



# An Interactive, Web-Based Tool for Discovering and Sharing Map Symbols

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**GeoVISTA** 

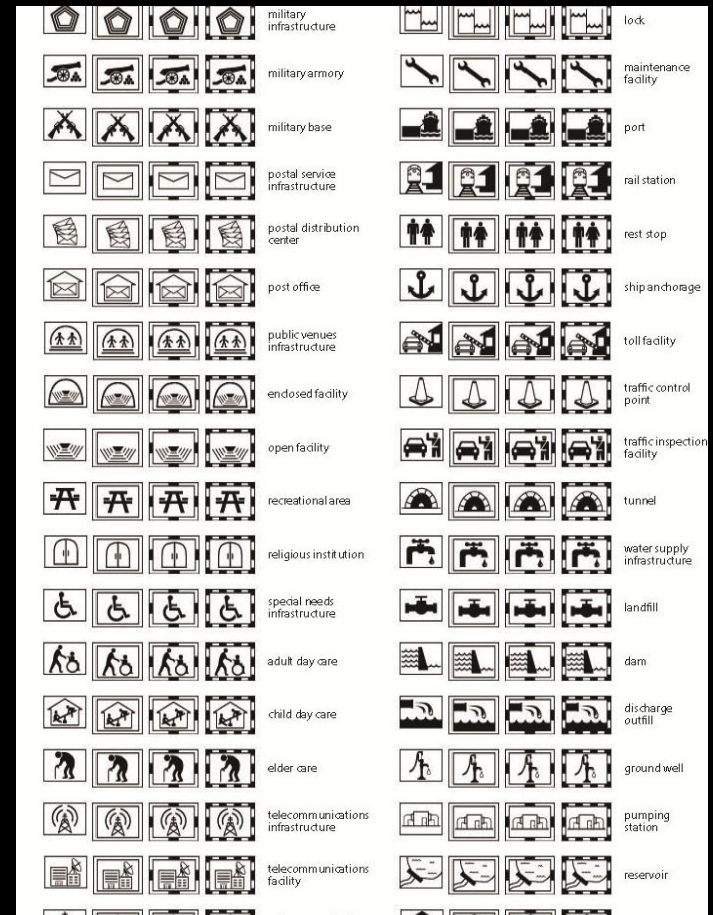
PENNSTATE



# Outline



- Motivation & Approach
- Application Design
- Current Progress
- Next Steps



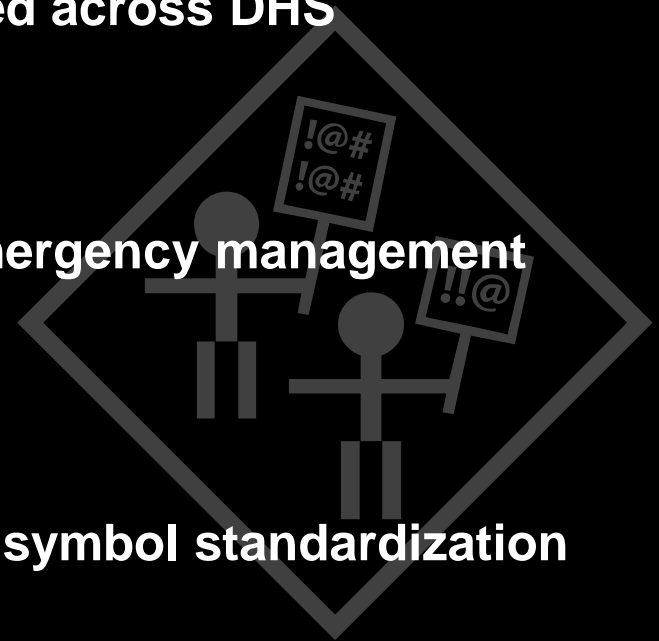
# Motivation & Approach



# Motivation



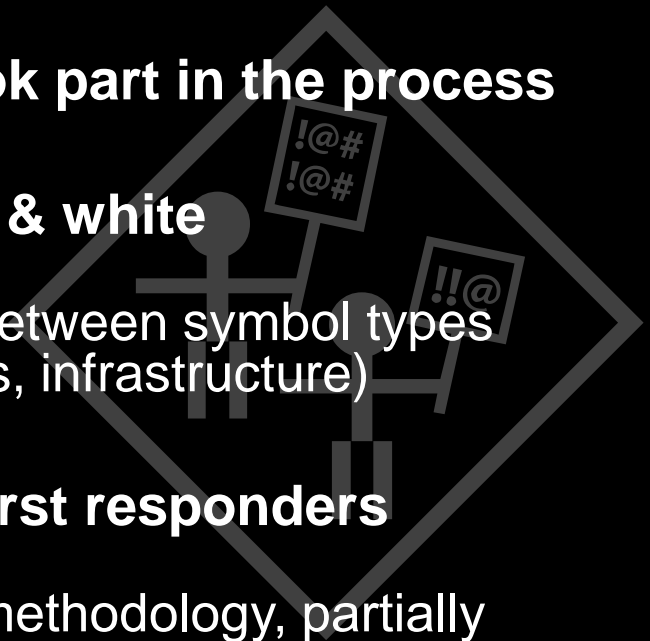
- **Diverse DHS organizations produce and use maps**
  - Audiences range from geospatial analysts to general public
- **No consistent set of map symbols used across DHS**
  - Even if we just look at point symbols
- **ANSI INCITS 415-2006 intended for emergency management mapping**
  - Poorly adopted by practitioners
- **Initial Objective: Develop process for symbol standardization**
- **Secondary Objective: Develop mechanism for symbol interoperability**



