

# VISTA – A Visualization Analysis Tool for Humanitarian Situational Awareness

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## ABSTRACT

The US Department of State’s Humanitarian Information Unit (HIU) is developing a new product and web-based visualization analysis tool, known as VISTA (Visualized Information & Synthesized Temporal Analysis). VISTA displays geo-spatial, temporal, numerical/graphic data and textual information, all in one product or via a web interface. VISTA is primarily intended for use by decision-makers, analysts, desk/project officers, and others to provide up-to-date common operating picture ie “a vista” about an emergency, issue or project.

## Keywords

Visualization, Situational Awareness, Common Operating Picture, Humanitarian Situational Analysis

## WHAT IS VISTA?

VISTA is a new way of visualizing information and answering some of the key questions of humanitarian personnel involved in both strategic and operational decision-making. At the simplest level, VISTA provides users with a snapshot common operating picture ie. “a vista” about a particular emergency, issue, sector or project. Geo-spatial information is displayed on a map or through a web-based Geographic Information System (GIS); quantitative data are displayed as graphs or charts; and temporal information is presented in a tabular timeline. VISTA is designed for all levels of personnel working for humanitarian organizations, from high-level, strategic decision makers to more operational project/desk officers and analysts. (See Figure 1 as a possible mock-up of a WebVISTA)

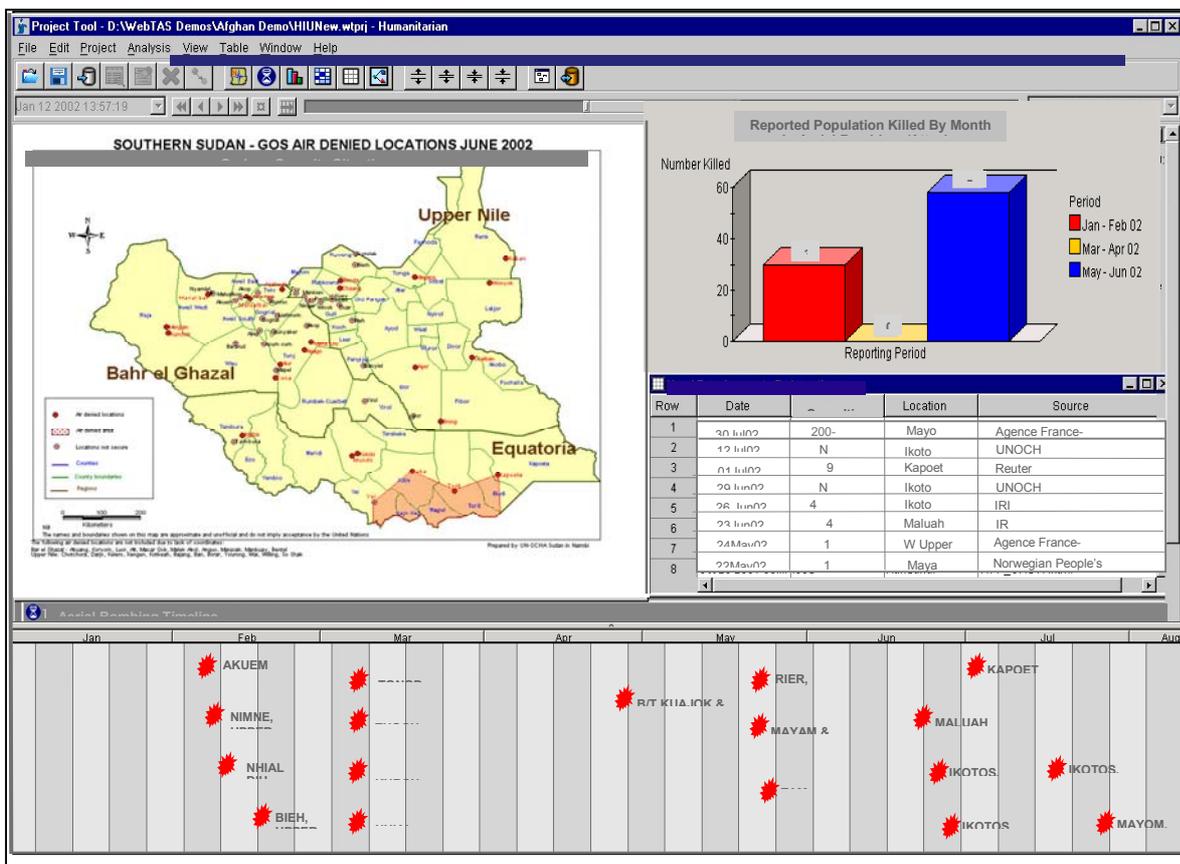
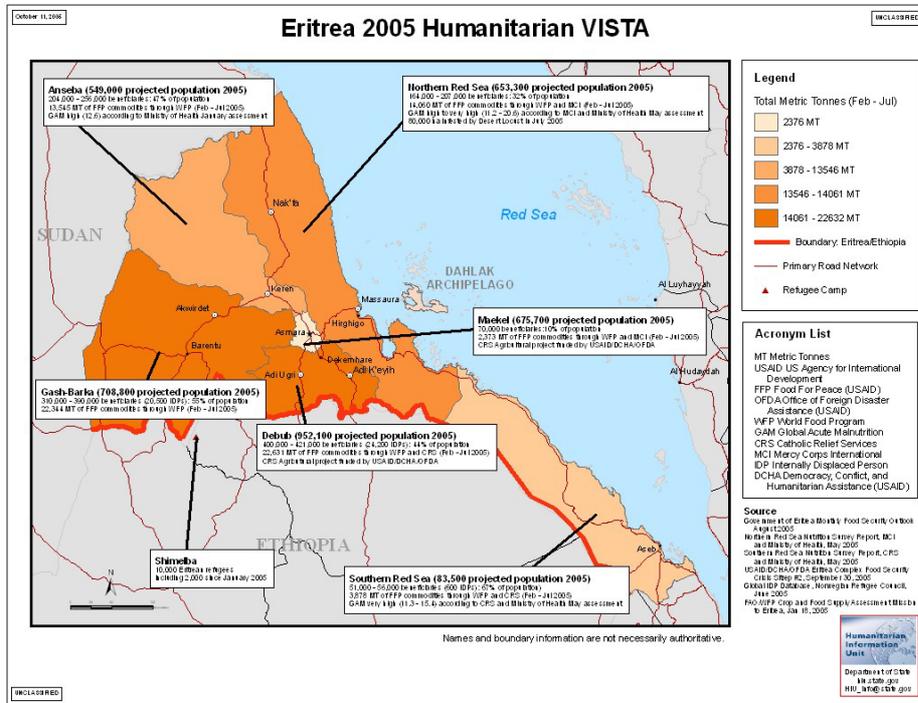


