Vizsafe Geoaware Network: Common Operating Picture Software

Technology Report

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FOREWORD

The U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T) Urban Operational Experimentation (OpEx) 2022—hosted in July 2022 by the OpEx Program and National Urban Security Technology Laboratory (NUSTL)—provided first responders with the opportunity to experiment with new and emerging technologies in realistic, urban settings. This event combined demonstrations of leading-edge technologies with application-based field assessments staged throughout the New York City metropolitan area.

Urban OpEx 2022 was an important opportunity for DHS S&T to understand better the operational needs and requirements of urban first responders. Additionally, this event enabled first responder agencies to assess new technologies and provide feedback to participating technology vendors. Urban OpEx 2022 included participation from a broad range of federal, state, local, and private sector partners.

As part of the preparation for this event, DHS S&T facilitated discussions with first responder agencies to identify existing capability gaps. In coordination with NUSTL, the OpEx Program, used these capability gaps to develop a Request for Information to solicit interest from technology vendors who addressed the current needs, interests, and priorities of first responder organizations. DHS S&T selected technologies, in collaboration with first responder stakeholders, for participation in Urban OpEx 2022. Urban OpEx events enrich the homeland security enterprise by gathering subject matter experts as first responder evaluators to train on and assess emerging technologies.

First responder evaluators provided recommendations and feedback to technology vendors that can inform the refinement of existing technologies. Evaluator recommendations also provided valuable insight for the national first responder community to inform investments in new and emerging technologies.

For more information on Urban OpEx 2022 or to view additional Urban OpEx reports, visit www.dhs.gov/publications-library/science-and-technology.

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EXECUTIVE SUMMARY

On July 21, 2022, the U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T) conducted Urban Operational Experimentation (OpEx) 2022, during which participants evaluated Vizsafe Geoaware® Network, referred to hereafter as "Geoaware." An intelligence dashboard developed by Vizsafe, Inc. and operated in partnership with Parsons Corporation, Geoaware is a common operating picture software platform that provides interoperable communications and situational awareness. Geoaware enables the integration of existing systems and assets, such as Internet of Things sensor networks, camera networks, and smartphone-generated incident reports into a single comprehensive view for authorized users on any mobile device or web browser.

During Urban OpEx 2022, first responder evaluators used Geoaware in an operational scenario to provide feedback on its features and suitability for urban first responder organizations. Participating responders came from a variety of New York City agencies, including the Metropolitan Transportation Authority, New York City Emergency Management, New York City Police Department, and Port Authority of New York and New Jersey, as well as first responder members from the DHS First Responder Resource Group,[1] including Lubbock (TX) Fire Rescue, North Carolina Department of Information Technology, Oswego (NY) Fire Department, and San Diego (CA) Fire and Rescue. Parsons Corporation and Vizsafe, Inc. product engineers presented Geoaware's features and capabilities. Evaluators experimented with Geoaware through a series of data integration processes and visualization exercises. The Urban OpEx Planning Team incorporated first responder input to develop a list of critical tasks for evaluators to accomplish while operating Geoaware. The Urban OpEx Planning Team also encouraged first responder evaluators to consider other ways outside of the identified critical tasks that they might use the technology for during an actual event or incident.

Evaluators found the Geoaware software intuitive and the display screen easy to read. They appreciated the "GoLive" streaming feature on mobile platforms and the ability to send and receive photos. Evaluators also liked the mapping and two-way communications features. Several evaluators commented that the training required to use Geoaware was time-consuming. Many evaluators needed assistance from the vendor multiple times throughout conduct, which was counter to the goal of creating a realistic operating environment. Evaluators suggested making keeping the functionality, look and feel of the mobile and desktop applications the same; making the "send" button easier to find; and increasing the size of the mapping feature on the desktop as alterations that would make the dashboard more user-friendly. Additional customization options such as notifications, reports, lists, channels, and searches are available, but these were not tests as evaluators were provided a pre-configured environment for the purposes of time and this experiment. Despite the challenges some faced, evaluators unanimously agreed that the user interface was easy to engage with and understand. The majority of evaluators recommend this technology for use by first responder organizations.

[1] First Responders Resource Group is an all-volunteer working group comprised of 120 experienced emergency response and preparedness professionals (active and retired) who help S&T maintain focus on the top-priority needs of responders in the field, helping to guide its research and development efforts.

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1.0 INTRODUCTION

The U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T) supports first responders in their mission to protect the public by introducing them to new products and tools that enhance their operational effectiveness. The DHS S&T Operational Experimentation (OpEx) Program partnered with the National Urban Security Technology Laboratory (NUSTL) to plan, conduct, and assess Urban OpEx 2022.