# ANSI Standard



- **Point symbol set designed for emergency response**
  - Goal was to facilitate common situational awareness, support point symbol interoperability
- **Federal/state/local stakeholders took part in the process**
- **Symbols designed to work in black & white**
  - Outline shapes used to distinguish between symbol types (incidents, natural events, operations, infrastructure)
- **Evaluation conducted online with first responders**
  - Made use of an “accept” or “reject” methodology, partially following the ANSI guidelines



# Other Standards



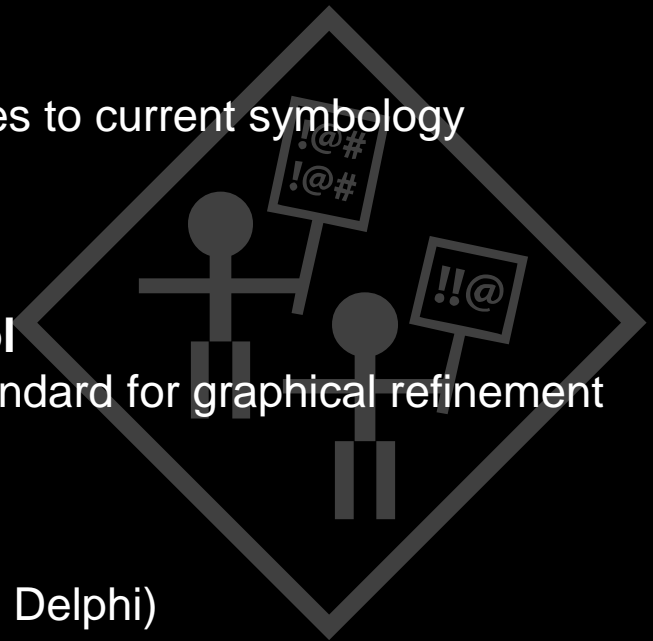
- **We discovered that most mission areas had their own, 'in house' standards**
- **These were developed on an ad hoc basis, usually by one cartographer**
- **Collections of ESRI markers and whatever else they could scrape together**
- **Such 'standards' are passed around to new employees and are promoted as default option**



