LifeRing

Experimentation Report

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FOREWORD

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

NUSTL hosts the S&T Urban OpEx with participation from a broad range of federal, state, local, academic and private sector partners. NUSTL's Urban OpEx Program presents an important opportunity for DHS to gain a greater understanding of the operational needs and requirements of local first responders, while enabling first responder agencies to assess new technologies.

Capability gaps and potential technologies will be reviewed with New York City first responder agencies to ensure the S&T Urban OpEx best addresses local responders' needs, interests and priorities, and benefits the homeland security enterprise as a whole. Participating first responders will train on and experiment with technologies they have identified as possible solutions to meet priority capability gaps. Participants will also be in the unique position to influence the development of new technologies and provide recommendations for future DHS S&T investments through their field technology assessments.

For more information on NUSTL's Urban OpEx Program or to view publish Urban OpEx reports, visit www.dhs.gov/science-and-technology/frg-publications.

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EXECUTIVE SUMMARY

LifeRing, developed by AGIS Inc., underwent operational experimentation on January 25, 2017 at the New York City Emergency Management Emergency Operations Center. LifeRing is a mobile command and control software that runs on Windows computers and mobile devices. The software creates a configurable common operational picture, which provides secure communications, situational awareness and information sharing between various types of organizations and levels of command.

Fifteen first responder and emergency management personnel participated in this event. The participants were given a presentation on the features and capabilities of LifeRing by the NUSTL experimentation director and then experimented with it on a computer and a mobile device. The experimentation session allowed participants to use LifeRing in an operationally relevant way so they could provide feedback on its features and suitability for use in first responder and emergency management organizations. The participants were provided with a list of tasks to accomplish while using LifeRing, but they were also encouraged to consider and attempt actions their organizations might take with LifeRing.

Overall, the participants felt LifeRing would be able to increase a first responder's ability to communicate and share information. The common operating picture created by LifeRing allowed the participants to view all the information being shared by the other participants and make decisions during the experimentation. The participants learned how to use most of LifeRing's functions and implement them with ease; however, participants found a couple of the features on the computer version of LifeRing to be less intuitive.

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1.0 INTRODUCTION

On January 25, 2017, LifeRing, a mobile command and control software developed by AGIS Inc., was evaluated during the U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T) Urban Operational Experimentation (OpEx) event, hosted by the National Urban Security Technology Laboratory (NUSTL). This event brought together urban first responders and product developers to experiment with emerging technologies in operational conditions. Subject matter experts participated from the New York City Fire Department (FDNY), New York City Emergency Management (NYCEM), New York City Police Department (NYPD) and Port Authority of New York and New Jersey (PANYNJ). NUSTL selected the technologies and worked with NUSTL scientists to plan the experimentation scenarios and arrange experiment venues. Responders from these agencies and members of the First Responder Resource Group (FRRG) experimented with the technologies and provided feedback and observations. Table 1-1 lists the technologies that were included in this event.

Urban first responders from the FDNY, NYCEM, NYPD and PANYNJ were canvassed for input on capability gaps that could be solved with technological solutions and for input regarding their technology areas of interest.

NUSTL then combined input from subject matter experts at these agencies and conducted a thorough technology selection process to establish three topic areas (Table 1-1) for experimentation at the Urban OpEx.

Table 1-1 Urban OpEx Technology Focus Areas

Topic Area	Description
Incident Management System	Emergency Data Exchange Language (EDXL) compliant incident management software, for large and cross-jurisdictional emergency management, that allows for data to readily be received and shared with other EDXL compliant software.
Communications and Tracking in Subterranean Environments	Technology solutions that enhance a first responder's ability to communicate voice, data and location information from an incident area that is GPS denied and impedes RF signals (e.g., tunnels and underground subway systems) to other colleagues and incident commanders who may or may not also be in such environments.
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., left behind bags), behavior threat detection (e.g., crimes in progress, people in need of assistance) and facial recognition.

1.1 PURPOSE

The LifeRing operational experiment was designed to provide first responders and emergency managers with an opportunity to learn about the capabilities and limitations of LifeRing, experiment with it in a hands-on fashion and provide feedback about its use for first responder and emergency management applications. The aim of eliciting evaluator feedback was to provide AGIS Inc. with information helpful in optimizing LifeRing for use by law enforcement and security personnel, and to provide S&T program managers with a better understanding of law enforcement and security organization needs in order to guide future S&T investments in this technology area.

1.2 OBJECTIVE

This experimentation was designed to allow first responders and emergency managers to use LifeRing in operational settings and to offer feedback and suggestions to the technology developer that could enhance the product capabilities for first responder operations.

1.3 RESPONDER CAPABILITY NEED

Law enforcement and emergency management agencies advising NUSTL on technologies to include in Urban OpEx 2017 indicated that they considered incident management systems to be a technology that could enhance their ability to manage and share information during a major event or disaster.

