

Geospatially Enabling Community Collaboration  
for Protecting Critical Infrastructure  
*Pilot Project Series – City/County of Honolulu, HI*



In cooperation with the US Department of Homeland Security  
and the Federal Geographic Data Committee

**September 2004**

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## The National Geospatial Initiative for Critical Infrastructure Protection

In response to a request from the Department of Homeland Security's (DHS) Office of Geospatial Management, GITA established a Critical Infrastructure Protection (CIP) Task Force to create a proposal and work plan to develop a framework for a National Geospatial Initiative for Critical Infrastructure Protection through a series of pilot projects. Since January 2004, this proposal and work plan have been reviewed and refined on several occasions by representatives of DHS, the Transportation Security Administration (TSA), the National Geospatial-Intelligence Agency (NGA), the Open Geospatial Consortium (OGC) and several other public and private organizations.

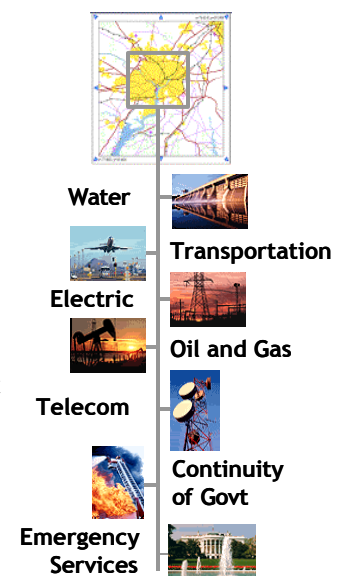
The primary purpose of these pilot projects is to facilitate an interactive dialogue among infrastructure stakeholders in a defined geographic area to address collaboration and data sharing issues that inhibit effective response and recovery in times of emergency. Specifically, these pilots would serve as an interactive, cooperative forum for collecting and analyzing information to determine:

- ☞ Data requirements (type, currency, accuracy, etc.);
- ☞ Intra- and inter-organizational process requirements;
- ☞ Interoperability and enterprise architecture requirements; and
- ☞ Technology requirements.

The ultimate goal of these pilot projects is to develop a unified national geospatial framework for protecting critical infrastructure. The successful outcome of the pilot projects will be based upon a coalescence of the needs and directions of a diversified group of public and private organizations working together in their respective communities to develop a pragmatic approach for addressing the protection of critical infrastructure necessitated by man-made and natural events.

## Protecting Our Critical Infrastructure is a National Priority

Homeland security has been made a national priority by our government and will likely remain a primary focus for the foreseeable future. But beyond the obvious impact of potentially successful terrorist attacks, it is important to remember that the results of natural disasters are just as serious. Hurricanes, earthquakes, tsunamis, floods and fires occur with unpredictable regularity and significant cost in lives and property. Damage to our underground infrastructure by excavators occurs on a daily basis. While most of this accidental damage goes



Graphic Courtesy of OGC, Inc.

unnoticed on the national level, the aggregate effect on economy is staggering, and the number of lives lost tragically unnecessary.

No matter the root cause of the emergency – terrorism, natural occurrences or unintentional human error – the methods of responding to, mitigating and ideally preventing reoccurrences are based in a common approach: the coordinated use of geospatial information. This cannot happen without the many mutually dependent agencies and organizations charged with protecting our nation’s citizens and infrastructure being able to efficiently and effectively share their geospatial data. There are obstacles that need to be overcome before this collaboration can occur, however, and that is the primary impetus behind GITA’s CIP Pilot Series, now known as “Geospatially Enabling Community Collaboration,” or “GECCo” for short.

From a GECCo perspective, critical infrastructure is vital to a community that depends on it for such things as economic security, quality of life, delivery of service and governance. Disruption of one or more of these assets would have a profound negative effect on both the public and private sectors within that community.

As a result, it is important to identify the interconnectivity among a community’s critical infrastructure and its supporting systems, in order to understand not only its vulnerabilities, but also its ability to withstand and recover from disruptions. The importance of understanding critical infrastructure interactions and vulnerability has taken on a new urgency due to the increase in terrorist activities. This is why the GECCo pilot project series is so important. These pilots will provide key information, identify data exchange and collaboration models, and defines technical solutions that will assist communities in meeting the challenges associated with protecting their critical infrastructure.