# Standardization Process



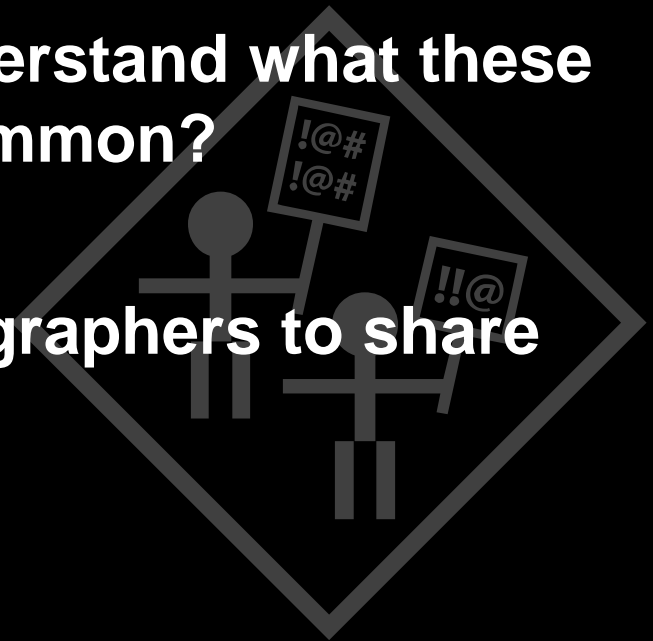
- **Distributed, web-based activities through a customized Drupal site**
- **Phase 1: Needs Assessment**
  - Review current symbology, identify new symbol needs, problems with current symbols
- **Phase 2: Initial Standard Development**
  - Develop symbol categories, vote on changes to current symbology
- **Phase 3: Standard Refinement**
  - Discuss, refine & vote on final categories
- **Phase 4: Implementation & Quality Control**
  - Test new symbology in exercise, submit standard for graphical refinement by cartographers
- **Methods feature**
  - Round-based discussion & voting (modified Delphi)
  - Card-sorting activities (using websort.com)
  - Anonymized participation



# Motivating Questions



- **How can cartographers in different mission areas learn about these 'in house' standards?**
- **What can we do to better understand what these various standards have in common?**
- **How can we encourage cartographers to share their symbols more widely?**





# Approach



- **Develop web-based solution for sharing / browsing point symbols**
- **Simple design – aim to support one key task really well**
- **Symbols that have gone through our standards process can receive special tags**
- **Iterative development process -> static mockup, dynamic prototype, refined prototype, final version**



# Application Design






search

browse by  ▼

sort by  ▼



<p><b>bomb threat</b></p> 	<p><b>definition</b> A bomb threat or other threat involving explosives. <span style="float:right">★★★★☆</span></p> <p><b>keywords</b> bomb, threat, explosive, warning, hazard</p> <p><b>categories</b> incident, event, people, attack, terrorism</p> <p><b>users</b> FBI, NGA, USCG, DNDO</p> <p><b>set</b> ANSI INCITS 415, MILSPEC 2525B</p> <p><b>creator</b> r.roth@psu.edu <b>uploaded</b> May 21, 2010 at 10:32am <a href="#">add to cart</a> ▶</p>
<p><b>fire</b></p> 	<p><b>definition</b> A significant fire event to a natural or man-made entity <span style="float:right">★☆☆☆☆</span></p> <p><b>keywords</b> fire, flame, firefighting, wildfire, forest fire, arson</p> <p><b>categories</b> incident, event, natural hazard, arson</p> <p><b>users</b> CBP, FBI, NGA, USCG</p> <p><b>set</b> ANSI INCITS 415, MILSPEC 2525B</p> <p><b>creator</b> a.robinson@psu.edu <b>uploaded</b> July 2, 2010 at 4:35pm <a href="#">add to cart</a> ▶</p>
<p><b>toxic release</b></p> 	<p><b>definition</b> A significant release of toxic chemicals in gas, liquid, or solid form. <span style="float:right">★★☆☆☆</span></p> <p><b>keywords</b> spill, release, toxic, chemical, hazmat, cloud, gas, liquid, solid</p> <p><b>categories</b> incident, event, people, hazard, hazmat</p> <p><b>users</b> DNDO, FBI, NGA</p> <p><b>set</b> ANSI INCITS 415, MILSPEC 2525B</p> <p><b>creator</b> r.roth@psu.edu <b>uploaded</b> July 1, 2010 at 1:22pm <a href="#">add to cart</a> ▶</p>
<p><b>civil disturbance</b></p> 	<p><b>definition</b> A sizable and significant protest, riot, or other civil unrest incident. <span style="float:right">★★★★☆</span></p> <p><b>keywords</b> protest, unrest, disturbance, riot</p> <p><b>categories</b> incident, event, people</p> <p><b>users</b> CBP, FBI, NGA, USCG</p> <p><b>set</b> ANSI INCITS 415, MILSPEC 2525B</p> <p><b>creator</b> r.roth@psu.edu <b>uploaded</b> July 2, 2010 at 3:35pm <a href="#">add to cart</a> ▶</p>
<p><b>major civil unrest</b></p> 	<p><b>definition</b> A very large and significant protest, riot, or other civil unrest incident. <span style="float:right">★★★★☆</span></p> <p><b>keywords</b> protest, unrest, disturbance, riot</p> <p><b>categories</b> incident, event, people</p> <p><b>users</b> CBP, FBI, NGA, USCG</p>