To identify technologies with the highest utility for emergency response personnel, urban first responders from the Metropolitan Transportation Authority (MTA), New York City Emergency Management (NYCEM), New York City Fire Department (FDNY), and New York City Police Department (NYPD) identified capability gaps in their work and technology areas that could help to mitigate those gaps.

Using this input, the Urban OpEx Planning Team identified technology areas to address the first responders' capability gaps. DHS S&T then developed and disseminated a Request for Information (RFI) to solicit responses from vendors who offer products in those technology topic areas. Table 1 highlights Urban OpEx 2022 technology areas included in the event.

Table 1: Urban OpEx Technology Areas

Topic Area	Description
Fixed, On-body or Handheld Sensors	Fixed, on-body, or handheld technology solutions that can send and receive sensor data to support and enhance first responders' mission effectiveness.
Unmanned Aircraft Systems (UAS)	UAS technology solutions that provide the capability to survey and model urban environments.
Situational Awareness Platforms	Situational awareness technology solutions that provide necessary information to first responders to enhance disaster and emergency preparedness and response capabilities.
Deployable Robotics	Technology solutions that provide deployable robotics capabilities to support or enhance first responders' mission effectiveness.
Deployable Communications Systems	Technology solutions that provide deployable communications capabilities for use during an emergency or disaster, restoring failed communications systems or augmenting existing ones to increase capacity for emergency response functions.
Video Content Analysis and Video Analytics	Mobile and deployable technology solutions that aid law enforcement in threat detection, including but not limited to anomaly detection (e.g., bags left behind), behavior threat detection (e.g., crimes in progress, people in need of assistance), and facial recognition.

DHS S&T used the technology areas to guide the selection process in consultation with subject matter experts (SMEs) from within S&T leading to the Urban OpEx Planning Team selecting seven technologies out of more than 50 RFI responses. The Urban OpEx Planning Team then worked with first responders, emergency response personnel, and technology developers to develop operational scenarios and select venues for staging the experiments.

In addition to scenario development, the Urban OpEx Planning Team created an Experimentation Plan (ExPlan) to guide the event. The ExPlan included information about logistics, safety, roles and responsibilities, experiment design and scope, and evaluation guidance. Hosted by the OpEx program and NUSTL, from July 19 to 22, 2022, New York City first responder agencies and members of the DHS S&T First Responder Resource Group (FRRG) experimented with the technologies and provided feedback and observations to inform technology development.

On July 21, 2022, eleven first responder evaluators used Geoaware as a part of Urban OpEx 2022. Developed by Vizsafe, Inc. and operated in partnership with Parsons Corporation, Geoaware is a situational awareness platform that provides interoperable communications via common operating picture (COP) software. First responder SMEs from NYPD, NYCEM, MTA, and Port Authority of New York and New Jersey (PANYNJ), along with FRRG members from the Lubbock (TX) Fire Rescue, North Carolina Department of Information Technology, Oswego (NY) Fire Department, and San Diego (CA) Fire-Rescue Department, participated as evaluators to assess Geoaware's utility for their respective agencies. Observers from the FDNY and various federal, state, and local partners also attended. Parsons Corporation and Vizsafe, Inc. participated in Urban OpEx 2022 under a Cooperative Research and Development Agreement (CRADA) with DHS S&T.

1.1 PURPOSE

The Urban OpEx Planning Team designed the Geoaware operational experiment to provide first responders and emergency response personnel with an opportunity to learn about Geoaware's capabilities and limitations, gain hands-on knowledge in a representative environment, and explore Geoaware's applications in various use cases. First responder evaluators gave feedback that could be used by Parsons Corporation and Vizsafe, Inc. to improve its Geoaware platform for use by first responder and emergency response personnel. Likewise, the feedback gave DHS S&T program managers a better understanding of first responder and emergency response personnel needs to help guide future S&T investments.

1.2 OBJECTIVE

Urban OpEx 2022 will introduce new technologies and assess their ability to address first responder mission capability needs.

- Objective 1: Share end-user feedback on Geoaware with the national first responder community to inform their decision-making
- Objective 2: Share first responder feedback with Parsons Corporation and Vizsafe, Inc. to improve their products

1.3 RESPONDER CAPABILITY NEED

First responders rely on large quantities of data and visual streams of real-time information to inform their response during an emergency. Situational awareness platforms that enable first responders to view and analyze data in one COP are critical to ensuring a timely and informed response. First responder SMEs who advised the Urban OpEx Planning Team on capability gaps indicated that situational awareness platforms could augment their ability to ingest and analyze data to support and enhance mission effectiveness during an emergency. This technology would streamline the communication of critical information while protecting urban first responders from potential hazards during a major event or disaster by increasing situational awareness.