Figure 1: Prototype Display of sample WebVISTA of southern Sudan

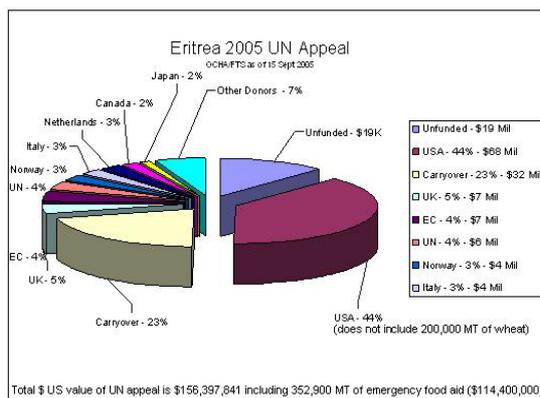
In 2006, the HIU is working with private contractors to design and develop VISTA as a web-based visualization analysis tool that provides up-to-date humanitarian situational awareness. In advance of the development of WebVISTA, the HIU has produced several static VISTAs – panoramic snapshots of various emergencies and humanitarian issues -- that display a map, a graph or chart, a tabular chronology and text boxes all on one product. (See Figure 2)



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**Eritrea 2005 Humanitarian VISTA**



**USG Humanitarian Assistance (FY 2005)**

State/PRM	\$1.9 M
USAID/DCHA/OFDA	\$1.7 M
USAID/DCHA/FFP	\$91.0 M
<b>Total</b>	<b>\$94.6 M</b>
USDA	\$69.0 M
<b>Total</b>	<b>\$153.6 M</b>

