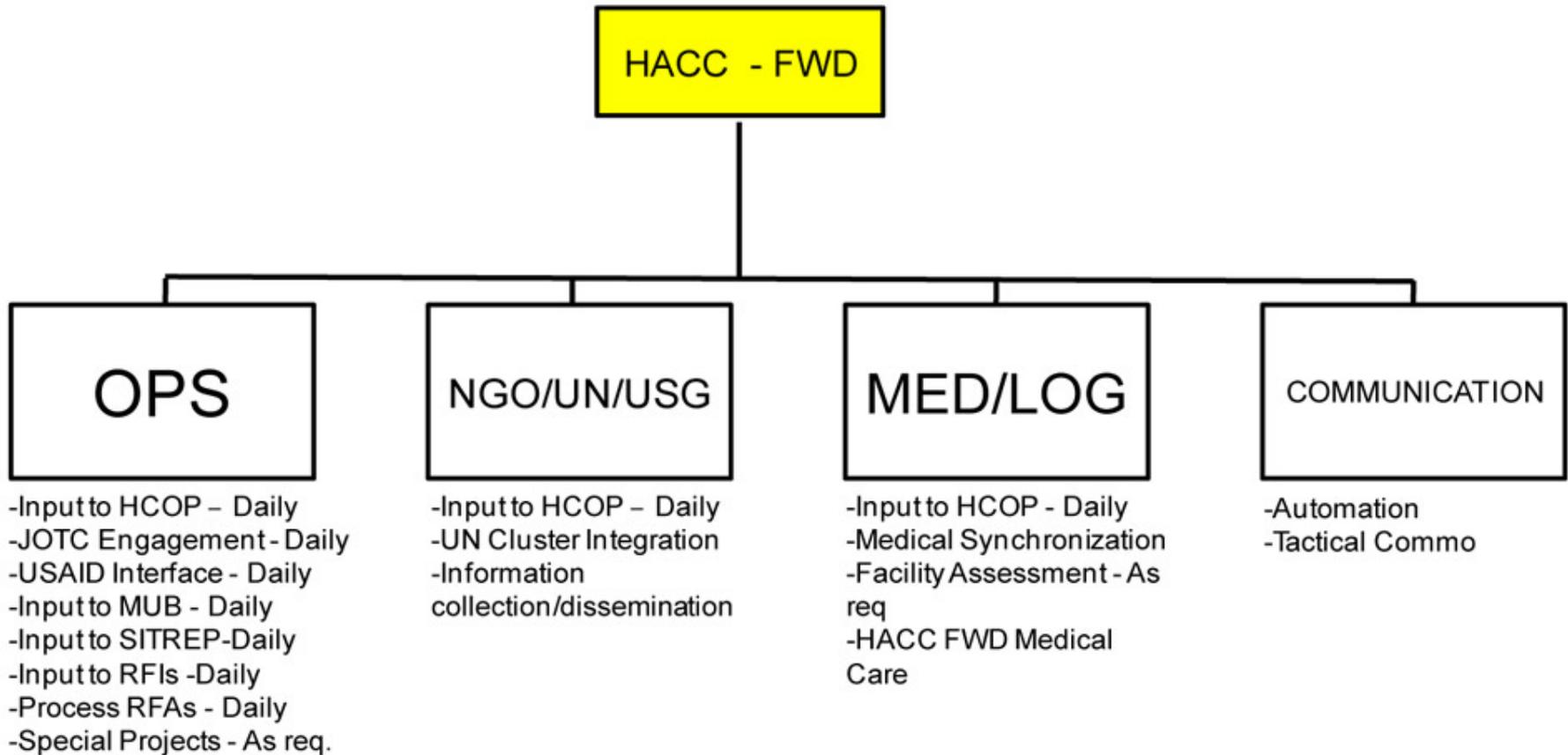


Source: JTF HAITI

JTF HAITI HACCC-FWD

HACC-FWD Responsibilities

Operation UNIFIED RESPONSE



Conclusions about Haiti Response

- Initial “shock” period caused episodes of Conflicted C2
- Relatively rapid response because of presences in country and proximity of many response organizations
- Responses largely organized by functional clusters
- True civilian leadership – UN, USAID, residual Haitian Government
- C2 maturity evolved, improving slowly over time
- In most clusters, Coordinated C2 was the highest maturity (level of net-centricity) achieved
- Islands of self-synchronization occurred, but they were isolated

Quotations from Participants

- UN SecGen Mr. Ban called the situation in Haiti “one of the worst humanitarian crises in decades”... “For a small country like Haiti, this is a tsunami-like disaster”
- LtGen Keen – “We knew ‘what was needed’. We had agreement ahead of time based on the El Salvador floods. The emergency operations center concept was known.”
- USAID – “Crisis often brings people together with a clarity of goal and a sense of urgency – and I saw that when USAID hosted the Haiti operations center in our Response Management Center...Our military brought unique capabilities at a crucial time. But they also brought something else: a real spirit of cooperation and service and willingness to work with civilian leadership.”
- UK Telegraph – “Critics of the cluster setups in Haiti have complained that too much time is wasted on meetings that could be better spent getting help into the field.”
- UPS CEO – “Haiti response was a logistics nightmare with very complex logistics solutions. We are a logistics service, this is how we help.”
- LtGen Keen – “Coordination and collaboration are the hardest things to do and we are still facing challenges.”