1.4 SCOPE

Due to time constraints and scenario limitations, evaluators and the Urban OpEx Planning Team could not experience all of the features, capabilities, and configurations of the Geoaware at Urban OpEx 2022. Technology training was limited to one hour of virtual training offered before Urban OpEx and one hour of in-person training at the event, which may have constrained how the evaluators interacted with the technology.

1.5 PRODUCT DESCRIPTION

Geoaware allows its end-users to integrate all existing sensors, cameras, and information streams in their network of information, people, and assets into a single COP. Devices and data sources integrated into Geoaware provide the end-user with important information from the device or source and with useful metadata such as location data and documented configuration information about a device or data source. Furthermore, Geoaware can relay that information to other users in real time, or users can create mobile incident reports and broadcast live video using the "GoLive" feature. Both types of information are accessible in after-action incident reporting. This technology increases responders' situational awareness of resources in the field, operational environments, and cross-jurisdictional stakeholders, integrating different information streams into one display (Figure 1).

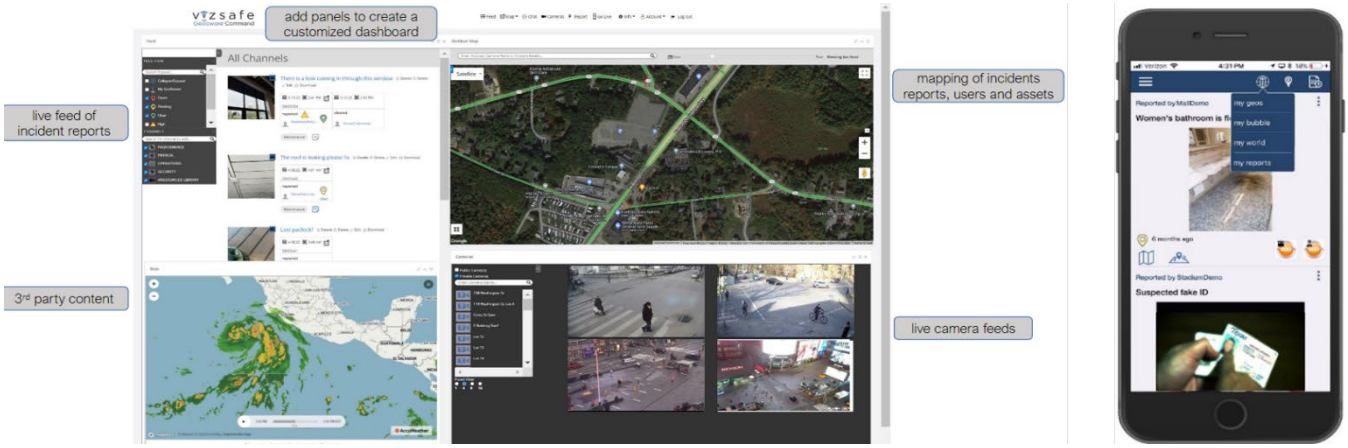

Figure 1: Geoaware Desktop and Mobile Application Display

Image credit: Vizsafe, Inc. in partnership with Parsons Corporation

2.0 EXPERIMENT DESIGN

The Urban OpEx Planning Team designed scenarios to allow first responders the flexibility to experiment with features most relevant to their missions. Input from first responders, the technology developer, the OpEx Program, and NUSTL's Experimentation Director helped develop scenarios that were not overly prescriptive but consistently engaged evaluators in testing the functionality of Geoaware.

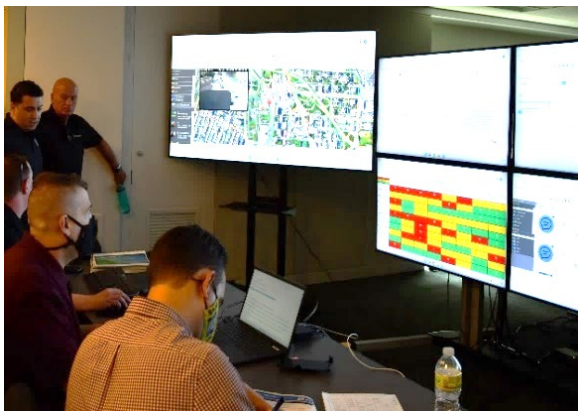

Figure 2: Evaluators Testing the Live Feed Data and Mapping Feature of Geoaware

Scenario:

- A Category 4 hurricane is approaching the New York-New Jersey (NY-NJ) metropolitan area

Critical tasks for the experiment included:

- Integrating multiple data sources
- Simultaneously pushing different data feeds to multiple platforms (web and mobile)
- Displaying simulated live feed data and maps (see Figure 2)

Given the limited time frame for training and experimentation and NYCEM's technology security restrictions, the Urban OpEx Planning Team; Parsons Corporation and Vizsafe, Inc; and first responder evaluators identified data sources to pre-populate Geoaware and establish pre-defined channels to use throughout the experiment. Evaluators experimented with Geoaware datasets and features through the provided scenario. Table 2 describes the various features and types of datasets evaluators experimented with during Urban OpEx 2022.

Table 2: Geoaware Features and Dataset Types Experimented at Urban OpEx 2022

Geoaware Features and Dataset Types	Description
Map Based Visualizations	Real-time, dynamic and interactive maps or incident pins; live user and asset locations; cameras; traffic; and other configurable live or static map data layers (e.g., polygons, points of interest)
Team Channels	Channels provide a way of categorizing incident reports for the purpose of filtering and permissioning information so that users only have access to incidents that are relevant to their role, responsibility, and location
Ingested Data Feeds	Incident, visual, or other data originating from outside of Geoaware (e.g., camera networks, RSS feeds, public or private data sets) that can be accessed and viewed in the same operating picture as the information generated by Geoaware users (e.g., user locations, incident reports)
GoLive™	Live video broadcasting from a Geoaware user's mobile device camera, similar to a body camera, to another group of Geoaware users
NewsFeed (Incident Feed)	Live, chronological feed of incident reports that can be filtered by channel, reporting user, incident description, or unique identification

After the experiment, the Urban OpEx Planning Team asked evaluators to consider how this technology would affect their current standard operating procedures and whether Geoaware could be used to augment their response capabilities.

2.1 SUMMARY OF THE OPERATIONAL EXPERIMENTATION

At Urban OpEx 2022, participants from NYCEM, MTA, PANYNJ, and the FRRG agency representatives convened (see Figure 3) at NYCEM Headquarters in Brooklyn, New York, to test and evaluate Geoaware. Before OpEx conduct was underway, evaluators for Geoaware had the opportunity to participate in virtual technology training with vendors, allowing evaluators to familiarize themselves with the technology in advance of the live event.

Figure 3: First Responder Evaluators at NYCEM

Eleven evaluators (see Table 3) rotated between six mobile devices and two web-based desktop stations, allowing them to interact with Geoaware in different ways to execute various tasks and test different functions. Each evaluator was paired with at least one data collector who recorded their observations about the experiments along with the real-time feedback from evaluators.

Table 3: Evaluators for Geoaware

First Responder Agency	Number of Evaluators
Lubbock (TX) Fire Rescue	1
North Carolina Department of Information Technology	1
NYCEM	2
NYPD Counterterrorism	1
Oswego (NY) Fire Department	1
PANYNJ	1
San Diego (CA) Fire-Rescue	1

Geoaware demonstrated the ability to ingest, analyze, and visualize data in a simulated hurricane response. The experiment helped first responders better understand the ability of Geoaware to integrate multiple streams of data into one COP during an emergency response. Table 4 summarizes the equipment used during this experiment.

Table 4: Equipment Used During Experimentation

Equipment	Description
Geoaware Network	Software for experimentation
Mobile devices	For first responder evaluators to use if they are unable to download the app on their agency-issued mobile devices
Television Monitor	HDMI cable for displaying Geoaware Common Operating Picture
Computer/Laptop	To run Geoaware software

2.1.1 CONDUCTING EXPERIMENTATION ACTIVITIES

Activities began with a classroom presentation from the OpEx Program, NUSTL, and NYCEM, providing an overview of Urban OpEx 2022 and its purpose. The Experimentation Director provided additional opening remarks and a safety briefing. A Parsons Corporation technology developer then trained evaluators on the capabilities of Geoaware. After approximately 30 minutes of hands-on training with evaluators, the OpEx began with evaluators operating Geoaware in the NYCEM conference room to ingest, analyze, and display various data streams

Figure 4: Evaluators Discuss Data Displays with the Experimentation Director

The Urban OpEx Planning Team divided the experiment scenario into two sets of activities focused on using Geoaware to integrate and visualize data during a hurricane. For the purposes of the experiment, responders used open-source, public data. The OpEx team designed these activities to test Geoaware's ability to complete various operations that first responders may require in an emergency response (see Figure 4).

