

# FEDERAL GEOGRAPHIC DATA COMMITTEE HOMELAND SECURITY WORKING GROUP

Michael P. Lee

United States Geological Survey, 12201 Sunrise Valley Drive, Mail Stop 590, Reston, VA, USA 20192 -  
michael.p.lee@dhs.gov

**KEY WORDS:** Federal Geographic Data Committee, Homeland Security Working Group, National Spatial Data Infrastructure, Homeland Infrastructure Foundation-Level Database Working Group, ANSI INCITS 415-2006, FGDC-STD-011-2001

## ABSTRACT:

The Federal Geographic Data Committee (FGDC) Homeland Security Working Group (HSWG) ensures that the National Spatial Data Infrastructure (NSDI) supports the preparation for, prevention of, protection against, response to, and recovery from (1) threats to the nation's population centers and critical infrastructures that are of terrorist, criminal, accidental, or natural origin and (2) related adverse events. The HSWG serves as the focal point for identification of geospatial metadata, information content, symbology, interface and other specifications, guidelines, and standards required to ensure that geospatial information technologies support the achievement of the strategic goals of homeland security. The HSWG identifies geospatial information technologies, resources, standards and data applicable to homeland security. It also identifies and addresses unsatisfied homeland security-related geospatial needs. The HSWG is complementary to all NSDI activities and therefore coordinates its activities with organizations representing communities of interest in the homeland security and related mission areas, as well as with other FGDC subcommittees and working groups. The HSWG uses nationwide coordination mechanisms between all levels of government to encourage appropriate participation in its activities and to fully inform relevant stakeholders about standards, data production, coordination activities, management planning, and training opportunities.

## 1. INTRODUCTION

The Federal Geographic Data Committee (FGDC) Homeland Security Working Group (HSWG) ensures that the National Spatial Data Infrastructure (NSDI) supports the preparation for, prevention of, protection against, response to, and recovery from (1) threats to the nation's population centers and critical infrastructures that are of terrorist, criminal, accidental, or natural origin and (2) related adverse events.

The working group serves as the focal point for identification of geospatial metadata, information content, symbology, interface and other specifications, guidelines, and standards required to ensure that geospatial information technologies support the achievement of these strategic goals of homeland security:

**Awareness** -- Identify and understand threats, assess vulnerabilities, determine potential impacts and disseminate timely information to our homeland security partners and the American public.

**Prevention** -- Detect, deter and mitigate threats to our homeland.

**Protection** -- Safeguard our people and their freedoms, critical infrastructure, property and the economy of our Nation from acts of terrorism, natural disasters, or other emergencies.

**Response** -- Lead, manage and coordinate the national response to acts of terrorism, natural disasters, or other emergencies.

**Recovery** -- Lead national, state, tribal, local and private sector efforts to restore services and rebuild communities after acts of terrorism, natural disasters, or other emergencies.

**Service** -- Serve the public effectively by facilitating lawful trade, travel and immigration.

The HSWG identifies geospatial information technologies, resources, standards and data applicable to homeland security. It also strives to identify and address unsatisfied homeland security-related geospatial needs. The HSWG is complementary to all NSDI activities and therefore coordinates its activities with organizations representing communities of interest in the homeland security and related mission areas, as well as with other FGDC subcommittees and working groups. The HSWG uses nationwide coordination mechanisms between all levels of government to encourage appropriate participation in its activities and to fully inform relevant stakeholders about standards, data production, coordination activities, management planning, and training opportunities.

In addition, an important function of the HSWG is to serve as a bridge and coordination mechanism between the Homeland Security and Homeland Defense geospatial domains. Homeland Security, for which the Department of Homeland Security (DHS) is the Federal lead, is defined as the unified national effort to secure America, prevent and deter terrorist attacks, protect against and respond to threats and hazards to the nation, ensure safe and secure borders, welcome lawful immigrants and visitors, and promote the free-flow of commerce. Homeland Defense, for which the Department of Defense (DoD) is the Federal lead, is juxtaposed to the Homeland Security mission area and encompasses the protection of U.S. sovereignty, territory, domestic population, and critical defense infrastructure against external threats and aggression.

## 2. PARTICIPATION

The working group has regular participation from the U.S. Departments of Agriculture, Commerce, Defense, Energy, Homeland Security, the Interior, Justice, and Transportation; the Army National Guard, Environmental Protection Agency, Federal Communications Commission, General Services Administration, National Aeronautics and Space Administration, National Capital Planning Commission, Tennessee Valley Authority, the U.S. Postal Service, the Urban and Regional Information Systems Association, the National Association of Counties and the National States Geographic Information Council.