Comparisons with other Complex Endeavors

- Initial period of Conflicted C2 may be unavoidable in major natural disasters
- Proximity and the presence of professional responders makes a major difference
- Most international progress since tsunami relief has occurred within functional clusters
- Collaborative C2 could not develop because no single integrated plan or planning organization emerged
- Strong civilian leadership was more present in Haiti than the other international cases studied (Tsunami Relief, Pakistan earthquake, Hurricane Katrina)
- Because of communications, lift, and security capabilities, the military role was crucial

Requisite C2 Maturity and Agility

- Complex disasters would be best served by Collaborative C2 but that level of maturity and net-centricity is very difficult to achieve
 - Barriers arise from inability and unwillingness to share information, understanding, and planning process
 - While the overall goal of the endeavor is normally clear (save lives and restore society) the specific goals of participants in the endeavor fail to converge
- Because complex disasters and complex endeavors evolve over time, agility (the ability to maintain mission effectiveness proactively in the face of changing circumstances and stresses, including the ability to conceptualize, design, create and deploy a successful endeavor) is essential but emerges slowly and often within specific clusters and activities
- Haiti will be a major case study as SAS-085 completes its work

Acknowledgements

- The Wall Street Journal, The New York Times, BBC World News, USAID, UN, World Food Programme, IFRC, SouthCOM, Logistics Cluster
- JTF HAITI
- European Joint Commission on Research
- Dr. Linton Wells, National Defense University
- Larry Wentz, Senior Research Fellow, Center for Technology and National Security Policy at the National Defense University
- Dr. Margaret D. Hayes, Evidence Based Research, Inc.
- Stacey Kaminski, Evidence Based Research, Inc.
- Christine Anderson, Evidence Based Research, Inc.

Contact Information

Richard E. Hayes
Evidence Based Research, Inc.
1595 Spring Hill Road, Suite 250
Vienna, VA 22182
rehayes@ebrinc.com
(703) 893-6800, ext. 372



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Back up Slides

Disaster Assistance Teams Dispatched as of January 13

International Organizations and NGOs

- **UN** mobilizes an emergency response team -- expected to be on the ground shortly -- to help coordinate aid efforts.
- **UN World Food Program** flying in additional food that would provide more than 500,000 emergency meals.
- **UNICEF** is dispatching two planes and a ship laden with tents, as well as food and other supplies designed for women and children.
- **The World Bank** planned to send a team to help assess damage and plan a recovery.
- **Medecins Sans Frontieres** (Doctors Without Borders) is treating around 600 injured people at hospitals
- **Telecoms Sans Frontieres**, a humanitarian group that helps set up communications during disasters, deployed an emergency team from Managua to provide vital support in emergency telecommunications. They are carrying satellite mobile and fixed telecommunications tools.
- **International Committee of the Red Cross** set up a special website to facilitate family contacts
- **WHO** deploys an initial 12-member team of health and logistics experts to the affected locations. The WHO experts being sent include specialists in the management of dead bodies, mass casualty management, specialist in health services and coordination of emergency health response.

Nation States

- **Argentine** Air Force Mobile Field Hospital already up and running along with helicopters from the Argentine/UN contingency
- **Brazilian** military already in country and sending additional help
- **Dominican Republic** opens its airports, hospitals and send aid to Haiti
- **US** military send ground assessment team and one P3 aircraft to do aerial reconnaissance.
- **France** is sending two airplanes and a field hospital as well as rescue services
- **Iceland** sent a search and rescue team of 37 specialists.
- **UK** a four-person field assessment team is en route to Port-Au-Prince to determine priorities for urgent assistance and Britain also sending a search and rescue team of 64 people with dogs and heavy rescue equipment.
- **Cuba** sends a rescue team
- **Peruvian** government sent rescue teams, dogs and 50 tons of food transported by two Peruvian Air Force airplanes.
- **United States Coast Guard** deployed helicopters and several aircraft and cutters to the region to aid in relief work