Evaluators using the desktop interface focused on using Geoaware to ingest RSS and Extensible Markup Language (XML) feeds. (See Table 5 for specific feeds used in the Geoaware experiment.)

Table 5: List of Data Feeds Used in Geoaware Experiment

RSS Feeds	Allowed XML Feeds
▪ NYCEM RSS (Notify NYC) ▪ NYC National Oceanic and Atmospheric Administration (NOAA)/National Weather Service (NWS) ▪ NYC New York (NY)-1 News	▪ Event & Incident Tracking Viewer ▪ National Shelter System Facilities ▪ Emergency Medical Service (EMS) Stations ▪ American Red Cross Chapter Facilities ▪ Hurricane Evacuation Routes ▪ National Hurricane Centers ▪ NYC Department of City Planning – ArcGIS Flood Hazard Mapper ▪ NYC Hurricane Evacuation Zone Finder ▪ NOAA Weather Alerts ▪ NYC Power Outages ▪ Accuweather Radar

For the first set of activities, evaluators simultaneously pushed different data feeds to multiple platforms (see Figure 6). They entered the vendor-issued credentials, giving them access to an extensive open-source data library. Evaluators then uploaded and integrated the selected data into feeds on multiple platforms. Evaluators toggled the data on and off the platforms to simulate data distribution to first responders during an incident.

Evaluators then focused on creating a visualization of open-source New York City public safety data, such as historical storm mapping data. Evaluators followed the same protocols from the data distribution activities while using the software to visualize the data and distribute critical information to first responders for situational awareness.

Evaluators used mobile devices to visualize data through mobile incident reports and live-streamed footage from outside the NYCEM Headquarters. Using the GoLive feature, evaluators broadcasted a live video from the vendor-provided mobile devices to the mock Incident Commander (IC). In a real-world situation, this capability would allow responders to use their mobile devices to transmit live situational awareness information back to the IC during an incident. It would also foster interagency coordination in incidents where multiple agencies respond to one threat because all parties simultaneously receive messages on the Geoaware channel. Additionally, evaluators could view and manage the submitted reports in a list format (including attached photos and videos) and view a map that provides geolocations of all reports, users, and cameras (see Figure 5).