The availability of information about critical infrastructure affects its vulnerability, as well as the ability of a community to function, meet the needs of its citizens, and grow. The disruption of critical infrastructure by either natural or man-made events can change the fundamental characteristics of the community, depending on the community’s response. The information related to critical infrastructure may be considered an independent data set in and of itself because of its importance to the community. Both content and access must be protected. Limitation of access to data about critical infrastructure must be balanced against the need for access required to protect the critical infrastructure.

Important data must be gathered, research conducted, and policies and agreements addressed in order to protect and enhance the critical infrastructure of a community. An important ongoing debate involves concern over how much information should be readily available among stakeholders when planning for and responding to an event. This debate centers around the limits that should be placed on access to and sharing of information involving critical infrastructure to reduce the vulnerability to terrorism, and competitive and safety aspects associated with the protection of both public and private infrastructure within the community.

Finally, the cost of protecting critical infrastructure could overwhelm a community if good decisions are not made concerning the allocation of resources and effort. Moreover, adequate steps need to be taken to reduce the risk of disruption, assess vulnerability, and develop

methods for responding to, mitigating, and preventing occurrences. This requires a new understanding of the processes that affect or are affected by critical infrastructure, the dynamic nature of natural or man-made threats, and the data and information needed to build robust mitigation, readiness, response, and recovery capabilities to make the community more resilient. GITA has responded with a call to action on behalf of the infrastructure management community to lead the development of a national initiative for critical infrastructure protection through the GECCo pilot project series.

## The Honolulu GECCo Pilot Project

As the GITA initiative progressed, the CIP Task Force identified several locations for pilot projects, but the selection of Honolulu as the first potential pilot site was made based upon circumstance and opportunity. A discussion with representatives of the City & County of Honolulu evolved into a broader consortium of interested organizations and the level of support among representatives of governmental, utility and private organizations in Hawaii proved to be the primary driver for selecting Honolulu. A relatively self-contained community with excellent longstanding cross organizational relationships, Honolulu is a very practical location for a state-based effort as well. The fact that most of the interested organizations are using the same land base was also a prime consideration. It looked to be the closest available domestic example to Japan's ROADIC <sup>1</sup> program and model and although there were no illusions that this would be easy by any means, it appeared that these considerations would enhance the potential for success.



A workshop to propose and discuss a Honolulu pilot project took place on June 30 and July 1, 2004. The GITA Pilot Workshop Team included Past President and FLAG Chair Dave DiSera; two colleagues of his from EMA, Inc., Claire Cooper from Honolulu and Dan Vaaler from St. Paul, MN; At Large Board Member Brent Jones, James W. Sewall Company; Ken Schmidt, City & County of Honolulu (which served as the host organization); and Bob Samborski of GITA.

The thirty-two workshop participants were senior managers with a good understanding of their organization's operations and emergency management functions. They also knew how GIS and other technologies can be used to manage and protect corporate assets and critical infrastructure. A wide variety of organizations responded to our invitation to participate: individuals represented various departments from the City & County of Honolulu, the State of Hawaii, USGS, US Corps of Engineers, Hawaiian Electric, Board of Water Supply, the Honolulu Fire Department, Oahu Civil Defense, Oceanic Cable Company, the Pacific Disaster Center, several military organizations, and quite a few other public and private entities, utilities

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<sup>1</sup> ROADIC Study Mission Report, November 2003.

and first responder and emergency management organizations. It was, by all accounts, quite a diverse group.

The workshop team provided the participants an overview of why geospatial technology is such a key tool for supporting CIP and emergency management efforts. GITA's National Geospatial Initiative for CIP was also reviewed and discussed. But the bulk of the workshop was devoted to interactive sessions in which all the participants defined the barriers to effective collaboration among their respective organizations. The group addressed these issues and many other barriers to data sharing. A survey of security-related initiatives underway in Honolulu and around the State of Hawaii was also taken.