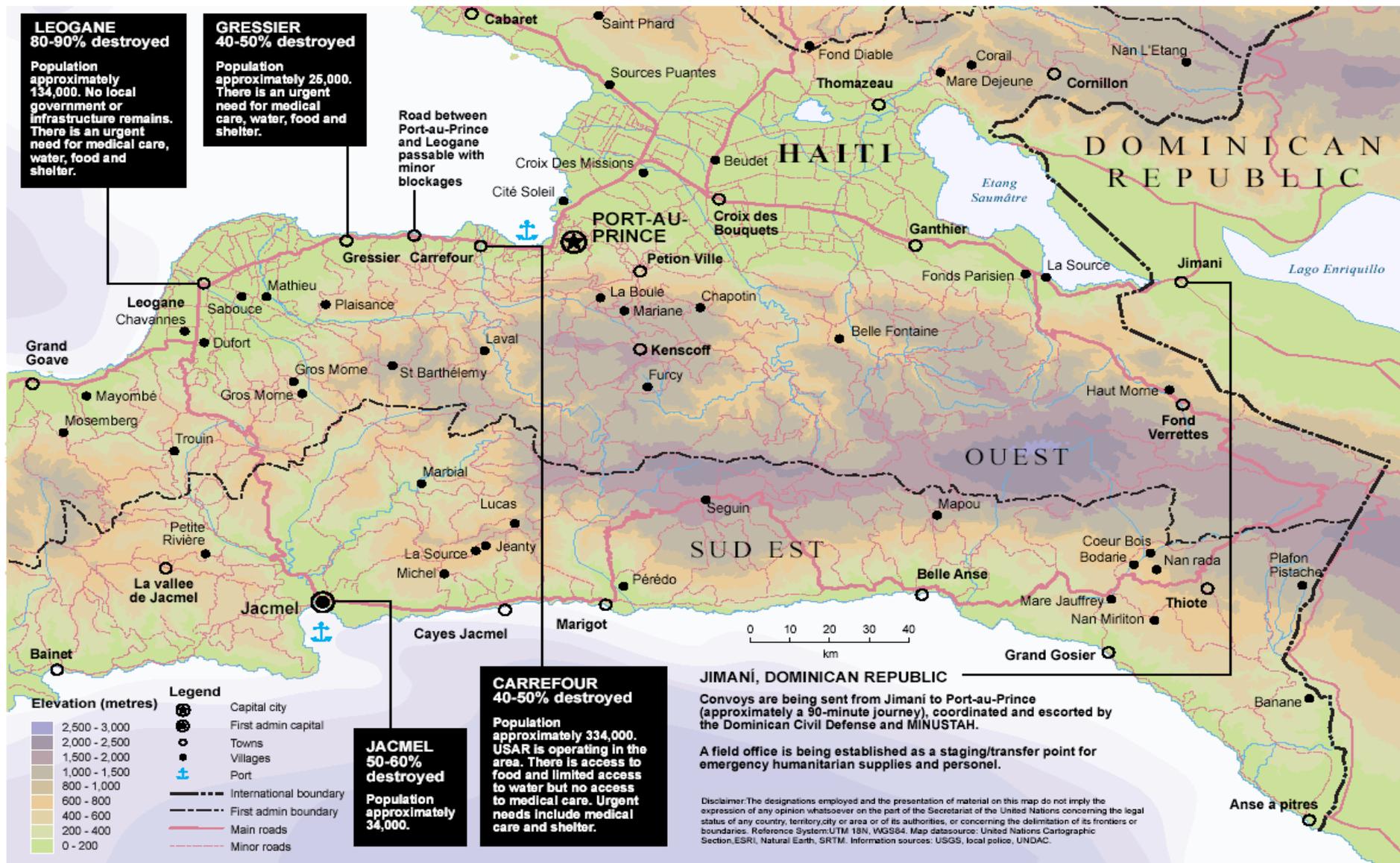
Disaster Assistance Teams Dispatched as of January 14

International Organizations and NGOs

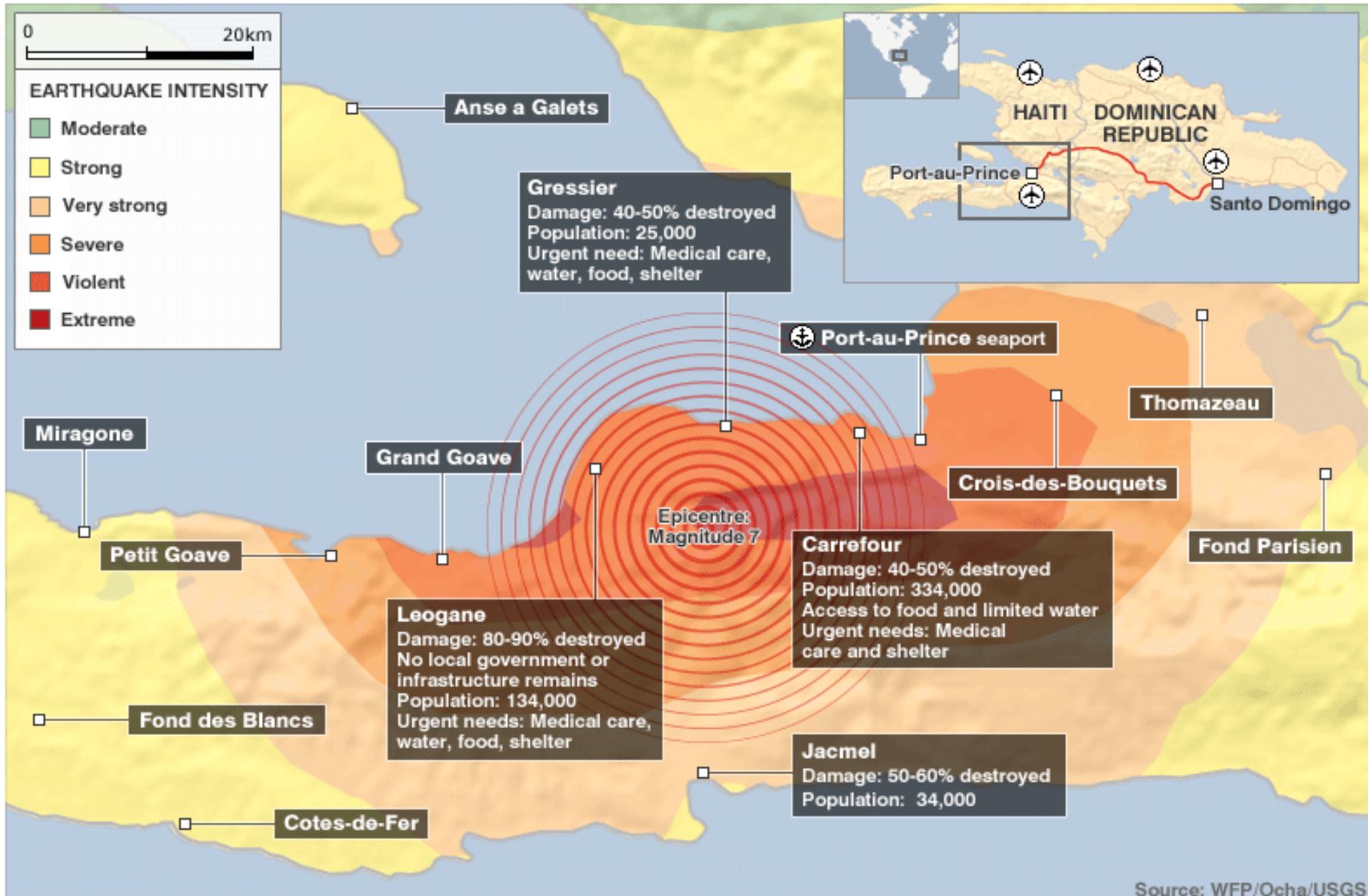
- **PAHO/WHO** sets up offices in DR
 - Coordination begins between PAHO/WHO and USAID Management Sciences for Health (MSH) to exchange logistics information regarding medicines and medical supplies.
 - Initial support has been provided for the UN Health Cluster Coordinator, Logistics Officers, Communication Officers, health systems and others.
- **ICRC** in country people working to distribute aid while additional supplies leave Geneva.
- **Dominican Institute of Communications** set up a cell tower using a satellite link.