symbol cart

	<p><b>civil disturbance</b></p> <p>protest, unrest, disturbance, riot CBP, FBI, NGA, USCG ★★★★☆ <a href="#">×</a></p>
	<p><b>explosion</b></p> <p>bomb, blast, explosion FBI, NGA, USCG ★★★★☆ <a href="#">×</a></p>
	<p><b>firearm</b></p> <p>gun, weapon, firearm, pistol CBP, FBI, USCG ★★★★☆ <a href="#">×</a></p>
	<p><b>arrest</b></p> <p>arrest, criminal, capture, police CBP, DNDO, NGA ★★★★☆ <a href="#">×</a></p>

[map preview](#) ▶

[download](#) ▶

# Back-end

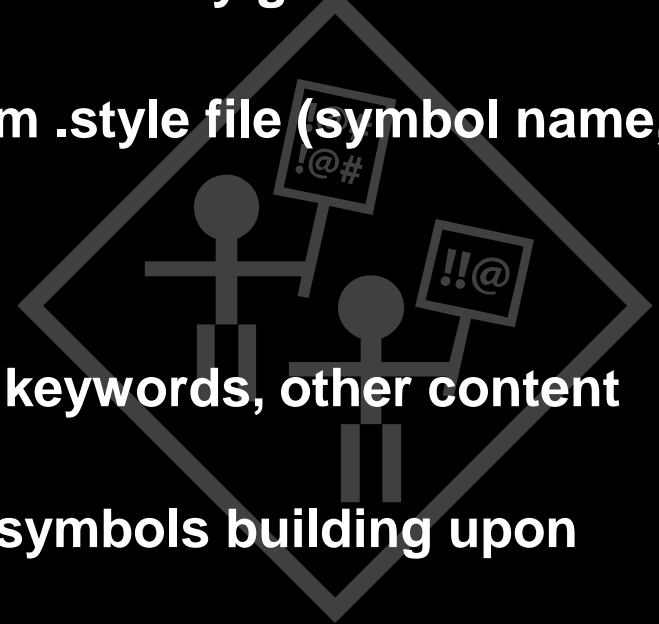


- **ArcObjects is used to parse ESRI style files and generate preview images of the styles**
- **Lucene.NET index for text content**
  - Quick text searching and retrieval of large amounts of content
  - Weights search criteria to improve search results – symbol hits, user rating, upload date, symbol standard, symbols having gone through our standards process
- **.NET web service supports read/write to the Lucene.NET index and read/write for .style files**
- **All content stored in the Lucene index or .style files (Microsoft Access) on the server (style files and image preview files)**
  - This may be improved in the future by parsing the style files and storing their information in a RDBMS

# User Scenario



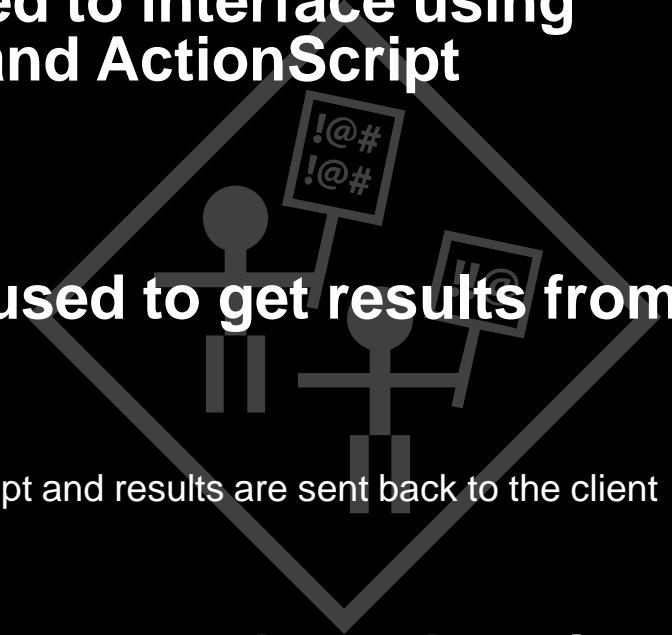
1. User uploads .style file
2. Preview thumbnails of symbols automatically generated
3. Some searchable content pulled from .style file (symbol name, category)
4. User presented interface for adding keywords, other content
5. Other users search, download, rate symbols building upon content and improving symbol search results