## 3. RESPONSIBILITIES

The National Spatial Data Infrastructure (NSDI) encompasses policies, standards, and procedures for organizations to cooperatively produce and share geographic data. The responsibilities of the HSWG include developing and facilitating the information and tools which enable the NSDI to be responsive to governments at all levels in the preparation for, prevention of, protection against, response to, and recovery from threats and hazards to our Nation. These HSWG responsibilities fall into the broad mission areas of Policy Recommendations, Standards, and Coordination. Principal responsibilities include the following:

### Policy Development:

A. Developing and implementing guidelines for the identification, dissemination, and sharing (web-served or other) of geospatial data required for DHS and DoD critical infrastructure programs that are, or may be, determined to be homeland security-sensitive.

B. Assisting in the development and publication of process and policy guidelines applicable to homeland security data and supporting the testing and validation of guidelines or specifications developed or modified by the HSWG.

C. Recommending additions and changes to the homeland security-related NSDI data themes and their lead agencies to the FGDC Steering Committee.

### Standards:

D. Developing, publishing, and facilitating the adoption of common standards of content, symbology, format, and accuracy for homeland security data for use by all Federal agencies, with adoption for use by non-Federal organizations encouraged to increase interchangeability and interoperability.

E. Participating in the development and evaluation of data theme definitions and standards used by international organizations and making process recommendations for international geospatial information data sharing for homeland security and global regional critical infrastructure protection purposes.

### Coordination:

F. Promoting the development of coordinated, consistent data and information availability, with emphasis on the needs of the first responder community, for use in crises and in planning

and conducting exercises and personnel training, particularly where multiple jurisdictions and/or agencies are involved.

G. Promoting the effective use of common, coordinated information sources and tools by local, tribal, state, Federal, and volunteer entities that ensure that elected officials and lead decision-makers are capable of developing integrated local and state plans that successfully integrate into and are enabled by national plans.

H. Developing procedures for the collection, compilation, and dissemination of information for and about homeland security data activities and promoting the coordination of those interagency activities related to homeland security data. This includes the identification and exchange of authoritative homeland infrastructure data among various Federal, state, and local levels of government, as supported by the efforts of the Homeland Infrastructure Foundation-Level Database (HIFLD) Working Group.

I. Supporting and promoting collaborative activities and initiatives established or recognized by the FGDC, such as the Geospatial One-Stop.

## 4. SUBGROUPS

The HSWG has established a number of subgroups to accomplish the work required to meet its responsibilities. Participants in these groups may be drawn from working group member organizations and from other organizations, as appropriate. Descriptions of work accomplished and of work underway by the various subgroups are described below.

### 4.1 Symbology Subgroup

The Federal Emergency Management Agency (FEMA), now part of the DHS, started an initiative in 2001 to develop standard map symbols for hazard and disaster mapping. Once developed, these symbols would aid disaster and homeland security efforts by eliminating the confusion that can arise from unintuitive, ambiguous, and/or inconsistent use of map symbols during emergency management activities.

Beginning in 2002, FEMA worked the initiative collaboratively with the HSWG. The Symbology Subgroup of the HSWG was established and became very active in revising the symbol set and developing related products. The Department of Census contributed considerable resources to the effort and coordinated much of the digital symbol production. Other members of the group included the DoD Defense Information Systems Agency, the Department of Energy, the National Imagery and Mapping Agency (now National Geospatial-Intelligence Agency), the National States Geographic Information Council, the National Weather Service, and the U.S. Army Corps of Engineers.

Subgroup activities included:

- Refining a list of map features relevant to emergency managers;
- Developing a set of symbols based on these features;
- Soliciting feedback from the user community of emergency managers;

- Evaluating the best collaborative path for accreditation as a standard;
- Developing interoperability specifications and a prototype for graphical display through the Open Geospatial Consortium; and
- Designing the standard for scalability so different symbol sets could be added for different types of users.

In 2006, the American National Standards Institute (ANSI) approved the standard that resulted from the work of the Symbology Subgroup. The standard, ANSI INCITS 415-2006 "Homeland Security Mapping Standard - Point Symbology for Emergency Management", is intended to help first responders and emergency managers at the incident and local levels. Information about the ANSI standard can be found at <http://www.ansi.org> and the work of the Symbology Subgroup, can be found at <http://www.fgdc.gov/HSWG/index.html>.