Nation States

- **Jamaica** sent a team of 168 military and medical personnel
- **China** sent a 50 member team
- **Qatar** sent a C-17 with supplies, 26 military personnel, security forces, police force and medical personnel.
- Over 20 countries has sent military personnel with **Canada, the US and DR** providing the most support
- The government of **Canada** has sent a 20-person reconnaissance team and two rescue helicopters
- **Belgium** has sent a military aircraft carrying a medical team of 20, a search-and-rescue team of 33 and a water purification system.
- At least 13 countries in the Americas have confirmed the deployment of medical teams.
- **Ireland** is sending a team of experts to assist in the emergency effort. Irish Aid will deploy specialists from its Rapid Reaction Corps.
- **Sweden** has dispatched a small logistics team as part of wider U.N. relief efforts.
- **Russian** search and rescue team arrives



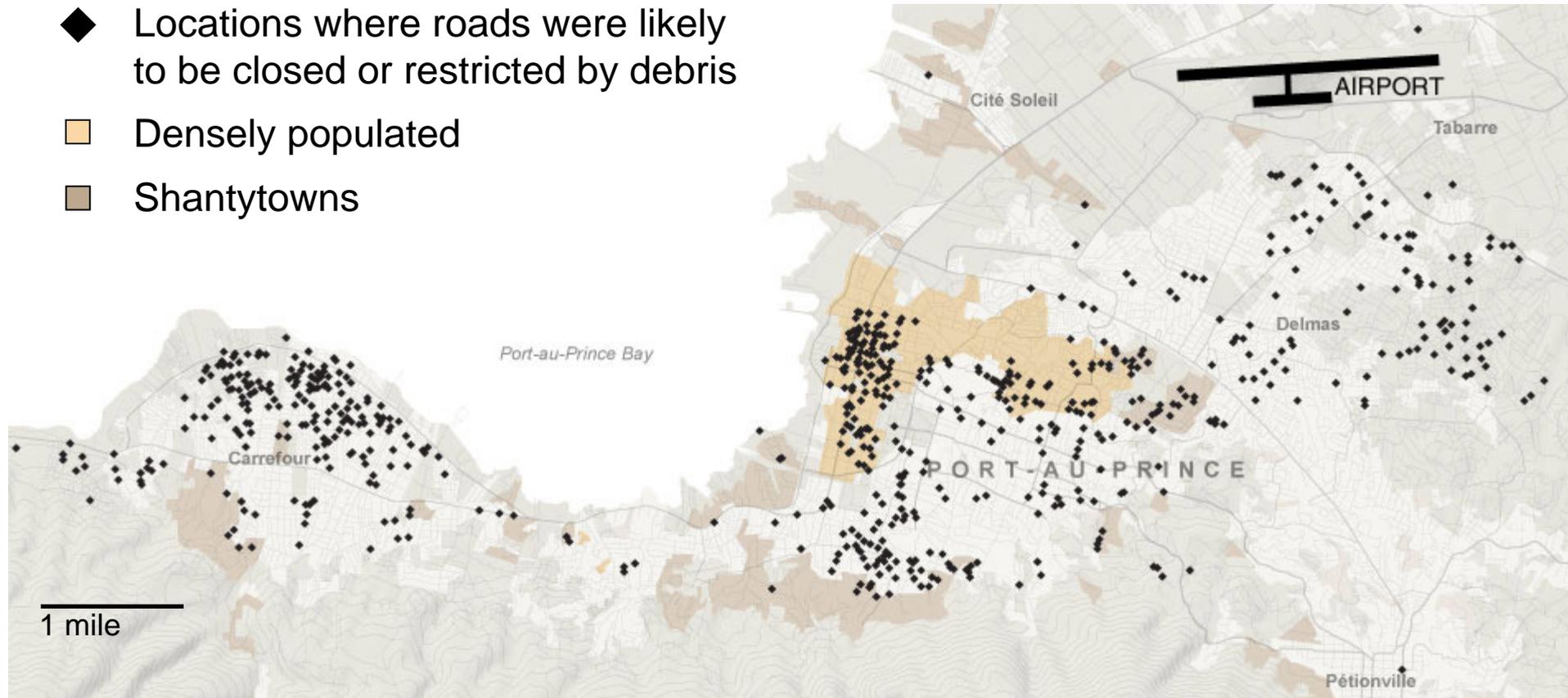
Haiti Damage Zones



Road Damage Assessment in Port-au-Prince

Map Created January 18, 2010

- ◆ Locations where roads were likely to be closed or restricted by debris
- Densely populated
- Shantytowns