**Chronology of Major Events**

DATE	EVENT
Nov 2004	Launch of 2005 UN Consolidated Appeal for Eritrea
Jan. 2005	USAID/DCHA/OFDA grants to UNICEF for nationwide water sanitation program (\$1,000,000)
Feb. 2005	USAID/DCHA/OFDA team assesses Northern Red Sea, Anseba, Makiaki, and Debub provinces
June 2005	Government of Eritrea imposes tax on NGOs for aid imports
June 2005	Release of UN Mid-Term Review and Revised Appeal
July 2005	Ministry of Agriculture reports 80,000 ha infested by Desert Locust in Northern Red Sea zoba and begins control program
July 2005	Govt. of Eritrea announces that USAID must withdraw and cease operations in Eritrea
July 2005	USAID/DCHA/OFDA Regional Advisor assesses Debub and Northern Red Sea
Aug 2005	USAID/DCHA/OFDA grant to CRS for agricultural program (\$670,835)
Aug 2005	73,978 MT of FFP food was delivered to WFP/Eritrea
Sep. 2005	WFP reports 2,000 Eritrean refugees have fled to Ethiopia since January 2005
Sep. 2005	US allocation of 100,000 MT wheat to WFP, 71,000 MT of wheat to CRS, and 29,000 MT of wheat to Mercy Corps Intl. to arrive in FY 2006

Source:  
 OCHA/FFTS September 15, 2005  
 USAID/DCHA/OFDA Eritrea Complex Food Security Crisis Situation Report #2, Sept. 30, 2005  
 USAID/DCHA/FFP Eritrea Report  
 WFP/Eritrea, September 12, 2005



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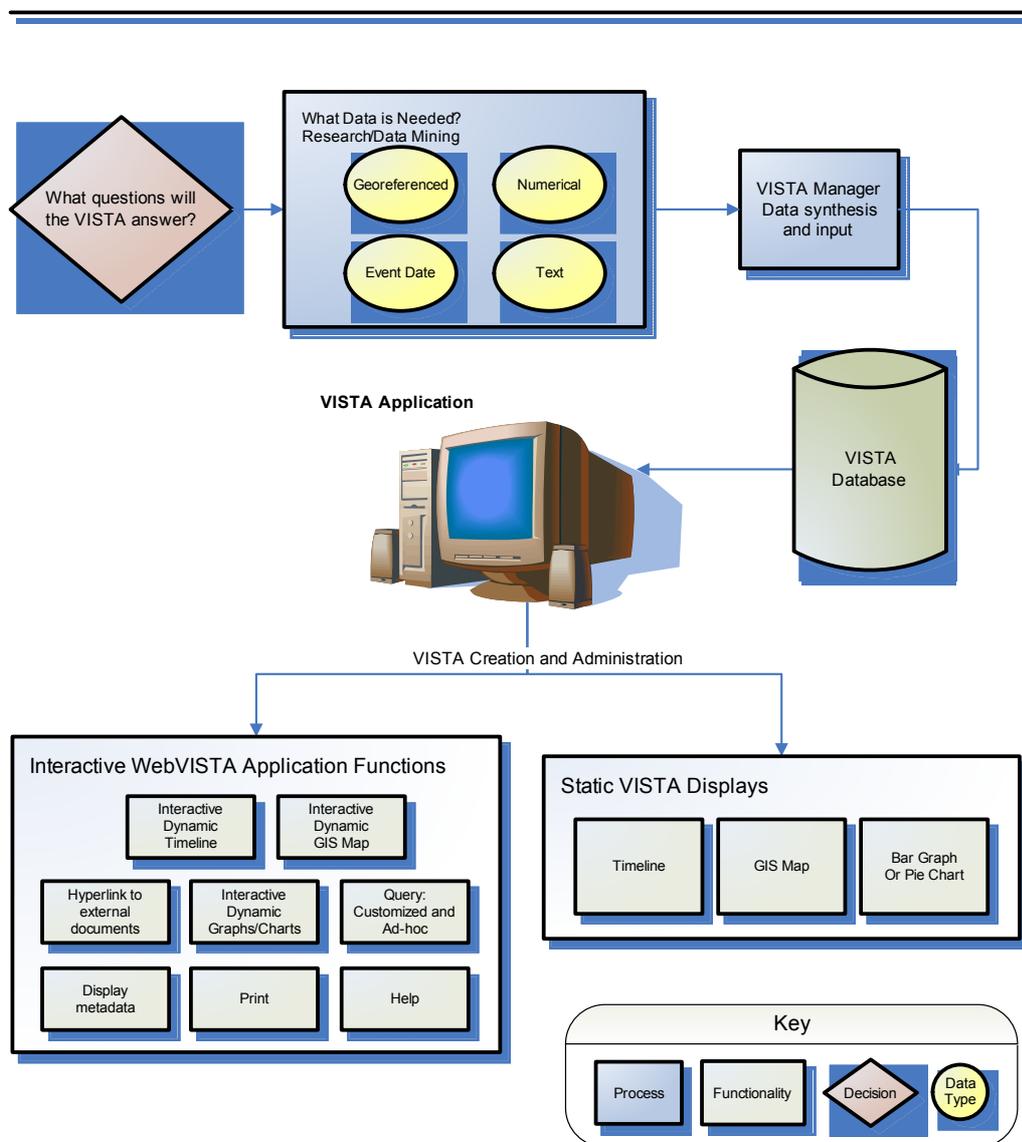
**Figure 2: Example of static VISTA of Eritrea humanitarian situation**