Today, the Symbology Subgroup has reformed after a period of inactivity to address additional issues associated with emergency management and other homeland security symbol needs. Some of these issues relate to expanded symbol sets, scale, training, and additional symbol formats. For more details, see the FGDC HSWG website at [http://www.fgdc.gov/participation/working-groups-subcommittees/hswg/index\\_html](http://www.fgdc.gov/participation/working-groups-subcommittees/hswg/index_html), or contact the Symbology Subgroup Chairperson, Mr. Robert Phillips, at [Robert.L.Phillips@uscg.dhs.gov](mailto:Robert.L.Phillips@uscg.dhs.gov).

#### **4.2 Guidance Subgroup**

The HSWG Guidance Subgroup was established to serve as the focal point for the preparation of recommendations concerning guidance, policy, and process required to ensure that geospatial information technologies support the strategic goals of homeland security and homeland defense. The Guidance Subgroup applies subject matter expertise of its members, and solicits outside subject matter expertise, when needed, to initiate draft FGDC policy guidance on issues requiring attention to effectively institute or enable the NSDI in the homeland security and homeland defense arena.

One responsibility of the Guidance Subgroup is stewardship of the FGDC document "Guidelines for Providing Appropriate Access to Geospatial Data in Response to Security Concerns". This document, authored by the FGDC HSWG, provides guidance for evaluating the need to reduce or eliminate public access to sensitive geospatial data.

After the September 11, 2001 terrorist attacks on the United States, Federal agencies and other organizations took different actions regarding continued public access to similar geospatial data that might increase vulnerability to further attacks. Some organizations withdrew data from public access, some sanitized the data, and others made no change in access to the data. To address questions of what safeguards of geospatial data are sensible and at what costs, the HSWG undertook the task of preparing the aforementioned guidelines in 2004. Working from conclusions and suggestions formulated in the Rand Corporation report titled "Mapping the Risks: Assessing the Homeland Security Implications of Publicly Available Geospatial Data", the HSWG prepared the guidelines as a series of decisions that a data originating organization makes about geospatial data. Each decision is accompanied by related instructions and discussion. In brief, the guidelines attempt to

help an originating organization determine if safeguards are necessary based on:

Risk to security -- Are the data useful for selecting one or more specific potential targets, and/or for planning and executing an attack on a potential target?

Uniqueness of information -- If the data pose a risk to security, is the sensitive information unique to the geospatial data?

Net benefit of disseminating data -- If the sensitive information poses a risk to security, and is unique to the geospatial data, do the security costs of disseminating the data outweigh the associated societal benefits of dissemination? Data that do not pose a risk or are not unique, or for which dissemination is a net benefit, do not warrant safeguards, so no additional consideration is necessary.

If the data need safeguards, the guidelines offer two options:

Change the data -- Change the data to remove or modify the information that causes concern, and make the changed data available without further safeguards. Organizations are advised to review the changed data to ensure that the change dealt effectively with the concern.

Restrict the data -- Establish, commensurate with the assessed risk, restrictions on access to, use of, or redistribution of the data.

To obtain a copy of these FGDC Guidelines, go to: <http://www.fgdc.gov/policyandplanning/Access%20Guidelines.pdf>. For more information on the referenced Rand Corporation report, see: <http://www.rand.org/pubs/monographs/MG142/>.

Additional work that the Guidance Subgroup has undertaken includes:

- Development of data sharing guidelines in collaboration with the National States Geographic Information Council;
- Coordination with the FGDC concerning recommendations for additional NSDI homeland security and homeland defense data themes and corresponding proposed lead agencies;
- Promotion of effective practices for homeland security grantees;
- Development of Geospatial One-Stop homeland security Community of Interest Pages for the Homeland Security Infrastructure Program and Cross-Border International data discovery and access; and
- Definition of standard "access" and "use" constraint verbiage for homeland security geospatial metadata.

More information about the HSWG Guidance Subgroup may be found at [http://www.fgdc.gov/participation/working-groups-subcommittees/hswg/subgroups/guidelines-sg/index\\_html](http://www.fgdc.gov/participation/working-groups-subcommittees/hswg/subgroups/guidelines-sg/index_html) or by contacting the Guidance Subgroup Chairperson, Mr. Michael Lee at [Michael.P.Lee@dhs.gov](mailto:Michael.P.Lee@dhs.gov).