Source: New York Times

Building Damage Assessment in Port-au-Prince

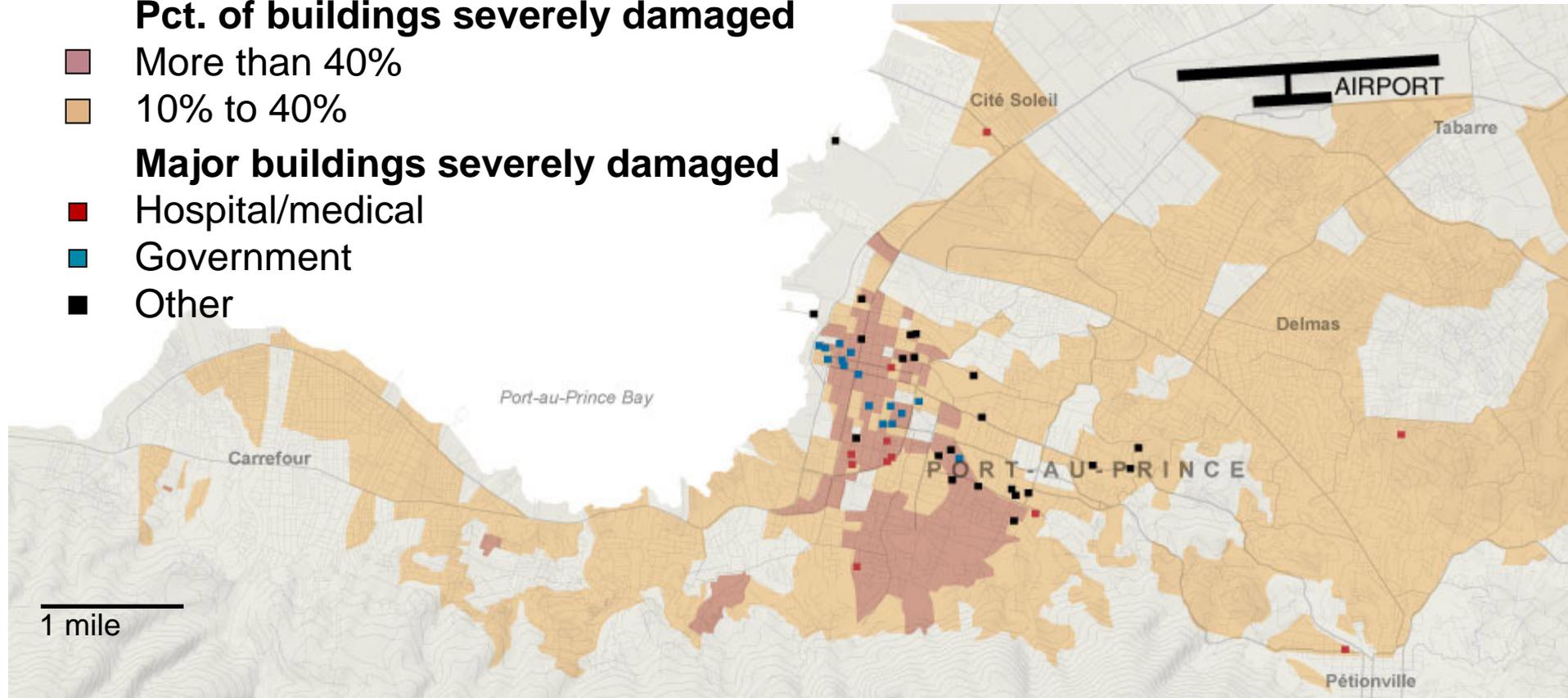
Map Created January 18, 2010

Pct. of buildings severely damaged

- More than 40%
- 10% to 40%

Major buildings severely damaged

- Hospital/medical
- Government
- Other



Source: New York Times

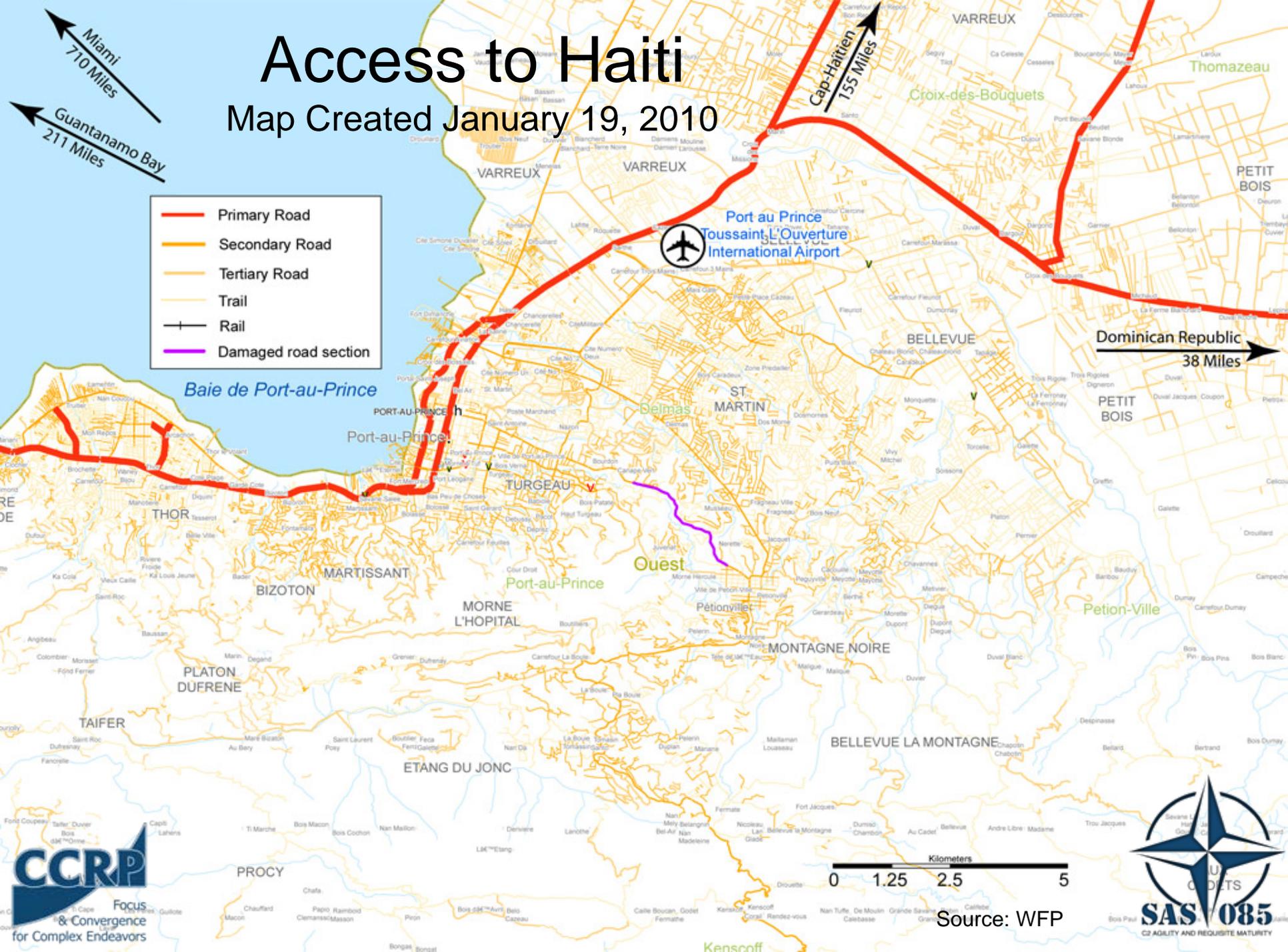
UN/NGO Response

Logistics Cluster Concept of Operations

- **Overview of Draft Concept of Operations** (Developed January 15, Revised January 18)
 - Santo Domingo (SDQ) is the main entry point for humanitarian cargo destined for Haiti by both sea and air.
 - The main issue is to organize onward transport from the Dominican Republic to Haiti.
 - Three helicopters will be operational from Barahona hub.
 - Fleet of trucks made available within Haiti for inter-agency use, including for NGOs.
- **Storage capacity**
 - **PAP storage:** A warehouse has been identified next to the US embassy where it is planned to establish a farm of up to 20 MSUs. Three out of four existing WFP warehouses are now structurally unsound.
 - **SDQ storage:** Bring cargo in to SDQ through Puerto Plata.
- **Fuel situation**
 - WFP has signed a fuel contract in Santo Domingo to shunt 10,000 gallons into Port-au-Prince. More needed
- **Accommodation** for 200 humanitarian workers in place
- **Timeframe for start-up operations**
 - First mobile units due to arrive January 21. Consult website to submit cargo movement requests
- **Prioritization of humanitarian cargo not yet in place**
- **Civ-Mil coordination**
 - Liason established with the US military in Haiti for use of logistics assets to support the humanitarian community. A dedicated Civ-Mil LNO will arrive in PAP on 19 Jan.
- **Road transit SDQ to PAP**
 - Jimani border crossing is the main entry point for goods transiting from SDQ to PAP. MINUSTAH states that they have set up a permanent office at the border for coordination of convoys and escorts to PAP.