The HIU envisions a phased, spiral development of a WebVISTA application, which has begun with a user requirement analysis and a feasibility study and evaluation of existing Commercial-Off-The-Shelf software tools. By the end of the first phase, a customized prototype WebVISTA application will be developed and tested in conjunction with identified US Government stakeholders. The prototype Phase 1 WebVISTA will be interactive, allowing users to select and retrieve specific information and view and print customized maps, graphs and charts and tabular chronologies. In order to provide necessary context and sourcing of information, the web-based tool will provide hyperlinks to documents and background text for more in-depth understanding of the situation.

**HOW DOES VISTA WORK?**

By its very nature, disaster and humanitarian information is complex, multi-thematic and dynamic. There is **temporal** information about events, incidents and changes in the situation. There is **geo-spatial** information about locations, affected areas, topography and environmental conditions. There is **quantitative** data on numbers of people affected, amount of monetary assistance, quantities of commodities, severity indicators, and comparative percentages. Finally, there is **textual** information providing background, context and analysis.

**Overview VISTA Application Process Flow  
For the Humanitarian Information Unit**



Prepared by Heather, HIU

**Figure 3: VISTA Application Process Flow**

In order to create a WebVISTA, this data must be extracted and entered into a database so that it can be retrieved and displayed via a web interface. (See Figure 3) To fully demonstrate VISTA, each nugget of event data **MUST** have four attributes:

- Geo-reference – a latitude/longitude and/or an area polygon (country, region, province, etc)
- Date – a day and/or a month and a year
- Number - something that can be quantified, even if it is zero
- Text Reference - a hyperlink to web document or database memo field

Once developed, the client/users can create, customize and manage their own VISTAs, such as an Emergency Situation VISTA, a Conflict Incident VISTA, a Donor Assistance VISTA, a Humanitarian Project VISTA....

	<b>Emergency Situation</b>	<b>Conflict/Security</b>	<b>Donor Assistance</b>	<b>Humanitarian Project</b>
<b>Geo-referenced data</b>	Affected Areas, Internally Displaced Person (IDP) and refugee camps	Incident Location	Recipient Area or country	Beneficiary Location Project Area
<b>Date</b>	Significant Events	Incident date	Allocation Date	Start Date
<b>Numbers</b>	Number Affected Number of IDPS and refugees	Number killed Number Displaced	Amount \$, Metric Tons	Beneficiary Number Project \$
<b>Text Reference</b>	Assessments, Situation Reports	Incident account	Press Release	Project document

The prototype WebVISTA can be used to answer standard questions and create tailor-made displays of this information. Users will be able to create and display customized maps, graphs and charts, tabular timelines, and with a click of the mouse, drill into the actual text sources used in analysis. This visualization analysis tool can provide answers to some of the key questions that decision makers and humanitarian organization personnel routinely ask.

### **Potential Questions answered by VISTA**

#### **Situational Awareness/Analysis**

- What, where and when were the recent events/incidents in the emergency?
- Where are the affected areas?
- How many people are affected, displaced, killed?
- Where, when and what were the assessments of needs?

#### **Project and Sectoral Monitoring**

- When are the milestone events in assistance projects?
- Where are organizations working and providing assistance in a given geographic area?
- What is the status of sectoral assistance projects?
- What is the sectoral (agricultural, water, health) situation?

