Geospatial Tools for Search & Rescue and First Responders

January 30, 2020
Future EM Geo Forum Dates

March EM Geo Forum
Details Coming Soon!

https://www.napsgfoundation.org/events/
Modeling and Data Working Group (MDWG)

Meeting the 3rd Wednesday of the month
from 2:00-3:30 PM ET

Adobe Connect: https://fema.connectsolutions.com/mdwg-monthly-meeting/
Conference Bridge: 800-320-4330, Passcode: 399137#

Email: fema-mdwg@fema.dhs.gov
Welcome

Chris Vaughan, GIO, FEMA
Today’s Presenters

Paul Doherty, PhD
Program Manager
NAPSG Foundation

Jared Doke
Program Specialist
NAPSG Foundation

Lance Gilmore
Emergency Management Specialist
FEMA

Adam Barker, PhD
Response Geospatial Office
FEMA
About NAPSG Foundation

**Our Vision**
A Nation of emergency responders and leaders equipped with the knowledge and skills in applying technology and data to change the outcome for survivors.

- 501(c)(3) Non-profit organization established in 2005
- +20,000 member network: Public Safety leaders, first responders, and GIS practitioners
- Board of Directors comprised of public safety & emergency management industry leaders
How Do We Do It

1. National Guidelines and Standards
   - Defining and promulgating consistent best practices

2. Exercises & Simulations
   - Fostering regional collaboration through implementation

3. Education & Training
   - Building capacity in using innovative technology

4. Tech Assistance
   - Transferring knowledge and skills
Today’s Attendees

Total Participants on Map

309

Type of Jurisdiction

- University: 2.27%
- Company/Other: 0.99%
- State Government: 16.18%
- Other: 4.35%
- NGO: 6.47%
- Federal Government: 29.00%
- Local Government: 24.42%

Sector Affiliation

- Search & Rescue: 30
- Emergency Management: 25
- Fire Service: 20
- Other: 15
- Law Enforcement: 10
- Military: 5
- Public Work: 3
- 911 Dispatch: 2
- Public Health: 1

(last update a few seconds ago)
Objectives

1. Learn about the purpose of SAR data collection and ways in which this data can be used.

2. Learn about field data collection methods and ways to integrate them into your organization.

3. Learn how to develop an organizational game plan to transform data and technology into actionable information that changes the outcome for survivors.

4. Gain insight into FEMA’s timeline and geospatial strategy for SAR.
Purpose of Field Data Collection
Situational Awareness (More than dots on a map...)

• Real-time situational awareness & collaboration
  “I can see where other search & rescue teams have already searched and what is needed in the field.”

• Enhanced data collection and reporting capabilities
  “I can see what has already been accomplished and make predictions on how much time and resources it will take to complete the operation.”

• Improved search strategy & tactics
  “I can see what areas have been covered and what remains to be searched.”

• Operational Intelligence
  “I can identify the highest priority tasks and assign them to the appropriate teams.”
Four themes of data collected by SAR and First Responder Survey

<table>
<thead>
<tr>
<th>Human Interactions</th>
<th>Structure Damage (Rapid)</th>
<th>Hazards</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="R" /></td>
<td><img src="image" alt="Structure Damage" /></td>
<td><img src="image" alt="Hazards" /></td>
<td><img src="image" alt="Support" /></td>
</tr>
</tbody>
</table>
Hurricane Florence

SAR SUPPORT SUMMARY
60 SAR TEAMS FROM 11 STATES
FEMA (IST AND REGION) AND US COAST GUARD
2,600 FIELD FORMS SUBMITTED | 340+ USERS

IN PARTNERSHIP WITH:

Greensboro Fire Swiftwater Team 2A
09/18/2018 1649h
One Team, One Fight

All Search and Rescue Teams on One Map!

Hurricane Michael
Interoperability

- Collaborate with SAR Teams across agencies
- Integrate with existing platforms
  - US National Grid
  - Existing data collection tools (GPS)
  - Common operating platforms at National, State, Local EOCs, volunteers
  - Messaging and C2 platforms
- Integrate with emergency management
  - Damage Assessment
  - Community Lifelines

**Inspections/Assessments after a Disaster**

**THE CHALLENGE**

When a home is damaged as a result of a natural or man-made disaster, numerous damage assessments are performed to assess the safety of the structure, quantify the damage, and determine financial aid from the government and/or insurance companies. While each assessment is conducted for a specific purpose, this puts a significant burden on the survivors and community and often times delays recovery efforts.