A central element of the workshop involved a scenario-based exercise designed to test participants' ability to respond to a realistic emergency event. In this case, the event was the detonation of a dirty bomb in downtown Honolulu during a holiday parade. Small group breakouts facilitated by the workshop team resulted in identifying what internal and external data was needed to plan for or respond to an emergency event, and also identifying what organization was responsible for that data. The groups were also asked to identify those issues involving the "controlled" access or exchange of data to support CIP during an event (i.e., "Existing internal rules do not allow for sharing of data with external organizations"). Finally, the groups were asked to classify these issues by type (the categories included Technology, Practices/Organization, and Data).

The second day focused upon identifying the various data sets that would be needed to constitute a comprehensive approach to providing for critical infrastructure protection, and if that data existed, who maintained it. The workshop concluded with the group engaged in discussion to identify the primary keys to pilot success.

The information obtained in this pilot project workshop will enable local and state critical infrastructure stakeholders to begin addressing the key themes that were identified through the workshop process during the next phase. The goal is to develop a framework by which these organizations can better collaborate in order to protect the critical infrastructure of Oahu and the State of Hawaii.

The following sections include a listing of the workshop participants, the barriers to collaboration, pilot project needs, keys to a successful pilot project, and next steps in carrying the pilot project forward. This material is based on the workshop findings, the dissemination of which have been restricted to workshop participants because of potentially sensitive local content.

## Pilot Project Workshop Participants

The following is a list of the workshop participants and the organizations they represented.

| <b>Name</b>          | <b>Organization</b>   |
|----------------------|---|
| John Lacio           | Army - 93D Weapons of Mass Destruction/CST                        |
| Brian McKee          | Board of Water Supply   |
| Byron Chu            | City & County of Honolulu   |
| Jon Lewis            | City & County of Honolulu   |
| Michelle Muraoka     | City of County of Honolulu - Real Property                        |
| Brian Miyata         | City of County of Honolulu - Department of Information Technology |
| Ken Schmidt          | City & County of Honolulu - Department of Information Technology  |
| Benton Ching         | Corps of Engineers  |
| Justin Pummell       | Corps of Engineers  |
| Douglas Oshiro       | State of Hawaii - DBEDT/STID                                      |
| Richard Shimomura    | State of Hawaii - Dept of Accounting and General Services         |
| Barney Yoshioka      | Hawaiian Electric Co.   |
| Goro Sulijoadikusumo | Hawaii Department of Transportation                               |
| Jeff Farris          | Honolulu Fire Department  |
| Socrates Bratakos    | Honolulu Fire Department  |
| Michael Ito          | Honolulu Fire Department  |
| Gary Lum             | Honolulu Fire Department  |
| Neal Nakamura        | Oceanic Time Warner   |
| Ray Isawa            | Pacific Disaster Center   |
| Chris Chiesa         | Pacific Disaster Center   |
| Shaun Tsuha          | State of Hawaii - Department of Public Safety                     |
| Joan Esposito        | State of Hawaii - Office of Planning                              |
| Nixon Medina         | State Agriculture Department                                      |
| Larry Kanda          | State Civil Defense   |

|                  |  |
|------------------|--|
| Faye Chambers    | State Civil Defense  |
| Henry Wolter     | United States Geological Survey                                |
| Reese Tokunaga   | Verizon Hawaii   |
| Charlie Tener    | Verizon Hawaii   |
| Craig Tasaka     | State of Hawaii - Office of Planning                           |
| Kristian Kerr    | City & County Honolulu - Information & Communications Services |
| Peter Hirai      | Oahu Civil Defense   |
| Michael Kitamura | Office of Senator Daniel K. Akaka                              |