#### **Assistance Tracking**

- When were donor assistance allocations given?
- When and where were aid commodities delivered?
- Where have donor assistance allocations been given? By country, by region, by district
- How much assistance has been provided and by whom?

VISTA is being developed as a phased project to meet the needs of different users and provide a phased introduction of different functionality. In this first prototype phase, WebVISTA will be able to provide dynamic visualizations and customized displays to answer some of the standard, frequently asked questions. The prototype WebVISTA will be designed to be simple to use for anyone familiar with the Web, without the need for complicated training or GIS skills. In later phases of development, WebVISTA will be able to provide more advanced functionality, such as:

**Geo-spatial Data Mining** – Computer-programmed collecting and extracting geo-referenced data for direct import into VISTA database

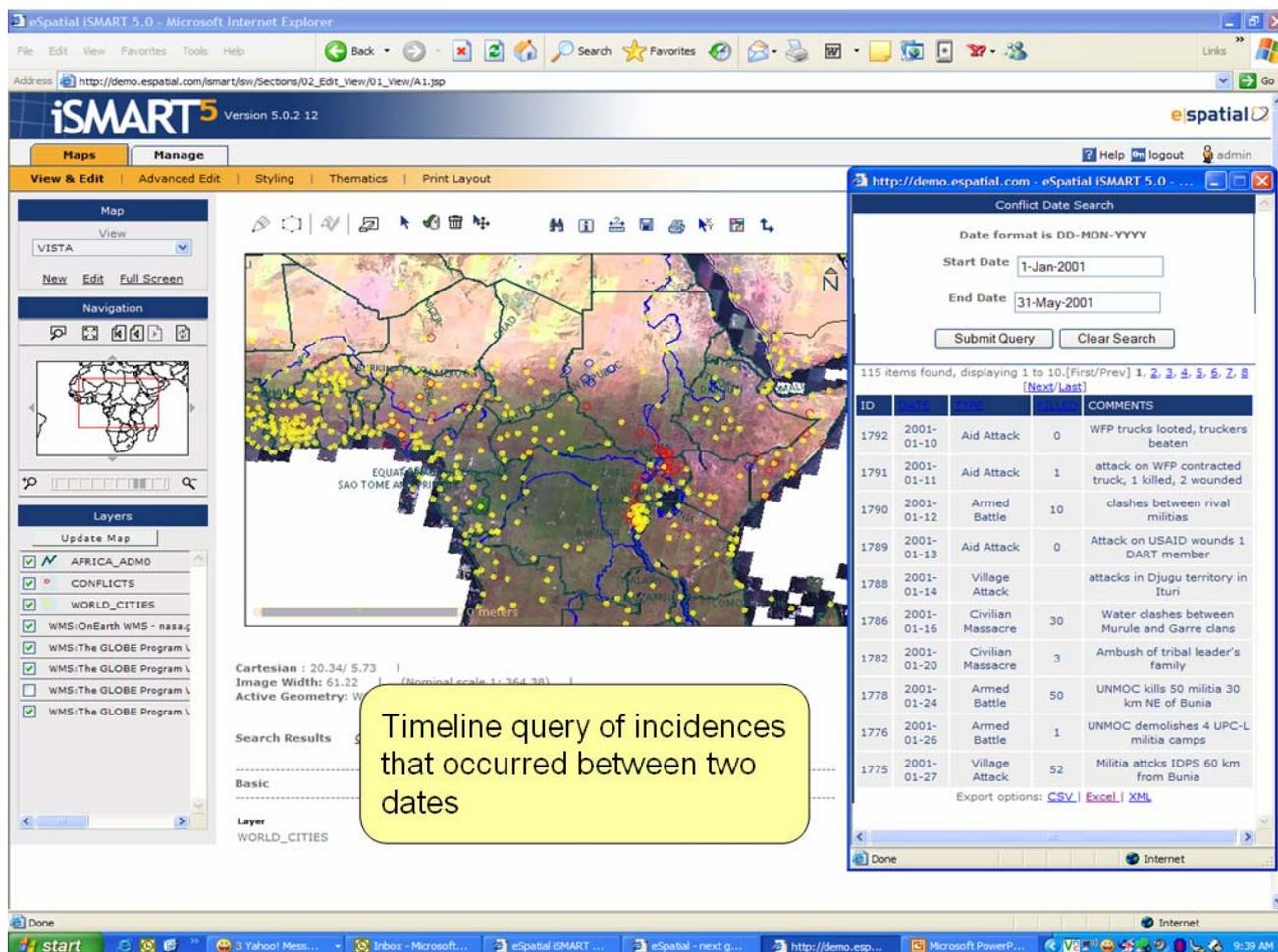
**Pattern Analysis** – Connecting geo-spatial, temporal, numerical and textual data to derive and display relationships and patterns.