Figure 6: Mobile Device with Geoaware Displays the Locations of Users

Image credit: Vizsafe, Inc. in partnership with Parsons Corporation

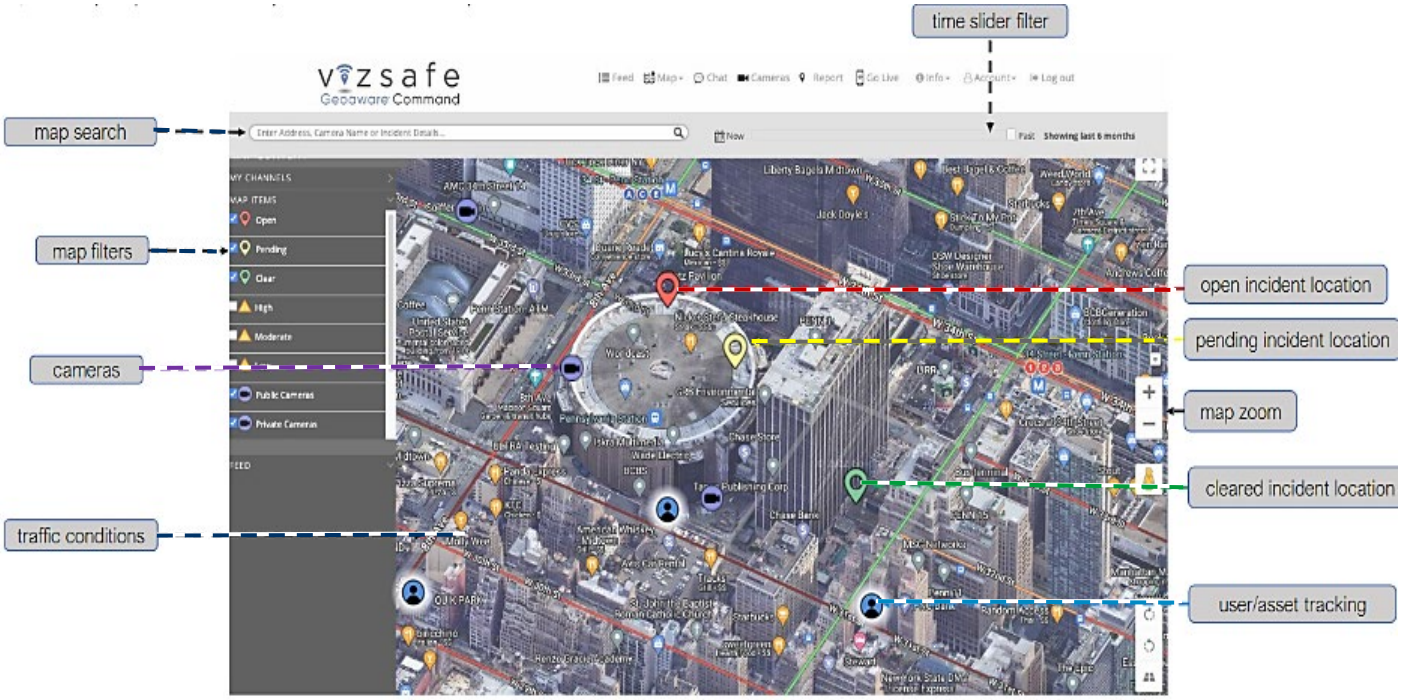

Figure 5: Traffic Display on Geoaware

Image credit: Vizsafe, Inc. in partnership with Parsons Corporation

The incident reports indicate the status level with red, yellow, and green pins, purple pins identifying live cameras, and blue pins to mark and track user locations in real-time.

The hands-on experimentation continued until each evaluator had an opportunity to use Geoaware. Parsons Corporation and Vizsafe, Inc. representatives were available to answer questions and provide technical assistance as requested during the hands-on experimentation. Otherwise, the Urban OpEx Planning Team encouraged the technology vendor to remain hands-off, allowing as much uninterrupted assessment of the technology as possible.

2.2 DATA COLLECTION

The Urban OpEx Planning Team assigned data collectors to observe first responder evaluators and collect their feedback during the experiment. Throughout the experiment, the Urban OpEx Planning Team encouraged evaluators to voice their opinions to assigned data collectors. (This feedback is reflected in the RESULTS section of this report.) The Urban OpEx Planning Team obtained feedback from the evaluators in several ways:

- During the test activities, at least one data collector worked with each evaluator to capture their comments, concerns, and difficulties using Geoaware
- After participating in the scenarios, the evaluators completed a questionnaire that recorded their opinions on the functionality of Geoaware for first responders and emergency response agencies
- Finally, the Experimentation Director led a technology debriefing session during which evaluators provided additional comments and feedback that data collectors recorded. The discussion included the following questions:
  - In what applications do you anticipate using this technology?
  - What did you like about this technology?
  - What did you dislike about this technology?
  - What changes would you recommend? Why?
  - Is this technology something that you would actively use if it was available to you?
  - How do you think this technology would affect your ability to complete your duties?

3.0 RESULTS

The results for the Urban OpEx 2022 evaluation of Geoaware contain three types of feedback: questionnaire feedback, data collector notes, and technology debrief notes. These results will help first responder agencies understand whether Geoaware may be suitable for their operations and provide information to Parsons Corporation and Vizsafe, Inc. on strengths and opportunities for improvement of their technology. Due to evaluators' different backgrounds, use cases, and experiences, some responses diverged from one another and were slightly contradictory about specific areas. However, most evaluators agreed as a group unless otherwise noted.

3.1 QUESTIONNAIRE FEEDBACK

Each evaluator completed a questionnaire covering technology functionality, ease of use, and most useful features. Part one of the questionnaire asked evaluators to respond to a series of statements about Geoaware's suitability for incident management missions and ease of use. Table 6 provides the questions and a breakdown of user responses. The number in each cell represents the total number of evaluators who selected Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree, or Unable to Determine when completing their evaluation answer.

Most evaluators agreed that Geoaware could help fulfill their agency's mission and that it was an improvement over the technology they currently use. Evaluators unanimously agreed that the user interface was easy to engage with and understand. Most participants agreed with the statement that Geoaware has the potential to improve their ability to communicate, share information, and coordinate complex interagency emergency responses. While recognizing the software's best used in an incident command setting, almost all evaluators indicated they would recommend this technology for use by first responders (see Figure 7).