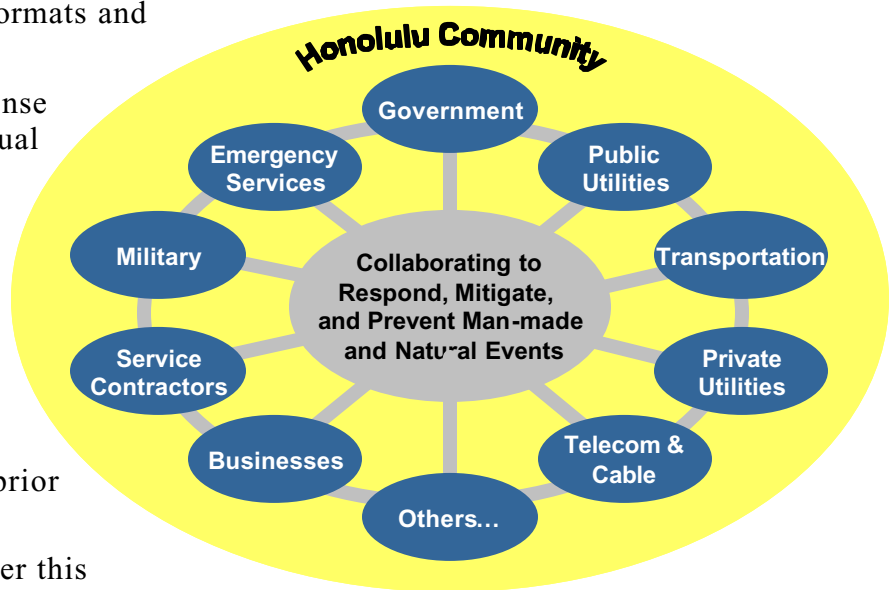
It should be noted that a number of other organizations were identified as stakeholder during the workshop. These groups will be contacted prior to the start of the pilot project phase. These groups included:

- ~~///~~ Honolulu Police Department
- ~~///~~ The Gas Company
- ~~///~~ Tesoro Petroleum
- ~~///~~ Chevron Corporation

## Barriers to Collaboration and Coordination

The following includes a summary of a number of the major barriers to existing collaboration among public and private that were identified during the workshop by the participants.

- ✍ Security issues about data getting into the wrong hands
- ✍ Competitive information gets in the way of sharing
- ✍ Data accuracy and currency varies
- ✍ Same data different formats and accuracies
- ✍ Most of the civil defense data is currently manual
- ✍ Trust among external organizations is question
- ✍ Don't always know who the GIS players are in the community
- ✍ Long term planning requires shared data prior to event
- ✍ The best way to deliver this information to field personnel
- ✍ Determining what data needs to be shared, can't share everything
- ✍ Confusion regarding who is doing what about coordination
- ✍ How is the data to be used once you give it to an external organization



As depicted in the graphic above, the Honolulu Community includes a variety of public and private organizations, including: the governmental agencies (local, state and federal levels), public utilities, transportation, private utilities, telecommunication and cable organizations, businesses, service contractors, military organizations, emergency services/first responders, as well as other organizations. The goal is to develop an environment that will allow these organizations to better collaborate in responding, mitigating, and preventing to both man-made and natural events.

## Pilot Project Needs

In our discussions and working exercises with the local, regional, state, federal and private sector organizations participating in workshop, sixteen (16) major needs repeatedly emerged. These needs have been organized into four major themes including: Data and Database Management, Interoperability and Accessibility, and Practices and Processes.

### Collaboration and Support Theme

- ✍ Establish data sharing agreements among essential public and private organizations.
- ✍ Establish advanced contracts for data collection, such as the use of remote sensing technology for incident management.
- ✍ Develop predefined list of GIS and other technical personnel and vendors required to support an event.

### Data and Database Management Theme

- ✍ Predefine all critical infrastructure data necessary to support planning for and responding to an event.
- ✍ Establish a back-up data center.
- ✍ Consolidate multiple datasets of duplicate data into a single environment.
- ✍ Create predefined database model to support emergency response.
- ✍ Create/share single, common georeferenced landbase (e.g., buildings, utilities, street and building addresses).
- ✍ Develop predefined metadata standards to ensure the best possible datasets are used for decision making.