#### **4.3 U.S. National Grid Subgroup**

The United States National Grid (USNG) provides U.S. civil agencies with their first standardized, nationally consistent,

grid-based system for describing locations on large-scale maps, integrating them with GPS, and improving the interoperable exchange of position information between multiple agencies involved in emergency response and consequence management. The USNG is based on the Military Grid Reference System, which has been successfully used by the U.S. and its allies to support operations worldwide. User-friendliness is key to the utility of the USNG. The ability to report locations with grid coordinates in meters, and to integrate with GPS, facilitates land navigation under extreme conditions.

The USNG Subgroup is responsible for the maintenance of the FGDC USNG Standard (FGDC-STD-011-2001). The subgroup also conducts numerous outreach functions regarding the USNG. Outreach is required to promote the value of the USNG. Examples include:

- First responders and emergency management personnel receive training in how to use the grid;
- Map-making organizations learn the proper ways to depict the USNG in their products;
- Commercial Geographic Information System (GIS) vendors receive guidance when implementing the grid in their map production software; and
- Policy makers at all levels of government learn about the operational benefits of adopting the USNG.

The USNG Subgroup has had several recent successes with the adoption of the FGDC USNG standard by a number of Federal, State, and Local governments and organizations.

In 2008, the USNG was identified as the primary land search and rescue georeferencing system under the National Search and Rescue Plan.

The U.S. Geological Survey (USGS) is defining new standards for relatively simple orthoimage-based 7.5-minute quadrangle maps that can be rapidly generated for emergency response to supplement older topographic maps. Key features of these products are a full 1,000-meter USNG grid referenced to North American Datum 1983 (NAD83).

Also, the DHS continues to recommend implementation of the USNG standard in its geospatial guidance to DHS grant recipients.

State and Local outreach and implementation initiatives have been aided by a USGS grant in 2007 to Delta State University, in Cleveland, Mississippi. These include:

- USNG training in Seattle, WA; Reno, NV; San Bernardino, CA; Dallas, TX; Austin, TX; Tampa Bay, FL; and Memphis, TN; resulting in more than 1,000 GIS professionals and emergency responders trained;
- State-level adoption in Florida and North Carolina, planned adoptions in Mississippi, Minnesota, and Iowa, and overall contact initiated in twenty-five states, the District of Columbia and Guam;
- Integration of USNG into eleven E-911 systems in Mississippi.

Other advances have been realized in the GIS software implementation arena, the most notable being integration of

USNG into ESRI products such as ArcGIS Explorer, ArcMap, and ArcGIS Server.

To obtain more information about the USNG Subgroup and its outreach activities, see the HSWG website, the USNG website at <http://www.fgdc.gov/usng>, or contact the USNG Subgroup Chairperson, Mr. Tom Terry at [neri.terry@usmc.mil](mailto:neri.terry@usmc.mil).

#### **4.4 Content Subgroup**

The responsibilities of the HSWG Content Subgroup include: facilitating review of information content of geospatial data models; comparing the content of reviewed data models with existing endorsed FGDC or other Federal standards for information content; providing recommendations to improve reviewed or existing content models (within the scope of homeland security geospatial data acquisition, processing, distribution, use, maintenance, and preservation); and providing mechanisms to engage the homeland security stakeholder community in open, public and transparent reviews of new and existing geospatial data models.

Regarding the latter, the Content Subgroup is responsible for conducting a review process that includes: 1) initiating public reviews of model documentation and announcement of the terms of the review process; 2) soliciting comments and/or change recommendations for a particular model under review; and 3) compiling and making public a record of comments, recommendations and determinations related to model modifications.

Finally, the subgroup is charged with the task of communicating with model stewards for the purpose of conveying comments and recommendations received by the subgroup, and where appropriate, suggesting and/or soliciting determinations on proposed model changes as feedback to public reviewers.

In 2006, the HSWG was asked by the DHS Geospatial Management Office (GMO) to coordinate the public review process for the new DHS Geospatial Data Model (GDM). The HSWG participated in the announcement of the public review and developed a procedure to accomplish collecting comments, adjudicating the comments, and communicating the adjudication results to the DHS GDM Modelling Team. To aid in a smoother communication process, the DHS GDM Modelling Team participated in the adjudication of comments with the Content Subgroup.