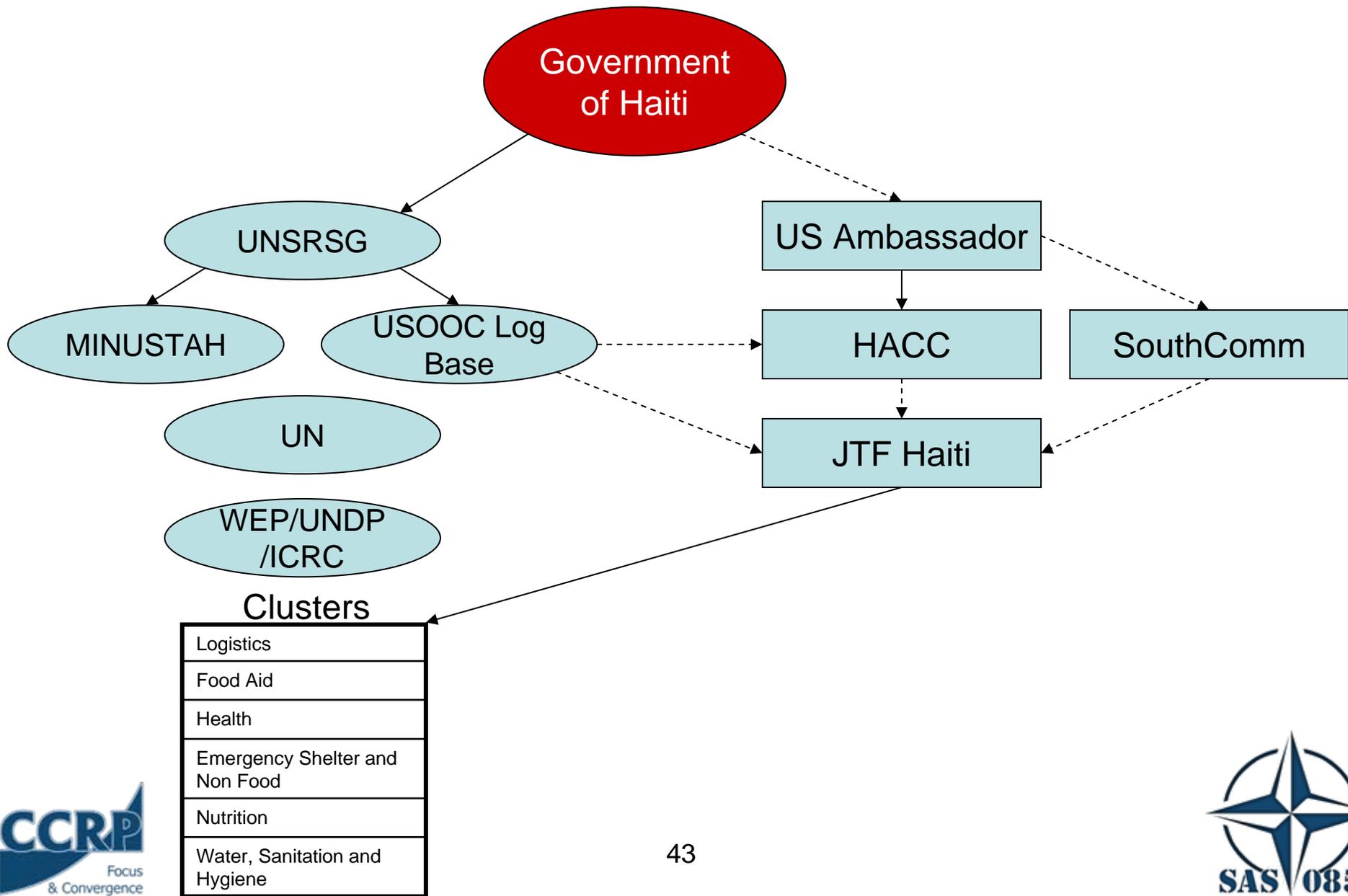
Access to Haiti

Map Created January 19, 2010



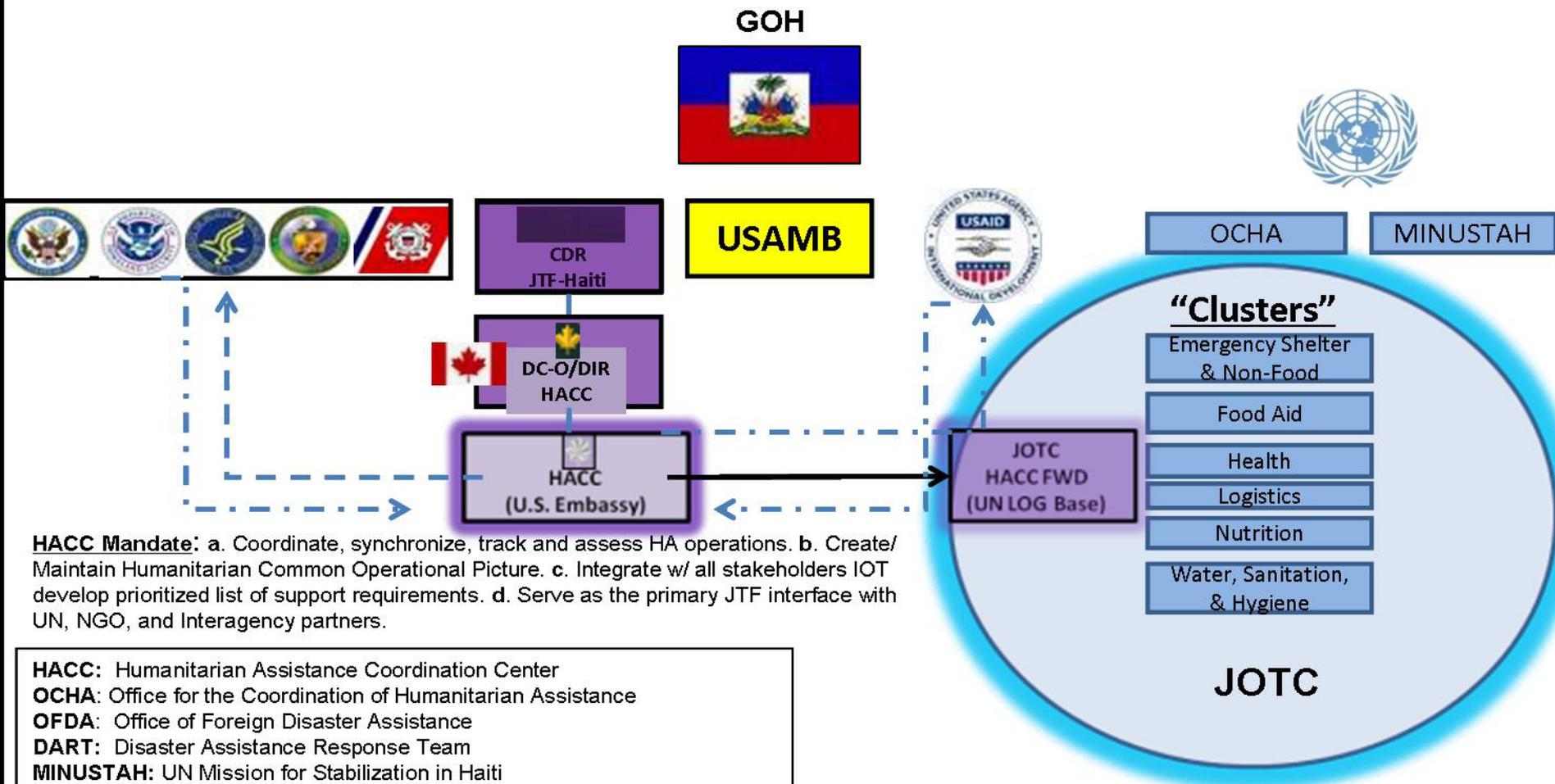
- Primary Road
- Secondary Road
- Tertiary Road
- Trail
- Rail
- Damaged road section