### Interoperability and Accessibility Theme

- ✍ Establish guidelines for shared data with the media during and after an event.
- ✍ Develop interoperability standards to enable the integration and exchange of related critical infrastructure protection data.
- ✍ Develop mobile mapping capabilities for both taking data in the field and collecting it during and after an event.

### Practices and Processes Theme

- ✍ Establish a process to organize and integrate both internal and external data together and distribute it.
- ✍ Establish emergency map production capabilities in more than one location.

- ~~///~~ Establish coordination of map production across agencies (Federal, State, City, private organizations).
- ~~///~~ Establish data collection responsibilities among multiple agencies (e.g., environmental monitoring, building inspections).

Each of these needs has been described in more detail, and this information will be used to focus the work plan during the next phase of the pilot project. For proprietary reasons, release of this detailed information has been restricted to participants in the Honolulu workshop.

## Keys to Pilot Project Success

The following includes the keys to pilot project success that were identified during the workshop by the participants.

- ✍️ Dedicated and consistent team members to support the project
- ✍️ Identify key decision makers in each stakeholder group
- ✍️ Develop clear roles and responsibilities for everyone – i.e.: data brokers, users, etc.
- ✍️ Educate and brief local legislators, council members elected officials (i.e.: the highest level decision makers) in order to obtain a commitment for resources for the project duration
- ✍️ Provide a education/briefing to private and public executives (highest level decision makers) to gain support
- ✍️ Federal funding for compliance
- ✍️ Define data, hardware and equipment requirements
- ✍️ Tie project into National Response Plan, develop relationship to ensure compliance and assistance
- ✍️ Provide continued facilitation and coordination by GITA
- ✍️ Use structured approach: objectives, activities, performance measures, schedules
- ✍️ Clearly articulate project purpose, but avoid formal structure (i.e.: sunshine law)
- ✍️ Need common operating picture, including standard operating procedures for First Responders
- ✍️ Answer the question: What does ‘Give me your data’ mean?
- ✍️ Personnel who can speak to both worlds: ‘Technoweenie’ and ‘Real World’
- ✍️ Define risks, vulnerabilities and hazards: help define types of data for different groups and look at interdependencies

## Next Steps

Based on the resulting pilot project workshop themes and identified issues, the work plan for the pilot project phase will be developed. It is anticipated that the initial phase of the pilot project would focus primarily on organizational collaboration requirements and basic data sharing capabilities and interoperability. Existing standards defined by the Open Geospatial Consortium and the FGDC, as well as commercial products will also be considered during this pilot phase.

This is a pragmatic approach that does not address all issues related to collaboration and data sharing, but does focus on the most important one: basic access to the best available data in the event of an emergency. It follows the 80-20 rule, delivering major benefits with relatively small effort. The pilot project will lay the foundation for future work which can address additional issues.

More complex issues that will receive some consideration during the pilot project, but that are not addressed in detail in the scope of the first phase, include:

1. *Alignment of spatial data between different spatial databases.* This is a broad and time consuming problem to address, but many useful emergency management functions can be carried out even if the data from different organizations is not precisely aligned. Use of the city/county landbase by many of the stakeholders will greatly reduce this issue for much of the spatial data. Adoption of standardized addresses will increase the efficiency of operations of and data sharing efforts between infrastructure managers, governments, and emergency responders.
2. *Data security and privacy issues for ongoing data sharing.* There are a variety of complex issues relating to privacy and security that need to be considered when organizations share data on an ongoing basis. These issues are more likely to be successfully accommodated during a state of emergency, when it is appropriate for authorized parties to have temporary access to any data belonging to local utilities, municipalities and other organizations.
3. *Semantic interoperability.* Insuring interoperability of database schemas requires that an organizations' application understands that a "road" object in the electric utility database represents the same thing as a "street" object in the water utility database. This is important for other more advanced applications but not needed for many basic emergency management applications.
4. *Data discovery.* Another aspect of data sharing is the ability for an organization's application to dynamically determine what data and services are available to it. In this scenario, it is generally the case that a relatively small number of known data sources are available. Consequently, this is a lower priority, but it will receive attention.