Figure 7: Evaluators Test Geoaware on a Mobile Device

Table 6: Evaluators' Responses to Questions on Suitability and Ease of Use

Equipment	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Unable to Determine
This technology can help urban first responders' missions.	0	1	0	5	2	0
This technology is an improvement on the technology urban first responders currently use.	0	0	0	6	1	1
This technology performed all capabilities outlined by vendor	0	1	0	5	2	0
Responders are able to easily use this technology in conjunction with their required personal protective gear, if applicable to the scenario.	0	1	1	4	1	1
The computer/mobile device user interface was intuitive and easy to both understand and engage with.	0	0	1	3	4	0
The technology was easy to use with little to no interference from vendor during testing.	0	1	0	4	3	0
This technology increases urban first responder's ability to communicate and disseminate information during an event or incident.	0	0	1	3	4	0
This technology can improve first responder's ability to communicate and coordinate with other agencies and groups.	0	0	1	3	3	1
This technology can improve my ability to review and report information back to my leadership.	0	0	0	4	4	0
This technology should be recommended to other urban first responders.	0	0	1	4	2	1

Part two of the questionnaire asked participants open-ended questions to describe what features of Geoaware they found most and least useful. Evaluators universally liked the ease with which they could live stream video, and they agreed that the most useful feature was Geoaware's two-way communication capability. Some evaluators expressed concerns about mobile users spending too much time on their cellular devices, however, IC can control when data is disseminated, which could possibly limit the time a responder spends on their mobile device.

During the experiment, data collectors also recorded evaluators' comments about positive attributes and challenges they experienced while testing Geoaware. Data collectors primarily documented issues with the software's customization abilities and noted evaluators' minor concerns about the user interface.

After the experiment, the Experimentation Director led a debriefing to solicit any additional feedback from the evaluators. The feedback was solicited under four categories during the debriefing: the mapping feature, Geoaware Mobile App, Geoaware Desktop App, Communications, Situational Awareness, Data Integration, and User Interface. Table 7 summarizes evaluator comments during the activities and debriefing as recorded by data collectors.

Table 7: Evaluators' Responses to Questions on Features

Application	Most Useful Features	Least Useful Features/Problems	Recommendations
Mapping Feature	▪ Can send and receive live and historical maps ▪ Includes adding a map layer, which one evaluator called a "must-have" feature	▪ Mapping feature images appear too small on the desktop version ▪ When searching for locations, auto-populate feature is slow	▪ Increase the size of the desktop mapping feature
Geoaware Mobile App	▪ Easy to use and download ▪ Able to upload from camera roll allows for earlier communication of events or incidents ▪ Limited drain on the battery when not continuously live-streaming video ▪ Available on both iPhone Operating System (iOS) and Android ▪ FirstNet approved ▪ Easy to start and transmit live stream video quickly ▪ Easy to filter reports by "open" and "cleared" ▪ "Message Sent" notification follows distribution of reports/videos ▪ Beneficial feature of sending videos and pictures via the live feed	▪ Mobile app crashed during the experiment[2] ▪ How to restart the app after it crashed required the vendor demonstration GoLive feature could not be accessed on the mobile app during the demonstration[2]	▪ Add the ability to restart a report within the app (without needing to exit the app to reset after mistakes) ▪ Condense reports for more streamlined viewing ▪ Add customizable views and notifications

[2] The crash and issues with GoLive were associated with the iOS version of the mobile application that was downloaded that same day. The vendor claims that these issues have since been rectified.

Application	Most Useful Features	Least Useful Features/Problems	Recommendations
Geoaware for Desktop	N/A	▪ Adequate training to use this system is time-consuming ▪ Evaluators thought it was not easy to evaluate this technology without vendor assistance ▪ Selecting different feed content was difficult ▪ Polygon or other shapes creation feature was not useful	▪ Add the ability to display chat and live stream simultaneously
Communications	▪ Two-way communication is the most useful feature ▪ Allows first responders from multiple agencies on the same channel, enabling cooperation between agencies ▪ Can set up a geofence area for pushing alerts to people in certain areas in the field	▪ Difficult to determine the status of messages/if they were received ▪ Redundant to have users select channels before starting a livestream and again when posting it as a report ▪ Unable to simultaneously push different data feeds to multiple platforms (e.g., web and mobile) ▪ Status of requests to GoLive was unclear ▪ User-submitted reports notifications obstructed the user interface and ease of use of other features	▪ Add a confirmation notification when clearing reports to eliminate accidental clearing
Situational Awareness	▪ Camera feed is very clear without latency ▪ IC can be set up anywhere ▪ Versatile for a wide range of missions	▪ Delays occurred in sending reports during the experiment[3]	▪ Make all platforms more unified ▪ Add the ability to submit different kinds of reports (e.g., information, threat) instead of only severity reports

[3] It is unclear if the cause of the delays in sending reports was associated with the product or the onsite cellular network.