# Development Details



- **Interface built using Flash Catalyst (converts AI & other art into UI objects)**
- **Functionality built and connected to interface using Flash Builder 4 (formerly Flex) and ActionScript programming**
- **Flash Builder and ActionScript used to get results from the web service**
  - User function calls can be made through ActionScript and results are sent back to the client as text strings or JSON strings
- **Flash plugin required for web browsers, but otherwise works broadly across platforms**



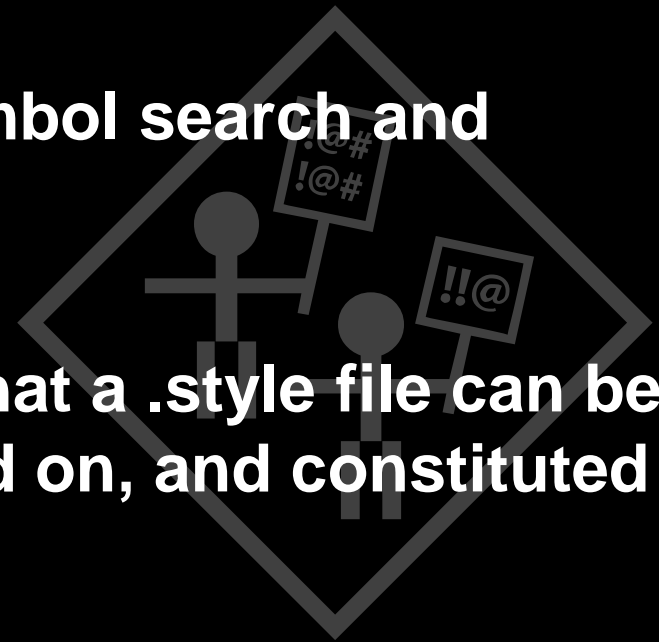
# Current Progress



# Progress to date



- **Developed interactive prototype based on static mockup + sponsor feedback**
- **Prototype supports basic symbol search and browsing**
- **Successfully demonstrated that a .style file can be contributed, parsed, searched on, and constituted differently for download**





# Next steps




# Another Brewer?





**SymbolStore** Welcome, **Guest** [login](#) or [create a new account](#)

search  browse by

**map preview**



**symbol cart**

	<b>civil disturbance</b> protest, unrest, disturbance, riot CBP, FBI, NGA, USCG ★★★★☆ <input type="checkbox"/>
	<b>explosion</b> bomb, blast, explosion FBI, NGA, USCG ★★★★☆ <input type="checkbox"/>
	<b>firearm</b> gun, weapon, firearm, pistol CBP, FBI, USCG ★★★★☆ <input type="checkbox"/>
	<b>arrest</b> arrest, criminal, capture, police CBP, DND, NGA ★★★★☆ <input type="checkbox"/>