**Predictive Modeling** – Using geo-spatial, temporal and statistical analysis to forecast events and visualize trends.

**Ad-Hoc Query Function** – Making specific natural-language queries for data visualizations by setting date, geographic and numerical parameters or selecting data fields

For example, a VISTA user could request the retrieval and display of specific data from the VISTA database such as

Display **CONFLICT INCIDENTS** in **AFRICA** between **JANUARY 1** and **MAY 31** (See Figure 4)



**Figure 4: Sample Query of WebVISTA on Conflict in Africa**

The query would generate a customized visualization – a VISTA – displaying a map showing the location of conflict incidents in Africa between January and May and a tabular chronology indicating the date and details of each displayed incident. The database table could be converted into a bar graph to display the number of incidents by month or a pie chart to display percentages of incidents by type.

Any attempt to present a “common operating picture” depends on a synthesis of disparate data and can provide an oversimplified visualization of a complex situation or issue. A visual representation is based on the data that is available and can present a misleading or incomplete understanding of the situation because missing information is not visualized. Visualizations run the risk of automatically being considered authoritative, without including the sourcing, dating, caveats, background and analysis that is conveyed in narrative text. VISTA addresses this concern by making the meta-database accessible and providing hyperlinks to web documents and background text for more in-depth understanding of the situation.

#### WHAT IS THE HUMANITARIAN INFORMATION UNIT?

The Humanitarian Information Unit (HIU) was created in 2002 by Secretary Powell as “a US Government interagency nucleus to identify, collect, analyze and disseminate unclassified information critical to USG preparations for and responses to humanitarian emergencies worldwide.” In 2004, the task “to promote best practices for humanitarian

information management” was added to the HIU’s Mission Statement. To accomplish this mission, the HIU is comprised of a current staff of 14, including secondments from the Department of State, US Agency for International Development (USAID), Department of Defense (DOD), the National Geospatial intelligence Agency (NGA), as well as contractors and fellowship/interns.

In an effort to facilitate interagency knowledge sharing and break down institutional stovepipes, the HIU was created as an interagency unit. It is housed and managed by the US Department of State, under the Bureau of Intelligence and Research (State/INR), but was designed to serve and report to other parts of the US Government and not be an internal stovepipe within the State Department. For oversight, the HIU reports to a multi-agency Executive Steering Committee, comprised of senior officials from State, USAID, DOD, the IC, NSC, NOAA and USGS. The Steering Committee meets twice a year and approves the strategic direction and objectives of the Unit.

The role of the HIU is to provide critical and reliable information quickly and efficiently to US Government organizations involved in providing humanitarian assistance in response to disasters and emergencies overseas. Fast and efficient sharing and leveraging of critical and reliable information can save time, save resources and ultimately, save lives in an emergency. The HIU has developed products for the Secretary of State, the Administrator of USAID and the National Security Council. These products are almost always created to be unclassified, so that they can be shared easily with other audiences within the international humanitarian community: the UN, NGOs, the media, the public, etc. Once provided to the specific US Government customer, HIU products are published on its website <http://hiu.state.gov>, as well as on other international humanitarian websites, such as ReliefWeb (<http://www.reliefweb.int>).

Another role of the HIU is to develop, test and promote new technologies for better humanitarian information management. The HIU has been in the forefront of using and promoting Geographic Information Systems (GIS) and satellite imagery, both for strategic and operational uses and applications. In addition, the HIU has tested and promoted the use of Personal Digital Assistants (PDA), Global Positioning Systems (GPS), and digital cameras on humanitarian field assessments. The HIU has also used collaboration tools and content management software to improve interagency collaboration and information sharing. VISTA is an example of a new web-based visualization tool that not only provides situational awareness, but facilitates humanitarian situational analysis, as well.

#### **ACRONYMS**

GIS – Geographic Information Systems

HIU – Humanitarian Information Unit

State/INR – US Department of State, Bureau of Intelligence and Research

VISTA – Visualized Information Synthesized Temporal Analysis