Bearing in mind these exclusions, the primary focus of the pilot project will be:

- 1) Determine appropriate collaborative models between identified organizations for sharing data during an event, including development of data sharing agreements and appropriate business practices among pilot project participants.
- 2) Install and test OGC compliant server software at data source sites. Existing software, as well as in-kind resources from commercial vendors will be used to the maximum possible extent.
- 3) Demonstrate the ability to access data from any of the participating organizations from a remote site, either individually or by overlaying data from multiple organizations.
- 4) Develop appropriate processes, and potentially prototype software, for authorizing access to data. Existing emergency management processes should provide the foundation for this project element.
- 5) Consider appropriate strategies for offsite location of backup servers.

It is anticipated that the operational phase of the pilot project will be expanded in scope based on the successful completion of the initial planning phase.

## Community Collaboration is Key to Success

It is important to bring all of our geospatial resources and expertise to bear on this important national initiative. Collaborative efforts among organizations such as the Geospatial Information & Technology Association, the Association of American Geographers, the Federal Geographic Data Committee, the Department of Homeland Security, the Transportation Security Administration, the National Geospatial-Intelligence Agency, the Open Geospatial Consortium, and many others, need to be pursued and sustained. Partnerships with other federal agencies and private sector companies will be required as we work toward developing a national geospatial framework for critical infrastructure protection.

We envision the Honolulu GECCo resulting in a replicable model that stakeholders in other communities can employ in constructing collaborative models for critical infrastructure protection, among other things. GITA will encourage additional GECCo's in other communities that leverage the effort and experiences of preceding and/or ongoing pilots. Eventually, a growing network of GECCo's nationwide will contribute to national programs defined by the federal government, such as the National Spatial Data Initiative (NSDI).

## APPENDIX A

### Workshop Incident Scenario – Event Description

The following includes the incident scenario – event description used to capture the information on collaboration and data related issues during the workshop exercise.

| <b><i>Event</i></b> | <b><i>Time</i></b>       | <b><i>Description</i></b>   |
|---------------------|--------------------------|---|
| 0                   | Prior to Incident        | It is a calm day 86 degrees; Kona winds are predicted. Department of Homeland Security announces national threat level orange.  |
| 1                   | 9:00AM<br>Kamehameha Day | There is a loud noise sounding like a sonic boom coming from the direction of the Harbor. A black plume of smoke begins rising in the vicinity of Aloha Tower. At the main police station, the power is out.                      |
| 2                   | 9:10AM                   | A police officer arrives at the scene at 9:05AM. She radios to dispatch that there's been a major explosion at the electric power plant across from Aloha Tower. In addition, several fires in the street have erupted.           |
| 3                   | 9:20AM                   | Fire trucks and crews arrive from Kakaako station and begin to hook up hoses to begin fighting the fire, and find low water pressure. More Police officers arrive. The first officer on the scene begins to vomit uncontrollably. |
| 4                   | 9:45AM                   | Ambulances arrive on the scene to find emergency workers and by-standers suffering similar symptoms.  |
| 5                   | 10:50AM                  | Paramedics treat emergency workers and citizens, and transport them to Queen's Hospital. County Health office is notified that people downwind of the explosion and fire are getting sick.  |
| 6                   | 11:30AM                  | County Health officer issues an evacuation order for downtown Honolulu. Emergency warning siren goes off.   |

|   |        |  |
|---|--------|--|
| 7 | 1:30PM | CNN, FOX, NBC, ABC and CBS have called the Mayor with questions about the explosion and reports of people getting sick. Reporters arrive at Queen's hospital as the hospital is being evacuated. The Mayor's office has directed all media requests to be handled by the city public information office.   |
| 8 | 2:00PM | The City has received a phone call at the police department dispatch from an individual that has asked to speak to the Governor. The police department informs the caller it is a holiday and the Governor is off-island. The caller then identifies himself as a member of a group that is affiliated with Al-Qaeda, indicating his group is responsible, and that more attacks to the other islands are to come if the U.S. does not stop its war on the Muslims. He hangs up with the conversation lasting only 1 minute. |