**THE SOLUTION**

Consistent standards and data sharing mechanisms are needed to various programs and agencies (e.g., state and local authorities, federal agencies, statutory authorities, non-profit organizations) can leverage the same data collected during the preliminary damage assessment. This will help avoid duplication of effort, conflicting information, and delays in bringing relief to the homeowner.

- American Red Cross
- State Inspectors
- Homeowner Insurance Adjuster
- U.S. Army Corps of Engineers (USACE)
- Disaster Survivor Assistance Team
- Small Business Administration (SBA)
- Federal Emergency Management Agency (FEMA)
- Community Lifelines Program (CLP)
- National Flood Insurance Program (NFIP)
- Individual Assistance (IA)
- Mitigation (Building Code Inspections)
- Environmental and Historic Preservation (EHP)
- Mitigation (Building Code Inspections)
- National Flood Insurance Program (NFIP)

FEMA

EM FORUM
Interoperability

January 28th Columbia, SC Tech Innovation Exercise
A lifeline enables the continuous operation of critical government and business functions and is essential to human health and safety or economic security.

FEMA has developed a construct for objectives-based response that prioritizes the rapid stabilization of Community Lifelines after a disaster.

https://www.fema.gov/lifelines
Modern Field Data Collection Methods
Garmin GPS and the Iron Sights Methodology
Search Definitions

- **RECON** - Preliminary survey of the area (How Big and How Bad)
- **RAPID SEARCH (Hasty Search)** - Fast paced and methodical search of the area.
- **PRIMARY SEARCH** - Quick search of the structures likely to contain victims.
- **SECONDARY SEARCH** - Systematic search of every room of every structure in the assigned area of operation.
  - **LOW COVERAGE** Secondary Search:
    - Systematic search of every room and void space.
  - **HIGH COVERAGE** Secondary Search:
    - Exhaustive search of every room and void space.
- **TARGETED SEARCHES** - Searches of specific locations.
  - Shelter locations
  - High Occupancy locations
  - Critical Infrastructure Facilities
  - Areas of last refuge
  - Locations of Special Needs Individuals or At-Risk Persons
# Iron Sights Icons

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<td>3</td>
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<td>5</td>
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<tr>
<td>Structure No Damage</td>
<td>Structure Damaged</td>
<td>Structure Failed</td>
<td>Structure Destroyed</td>
<td>Assisted</td>
<td>Evacuated</td>
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<td>F</td>
<td>V</td>
<td>V</td>
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<tr>
<td>Rescued</td>
<td>Follow-Up Form</td>
<td>Victim Detected</td>
<td>Confirmed Victim</td>
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<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Shelter in Place</td>
<td>Follow-Up Form</td>
<td>Victim Detected</td>
<td>Confirmed Victim</td>
<td>Human Remains</td>
<td>Human Remains Removed</td>
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<td>13</td>
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<td>15</td>
<td></td>
<td>Targeted Search</td>
<td></td>
<td></td>
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<tr>
<td>Shelter in Place</td>
<td>Animal Issue</td>
<td>Fire Incident</td>
<td>Hazardous Material Incident</td>
<td>Targeted Search</td>
<td>Flood/Water Level</td>
<td></td>
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</tbody>
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<td>22</td>
<td>23</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Helicopter Landing Site</td>
<td>Route Blocked</td>
<td>Extra 23</td>
<td>Extra 24</td>
<td>Extra 23</td>
<td>Extra 24</td>
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</tr>
</tbody>
</table>
Transition from GPS to Survey123
Survey123

- App that can be used on Android, iOS, Windows, and Desktop Computers and is part of the Esri ArcGIS platform.
- Works on smartphones, tablets, laptops, or desktops.
- Survey123 for ArcGIS is a complete, form-centric solution for creating, sharing and analyzing surveys.
- Use it to create smart forms with skip logic, defaults, and support for multiple languages.
- Collect data via web or mobile devices, even when disconnected from the Internet.
- Analyze results quickly
Part of the ArcGIS Platform
Benefits of Survey123 over GPS for USAR