Application	Most Useful Features	Least Useful Features/Problems	Recommendations
Data Integration	▪ Can bring in different widgets and create new panels to add third-party content on dashboard ▪ Single collection point for data streamlines the operation ▪ Web-based functionality enables easier handling of certain web restrictions common on agency-issued computer systems ▪ System has an open Application Programming Interface (API), is open source, and can be integrated with sensors and devices	▪ Challenging to click on different feed content ▪ GoLive feature was not intuitive, causing confusion about capabilities (e.g., GoLive is different than filming a video) ▪ Unclear how to exit the Livestream	▪ Incorporate social media analytics ▪ Simplify the RSS feed process ▪ Make the "send" button easier to find and uniform throughout applications
User Interface	▪ Adds notes and uses the "@" symbol to tag individual users ▪ Creates channels for specific user groups ▪ Easy to edit reports and tag (i.e., categorize) them appropriately	▪ Steep learning curve for many features ▪ Not all live links are marked (i.e., blue, underlined), making it difficult to navigate ▪ Difficult to find the "send" button on different reports ▪ Trouble sending video to different channels ▪ Some evaluators found the dashboard to be clumsy ▪ Reports can be accidentally cleared from both mobile and desktop without an "undo" button	▪ Improve user interface overall to make the technology more accessible ▪ Timestamp should occur when you post the report, not when you start it ▪ Dashboard should have its icon on the top ribbon ▪ Add default channel selections ▪ Add an auto-populate feature when searching for other users ▪ Ability to create a master incident list ▪ Add a "select all" feature for submitting reports to channels

4.0 CONCLUSION

Evaluators' feedback on Geoaware was generally positive. Throughout responses on the written questionnaire and during the debrief, evaluators identified the technology's two-way communication capability and ease of use as positive attributes. Evaluators found that Geoaware's web-based platform was effective in handling certain web restrictions. The open API design allows integration with external sensors and devices, ultimately increasing situational awareness during emergency response situations.

A majority of evaluators also noted several shortcomings while testing Geoaware. For example, operators struggled to send video to different channels and were unsure if intended recipients got their messages. Evaluators also noted that when using the desktop application, the mapping feature was too small to be useful in the IC setting, which could impede emergency incident response. They added that they would prefer more similarity in the look and functionality of the mobile and desktop applications. Additionally, evaluators stated that many of Geoaware's features had a steep learning curve and found some counterintuitive.

Evaluators offered recommendations to address these problems:

- Add the ability to select default channels
- Add read receipts to ensure messages have been received and read
- Enable end-users to customize the desktop view and notification status
- Enlarge the mapping feature map display on the desktop
- Make the "send" button easier to find across platforms
- Configure both mobile and desktop applications to be more intuitive

Some recommendations sought to extend Geoaware's capabilities by integrating Geoaware with other information, technologies, or tools used by first responders, more specifically integrating with social media analytics (e.g., stated threat monitoring).

All Urban OpEx 2022 experiments were conducted in a half-day timeframe. They were driven by a tailored set of scenarios that limited the evaluators' exposure to a typical training program, broader technology configurations outside the planned scenario, and additional features/configurations of the technology not applicable to the scenario. Given these constraints, it is possible that some first responder evaluator feedback or suggestions for improvement could be addressed with the completion of the entire technology provider-recommended training program or having more experience using the technology.

In conclusion, the majority of first responder evaluators found that Geoaware had positive attributes, including communications ability and situational awareness for both IC and first responders on the ground. However, first responders identified significant challenges with the desktop application, including difficulty learning how to use the platform, and flagged long training times as a possibility. The feedback from evaluators may enable the technology vendor to improve the product and expand the number of use cases where Geoaware could support first responders' work.

5.0 ACRONYM LIST

Acronym	Definition
API	Application Programming Interface
COP	Common Operating Picture
CRADA	Cooperative Research and Development Agreement
DHS	U.S. Department of Homeland Security
DOT	Department of Transportation
ExPlan	Experimentation Plan
FDNY	New York City Fire Department
FRRG	First Responder Resource Group
HDMI	High-Definition Multimedia Interface
IC	Incident Commander
iOS	iPhone Operating System
MTA	Metropolitan Transportation Authority
NWS	National Weather Service
NYCEM	New York City Emergency Management
NY-NJ	New York-New Jersey
NYPD	New York City Police Department
NUSTL	National Urban Security Technology Laboratory
OpEx	Operational Experimentation
PANYNJ	Port Authority of New York and New Jersey
RFI	Request for Information
RSS	Really Simple Syndication (XML files easily read by a computer that automatically updates information)
S&T	Science and Technology Directorate
SME	Subject Matter Expert
UAS	Unmanned Aircraft System
URL	Uniform Resource Locator (website address)
XML	Extensible Markup Language (markup language and file format for storing, transmitting, and reconstructing arbitrary data)