Haiti: Reality of the earthquake



US Approach

JTF Haiti HACC: Nodal Integration

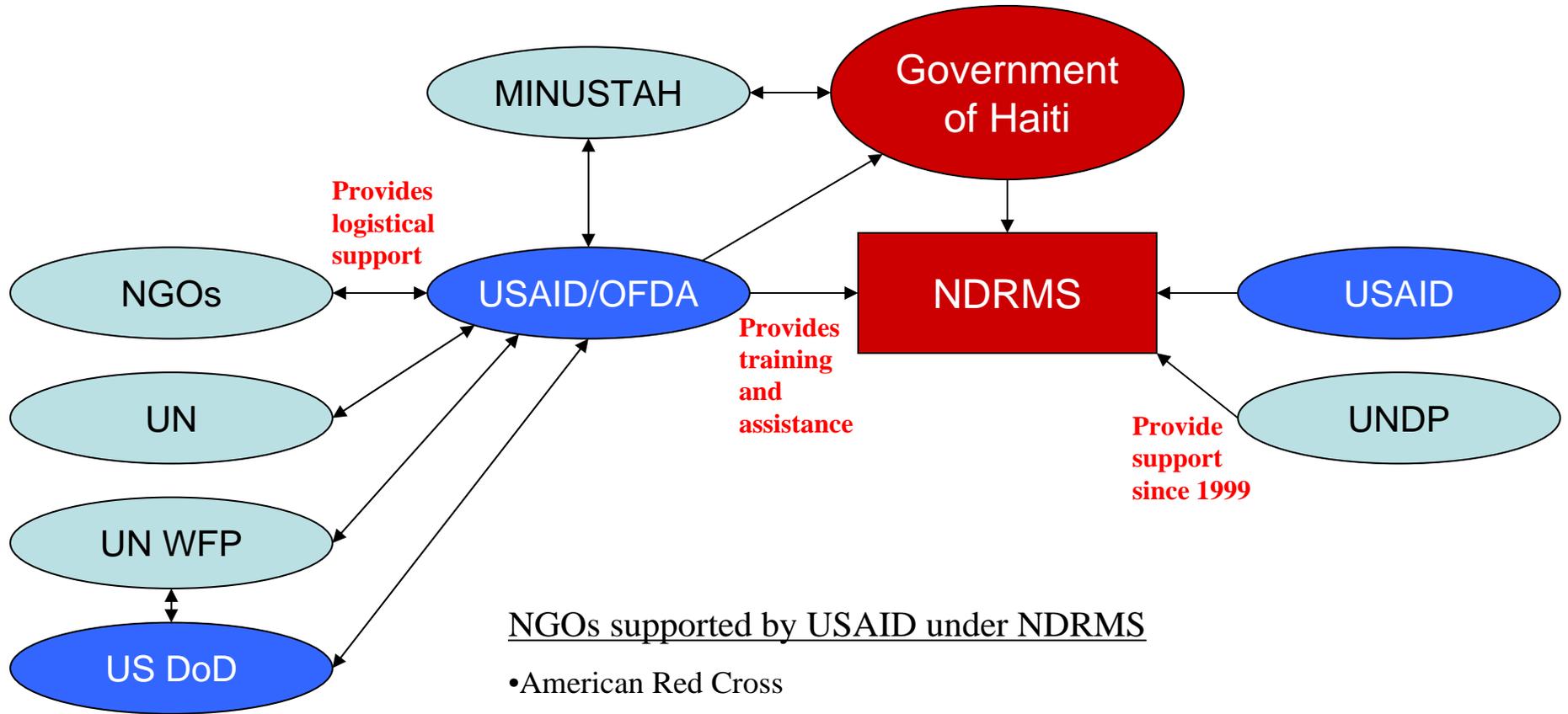


HACC Mandate: a. Coordinate, synchronize, track and assess HA operations. b. Create/ Maintain Humanitarian Common Operational Picture. c. Integrate w/ all stakeholders IOT develop prioritized list of support requirements. d. Serve as the primary JTF interface with UN, NGO, and Interagency partners.

- HACC:** Humanitarian Assistance Coordination Center
- OCHA:** Office for the Coordination of Humanitarian Assistance
- OFDA:** Office of Foreign Disaster Assistance
- DART:** Disaster Assistance Response Team
- MINUSTAH:** UN Mission for Stabilization in Haiti
- JOTC:** Joint Operations and Tasking Centre
- HCT:** Humanitarian Country Team
- JMAC:** Joint Mission Analysis Centre

Source: Larry Wentz, NDU

USAID Disaster Preparedness and Mitigation Assistance to Haiti FY 2009



NGOs supported by USAID under NDRMS

- American Red Cross
- Save the Children
- Pan American Development Foundation

Source: USAID Haiti-Disaster Preparedness and Mitigation Programs Fact Sheet #1, FY 2009



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