**map settings**

map

color

symbol size

map scale

feature density

label size

# Evaluation Plans



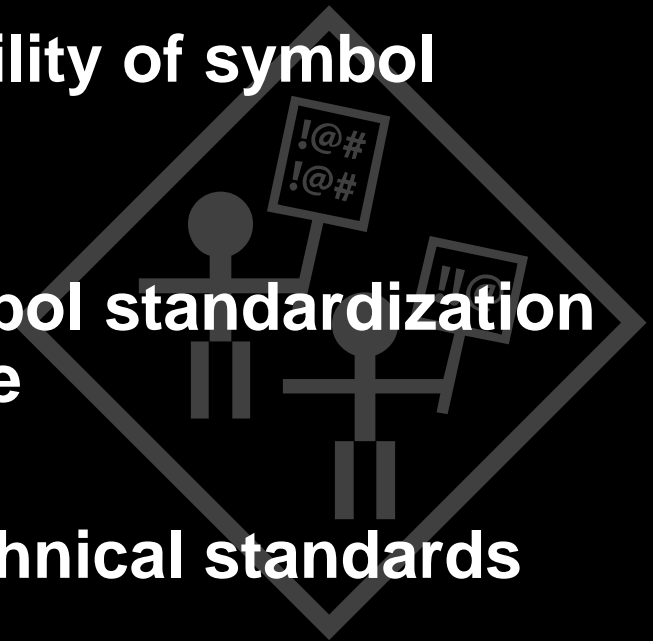
- **We have presented prototype to DHS mapmakers in late October 2010 for feedback**
- **We are currently incorporating feedback and will ramp up development in Summer 2011**
- **Wider dissemination? Hopefully...**



# Next Steps

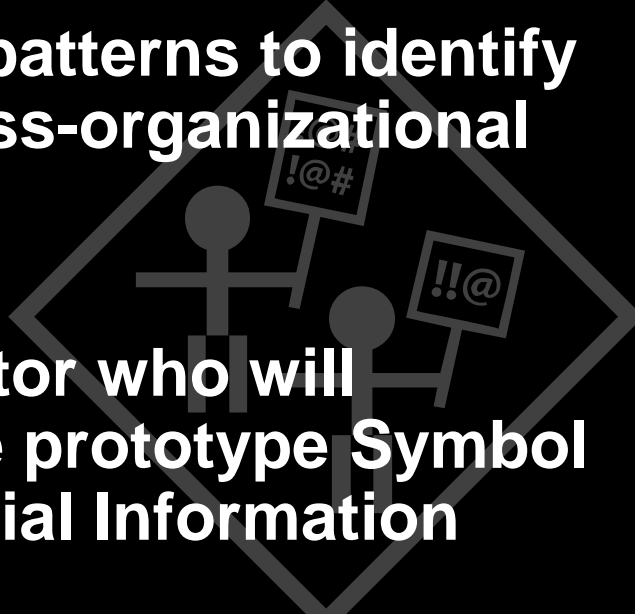


- **Lucene.NET weightings (currently a simple text matching)**
- **Add RDBMS for better scalability of symbol storage**
- **Integrate portions of our symbol standardization process into the Symbol Store**
- **Develop support for other technical standards (SLD, for example)**



# Next Steps

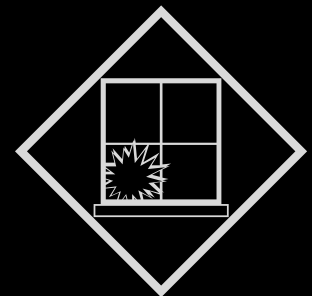
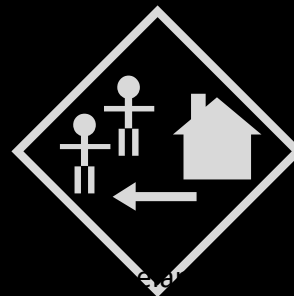
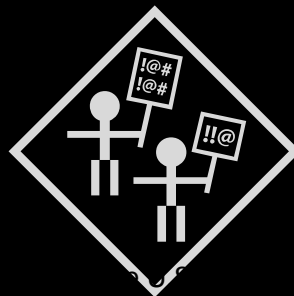
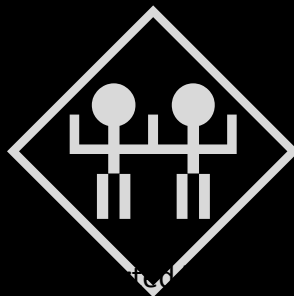


- **Extend tools to handle dynamic / multi-scale point symbols**
  - **Explore Symbol Store usage patterns to identify frequently used symbols, cross-organizational commonalities, etc...**
  - **Coordinate with DHS Contractor who will implement components of the prototype Symbol Store within the DHS Geospatial Information Infrastructure**
- 

Thanks for your attention!

for more information:

<http://www.geovista.psu.edu/symbology/>



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