- Smart form logic based on waypoint selected
- Automatic field calculations
- Ability to easily project waypoints to desired location
- Near real time data collection in a connected environment
- Fully integrated with ArcGIS Platform
- Ability to collect more meaningful data
- Enhanced data sharing
## Additional Waypoints

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Description (Based on NG-TF1 Guide)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Human Interaction</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Structure No Damage</strong></td>
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<tr>
<td></td>
<td></td>
<td>Low Risk, low probability of further collapse</td>
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<tr>
<td></td>
<td></td>
<td><strong>Structure Damaged</strong></td>
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<tr>
<td></td>
<td></td>
<td>Medium Risk, structure is moderately damaged</td>
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<tr>
<td></td>
<td></td>
<td><strong>Structure Failed</strong></td>
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<tr>
<td></td>
<td></td>
<td>High Risk, may be subject to sudden collapse</td>
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<tr>
<td></td>
<td></td>
<td><strong>Structure Destroyed</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete destruction of structure</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Other/Support</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specific location or condition requiring increased search effort</td>
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<td></td>
<td></td>
<td>Appropriate site for landing zone</td>
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<tr>
<td></td>
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<td>Issue including aggression, location, assistance needed, etc.</td>
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<tr>
<td></td>
<td></td>
<td>Incident Command Post</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Location that is used for the assembly, triage (sorting), medical stabilization and subsequent evacuation of casualties</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can be used to update the location of a SAR team.</td>
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<tr>
<td></td>
<td></td>
<td>Area where apparatus and personnel report to await assignment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A location that is confirmed to be safe from hazard or threat (e.g., above maximum flood height, clear from wildfire hazard, far from falling debris in an earthquake).</td>
</tr>
<tr>
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<td>Mission specific placeholder to be determined (e.g. abandoned vehicle, commercial structure, evidence)</td>
</tr>
<tr>
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<td>Mission specific placeholder to be determined</td>
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<td>Mission specific placeholder to be determined</td>
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<tr>
<td></td>
<td></td>
<td>Mission specific placeholder to be determined</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other not already identified</td>
</tr>
</tbody>
</table>

### Symbol Legend
- **A**: Assisted - Materials assistance provided to residents
- **E**: Evacuated - Survivors transported to collection point
- **R**: Rescued - Technical rescue that required physical intervention
- **V**: Victim Detected - Potential victim detected (including canine alert or intelligence)
- **C**: Confirmed Victim - Confirmed live survivor (visual, audible, physical confirmation)
- **HU**: Human Remains - Confirmed victim determined to be deceased
- **HR**: Human Remains Removed - Human remains removed from specific location
- **S**: Shelter In Place - Survivors have chosen to remain at location
- **F**: Follow-Up Form - Additional information required not adequately described by symbol set
- **F**: Fire Incident - General fire occurrence
- **F**: Hazardous Material Incident - Nuclear, biological, or chemical incident
- **F**: Flood/Water Level - Predetermined site for documentation of water line
- **F**: Route Blocked - Inaccessible route by land or water
- **F**: Other Hazard - Other hazard not already identified
• Import .gpx data
  • Similar schema
  • GPS → Append to feature layer
  • Labor intensive, but possible

• Export via .csv, .xls, .shp, .gdb and KML!
  • *Not a dynamic/live connection
Opportunity for Remote Assistance

SUSAR Training in Wichita, KS

Supervising in real time in Redlands, CA
SAR and First Responder Survey Form
SAR and First Responder Survey

- Developed by the NASPG SAR Working Group
- Adopted by FEMA USAR and IAFC
- Deployment Kit available to deploy in your own organization
- v6 is the current production version, but we are now testing v7
Explorer

1. Location update: 27320 W Lugee Ave, Redlands, California, 92374
   - Created by: polkancy.naps, Aug 11, 2019
   - Team Name: NAPSG1
   - Squad Leader: 

2. Maps
   - On device
     - Web Map for Collector: Offline area
     - Map details
     - Recent
       - Add to favorites
       - Add offline area
     - Web Map for SAR Survey - Collector: Offline area
     - SAR Survey Operations Web Map for NAPSG Sandbox: e6010
   - Favorites
     - City of Colorado Springs Traffic Cameras
     - Colorado Springs Bike Map
   - My maps
     - SAR Survey Operations Web Map for NAPSG Sandbox: e6010

3. Add offline area
   - Pan and zoom to define the area
   - DOWNLOAD AREA

4. Area 3
   - Level of detail: Buildings
Supporting Applications

Moving Beyond Dots on Maps and Reports!
Summary Dashboard

486 Total Waypoints
3654 Miles of Track
Survey123 Reports
Geospatial Game Plan
NAPSG SAR Working Group

• Start with identifying core information needs
• Develop a game plan for addressing those information needs. Test it. Refine it.