The DHS GDM fulfils the Federal Enterprise Architecture requirement of a logical Data Reference Model. Its use and implementation are required by DHS Components (agencies) and is intended to be the template for physical implementation models developed by GIS software vendors and applications developers. The DHS GDM is part of the larger National Information Exchange Model (NIEM) Enterprise Architecture initiative underway in joint development with the Department of Justice (DOJ). The DHS GDM is the geospatial component of the NIEM and will help enable DHS and DOJ to achieve the data sharing goals of the Federal Government's Information Sharing Environment. It is important to note that because of its rich descriptions of feature and attribute content, and its utility towards data sharing, plans are underway to require conformance to the DHS GDM by potential grantees when collecting geospatial data and building applications using DHS grant funds.

Today, the Content Subgroup has successfully adjudicated over 200 comments for the DHS GDM Modelling Team and is preparing to support further reviews as the model enters a more stable and cyclical maintenance environment. Comment adjudication will follow the same patterns established for earlier reviews.

In addition to model reviews, the DHS GMO has asked the Content Subgroup to coordinate the awareness, review and promotion needs of other items related to the DHS GDM to include physical data model implementations of the GDM, a variety of GDM documentation, and automated web-based tools that are intended to help users adopt the DHS GDM. For a current view of DHS GDM items that have been released for public review, go to <http://www.fgdc.gov/dhsgdm/>.

## 5. CONCLUSION

The FGDC HSWG is a Federally chartered organization staffed primarily by volunteers who share a desire to improve the coordination, development, and communication of geospatial policy, standards and guidelines that enable our nation to achieve the strategic goals of homeland security. It is through the dedicated efforts of these volunteers that the HSWG has been able to achieve the accomplishments summarized above, and continues to contribute to Homeland Security and Homeland Defense geospatial readiness.

## REFERENCES

American National Standards Institute, International Committee for Information Technology Standards, Homeland Security Mapping Standard - Point Symbology for Emergency Management, ANSI/INCITS 415-2006.

Baker, John; Lachman, Beth; Frelinger, David; O'Connell, Kevin; Hou, Alexander; Tseng, Michael; Orletsky, David; and Yost, Charles, 2004, Mapping the risks: assessing the homeland security implications of publicly available geospatial information: Santa Monica, Ca., RAND Corporation, 195 p. (Also available through the RAND Corporation web site at <http://www.rand.org/publications/MG/MG142/index.html>) (Accessed August 12, 2004).

Colvocoresses, Alden P., 1997. The Gridded Map, *Photogrammetric Engineering & Remote Sensing*, Vol. 63, No. 4, (April 1997), pp. 377 – 380.

Doyle, Frederick J., Jules McNeff, N.G. Terry, Jr.. 2002. FGDC Adopts USNG: Time to Standardize, *Geospatial Solutions*, Jan 2002.

Federal Geographic Data Committee. Homeland Security Working Group. "Guidelines for Providing Appropriate Access to Geospatial Data in Response to Security Concerns". Washington: June 2005, 16 p. Available through Federal Geographic Data Committee web site at <http://www.fgdc.gov/policyandplanning/AccessGuidelines.pdf>.

National Search and Rescue Committee (NSARC), 2008. Catastrophic Incident Search and Rescue Addendum to the United States National SAR Manual (April, 2008): 63.

National States Geographic Information Council, 2002, Data access decision tree: National States Geographic Information Council.

Sternstein, Aliya, 2006. Another Post-Katrina Problem: What happened to the streets? *Federal Computer Week*, Feb 27, 2006.  
Terry, N.G. 1996., One Nation – One Map Grid, *GPS World*, Vol 7, No. 4 (April 1996), pp. 32 – 37.

## ACKNOWLEDGMENTS

Scott McAfee, Chair, Emergency Response Symbology Subgroup, FGDC HSWG

Robert Phillips, Chair Symbology Subgroup, FGDC HSWG

Larry Baucom, Co-Chair, Guidance Subgroup, FGDC HSWG

Travis Hardy, Co-Chair, Guidance Subgroup, FGDC HSWG

Neri (Tom) Terry, Co-Chair, U.S. National Grid Subgroup, FGDC HSWG

Edward Freeborn, Co-Chair, U.S. National Grid Subgroup, FGDC HSWG

Andrew Freckmann, Co-Chair, Content Subgroup, FGDC HSWG