Agency

• Host – Decide where you will host the platform?
• Team - Build the Team (GIS/TIS, Trainer, Champion)
• Access - Do the right people have access to the right content?
• Sharing - Do you have a data sharing agreement in place?
# Game Plan and Data Sharing

<table>
<thead>
<tr>
<th>Core Info Need</th>
<th>Public</th>
<th>First Responders</th>
<th>Emergency Managers</th>
<th>Field Game Plan</th>
<th>Operational Game Plan</th>
<th>Technical Game Plan</th>
<th>Data Sharing</th>
<th>Link to App</th>
<th>Link to Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Search Coverage (Track/Log)</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Incident Command Staff will use Incipio and start tracking, choosing their mission type - Rescue, Search, Incident, etc. Emergency Management Staff can access the same information with permissions and signing the data sharing agreement.</td>
<td>Incident Command Staff will use a Web Application to create and update assignment areas. Emergency Management Staff can access in this process based on spatial analysis and modeling of high-priority areas by accessing the WebApp or editing the feature layer directly.</td>
<td>SC - First Responders and their ESFs partners have full access (e.g., FEMA, ERDA, UOS). External agencies (e.g., Fema) can request access, subject to approval and briefing from SCERT. The Public will have no direct access to this data.</td>
<td>SC First Responders and their ESFs partners have full access (e.g., FEMA, ERDA, UOS). External agencies (e.g., Fema) can request access, subject to approval and briefing from SCERT. The Public will have no direct access to this data.</td>
</tr>
<tr>
<td><strong>Search Assignment Areas</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Incident Command Staff will create assignments and update their status. Emergency Management Staff can access this same information with permissions and signing the data sharing agreement.</td>
<td>Incident Command Staff will use a Web Application to create and update assignment areas. Emergency Management Staff can access in this process based on spatial analysis and modeling of high-priority areas by accessing the WebApp or editing the feature layer directly.</td>
<td>SC - First Responders and their ESFs partners have full access (e.g., FEMA, ERDA, UOS). External agencies (e.g., Fema) can request access, subject to approval and briefing from SCERT. The Public will have no direct access to this data.</td>
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</tr>
<tr>
<td><strong>Human Interactions</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Incident Command Staff will review incoming reports for any follow-up needs follow-up / flat and immediately assign the most appropriate resources to resolve the issue. Emergency Management Staff can access this same information with permissions and signing the data sharing agreement.</td>
<td>Incident Command Staff will use the SCERT and First Responder Survey, QuickCapture, and Explore for SCERT accessing the Field App and KML file via a laptop, desktop, or tablet. SCERT Staff will monitor incident surveys for follow-up and query using an Operations Dashboard and Web Application App. Emergency managers can access any of the apps above, or use the hosted feature layer view in their own web maps and apps.</td>
<td>SC - First Responders and their ESFs partners have full access (e.g., FEMA, ERDA, UOS). SC Emergency Managers (involuntary ESF support have read-only and integration access, External agencies (e.g., Fema) can request access, subject to approval and briefing from SCERT. The Public will have no direct access to this data.</td>
<td>SC First Responders and their ESFs partners have full access (e.g., FEMA, ERDA, UOS). SC Emergency Managers (involuntary ESF support have read-only and integration access, External agencies (e.g., Fema) can request access, subject to approval and briefing from SCERT. The Public will have no direct access to this data.</td>
</tr>
<tr>
<td><strong>Hazards</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Incident Command Staff will use Survey 360/ QuickCapture in the incident, Floodwater, Flood, Water Blocked, Other Hazard, Animal Issue. Emergency Management Staff can access this same information with permissions and signing the data sharing agreement.</td>
<td>Field Teams will use the SCERT and First Responder Survey, QuickCapture, and Explore for SCERT accessing the Field App and KML file via a laptop, desktop, or tablet. SCERT Staff will monitor incident surveys for follow-up and query using an Operations Dashboard and Web Application App. Emergency managers can access any of the apps above, or use the hosted feature layer view in their own web maps and apps.</td>
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SARGIS Hub

1. Resources by role
2. Links to training videos / just in time training
3. Points of contact
   • FEMA Urban Search and Rescue
   • International Association of Fire Chiefs
   • NSARC Geospatial Working Group*
4. Sandbox for testing geospatial tools – **NOT FOR REAL-WORLD RESPONSE**
Incident Battle Card

20200128 Southeast Exercise – Field Ops Battlecard

*Explorer optional

1. Install Explorer App
2. Sign in not required for this exercise.
3. Scan QR Code to open "SAR Survey Operations Web Map for NAPSG Sandbox e6610"

1. Install Survey123 App
2. Sign in not required for this exercise.
3. Scan QR Code to open "t v7a SAR and First Responder Survey"

1. Install ArcGIS QuickCapture
2. Sign-In
   Username: napsg10
   Password: napsg2020
3. Download "SAR QuickCapture Sandbox (v7)"

Additional resources at https://sargis.napsgfoundation.org
## Deployment Options

<table>
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<tr>
<th>FEMA</th>
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<tbody>
<tr>
<td>- fema.maps.arcgis.com</td>
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<tr>
<td>- Uses the SARWG Templates</td>
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<tr>
<td>- FEMA Task Force use only</td>
</tr>
<tr>
<td>- Contact Adam Barker and Lance Gilmore</td>
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</tbody>
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<thead>
<tr>
<th>Third Party</th>
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<tbody>
<tr>
<td>- Pay a third-party to host in ArcGIS Online and maintain the platform based on the SARWG Templates</td>
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<td>- Bring your own GIS Staff OR pay for contract support</td>
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<td>- Requires data sharing policy</td>
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<thead>
<tr>
<th>Host Yourself</th>
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<tbody>
<tr>
<td>- Use the SARWG Template to host the Survey and supporting apps in ArcGIS Online</td>
</tr>
<tr>
<td>- Recommended this is done at a State or Regional level to reduce duplication and simplify integration</td>
</tr>
<tr>
<td>- Bring your own GIS Staff OR pay for contract support</td>
</tr>
</tbody>
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FEMA USAR Update
FEMA US&R Program

FEMA US&R Program

- Since Survey123 was implemented, West Division has taken the lead evaluating additional functionality, potentially using QuickCapture for track logs and delivered the first instructor lead training at their Division meeting in December.
- West Division has another workshop scheduled in March, target audience: Search Team Managers, Search Specialists, Planning Team Managers, Technical Information Specialists, Communication Specialists and Task Force Leaders.
- Central and East Division have funding to support similar instructor lead and/or virtual training.
Using the National Urban Search and Rescue Response Program

FL-TF2 Training
FEMA US&R

- FEMA US&R will adopt the new NAPSG Survey123 schema
- Until explicit notice, we will continue to use the “2019” version
- Once the new schema is out, I will wipe the practice dashboard to create a sandbox for the new survey
- HUB site under development…
What’s Next?

- Re-Convened the SAR Working Group
- Adoption of Follow-Up Workflow
  - Red – Needs Follow-up
  - Yellow – Assigned
  - Green - Complete
- Search Data Analytics – e.g., to estimate the % of buildings searched in a search segment
- Data Dictionary between SAR Damage and Preliminary Damage Assessment
- More Training Videos!!!

January 28th SCERTF Exercise
February 20th CO-TF1 Exercise
Geospatial Coordination Calls

• Hosted by the *SAR Geospatial Working Group
• Daily call during Hurricane deployment
  • FEMA US&R
  • NPS/DOI
  • USCG
  • SUSAR
  • Supporting NGOs (e.g., NAPSG, IAFC, Crowdsourcing Rescue, Humanity Road, etc.)
  • Emergency Management Agencies
• NAPSG SAR Working Group Slack Channel

*Under consideration for affiliation with the NSARC
We Need You!

1. Follow the Initiative [https://sargis.napsgfoundation.org/pages/usar](https://sargis.napsgfoundation.org/pages/usar)
2. Use the Sandbox to train and send us your feedback!
3. Share information with State SAR and GIS Coordinators
Interested in Geospatial Coordination for SAR?

Scan the QR code to open the survey on your device. Click to download

https://arcg.is/1m88Tj
Thank you!

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