1.4 PRODUCT DESCRIPTION

LifeRing is a mobile command and control software that runs on Windows computers and mobile devices. The software creates a configurable common operational picture, which provides secure communications, situational awareness and information sharing between various types of organizations and levels of command. LifeRing uses the Global Positioning System (GPS) to update users' locations in real time. Users can also place additional icons on the map to mark the location of assets or emergencies, and they can diagram the area with the whiteboard feature. LifeRing enables users to communicate through streaming video, text messages and push-to-talk (PTT) communications. All data collected by LifeRing is saved with timestamps for later analysis.
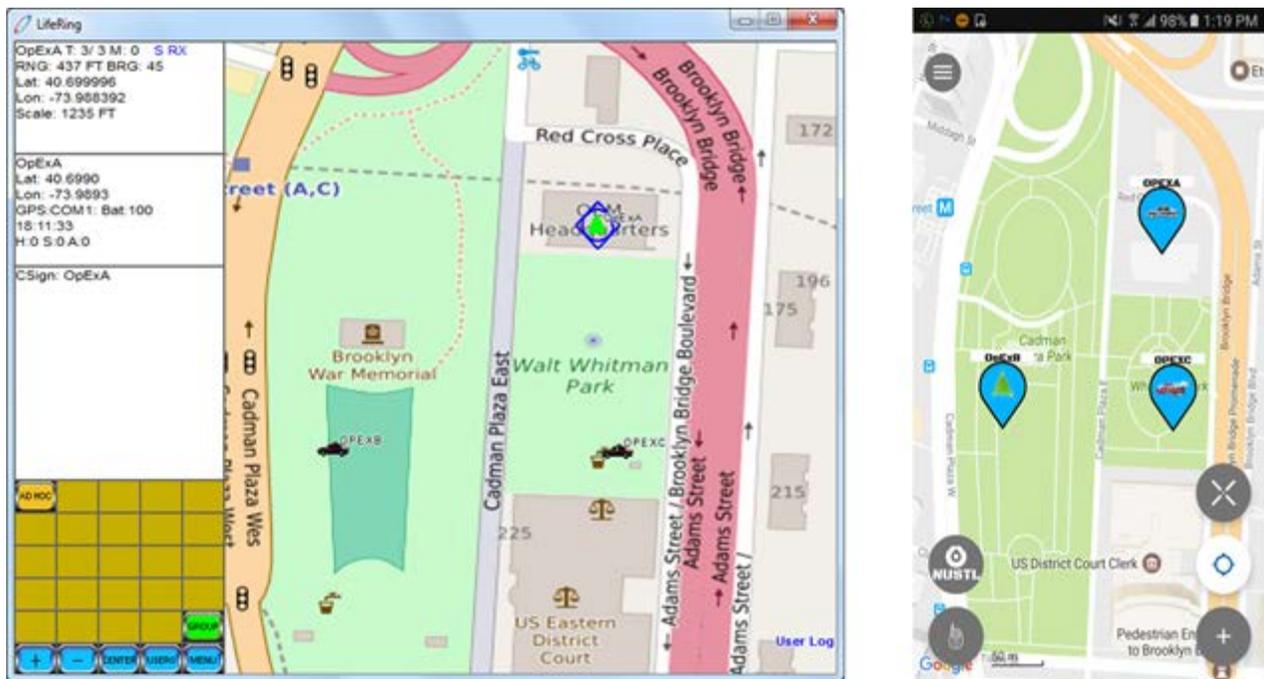

Figure 1-1 Screenshots of LifeRing 5.0 for Windows computers (left) and Android mobile devices (right).

2.0 EXPERIMENTATION DESIGN

2.1 EVENT DESIGN

A detailed description of the experimentation design can be found in the Experimentation Plan for LifeRing[i]. The experimentation scenario was developed with input from first responders, emergency managers, the technology developer and NUSTL's Urban OpEx experimentation directors.

The experimentation intended to provide a group of first responder evaluators an opportunity to learn about the features and capabilities of LifeRing, and—through using the software on both laptop and mobile device platforms—to assess the potential for using LifeRing in a command center and as a response team in the field.

2.2 SUMMARY OF THE OPERATIONAL EXPERIMENTATION

On January 25, 2017, participants from the NYPD, PANYNJ, NYCEM, U.S. Customs and Border Protection and Boston Fire Department convened at the NYCEM Emergency Operations Center (EOC) in New York, New York, to participate in an operational experimentation with LifeRing.

Activities began in a conference room with a presentation by the NUSTL OpEx Program Director about the Urban OpEx program and the purpose of the operational experiment. Additional opening remarks were provided by the NUSTL Director and a safety briefing was provided by the Safety, Health and Environmental Management System Coordinator. The NUSTL Experimentation Director provided training on the operation of LifeRing for the participants, and participants then formed groups and operated LifeRing on either a computer or one of four available mobile devices. The group using computers assumed the role of a command center, and the groups using the mobile devices assumed the role of response teams. The specific devices, operating systems and software versions used during the experimentation can be found in Table 2-1.

Table 2-1 Devices and software used during the experimentation

Device	Model	Operating Systems and Software Used in Experimentation
Computer 1	Panasonic Toughbook	Windows 7 LifeRing 5.0 for PC
Mobile Device 1	Samsung Galaxy S7	Marshmallow OS Android 6.0 LifeRing 5.0A for Android
Mobile Device 2	Samsung Galaxy S7	Marshmallow OS Android 6.0 LifeRing 5.0A for Android
Mobile Device 3	Samsung Galaxy S7	Marshmallow OS Android 6.0 LifeRing 5.0A for Android
Mobile Device 4	Nexus 7	Android OS 5.2.2 LifeRing 5.0A for Android

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[i] NUSTL. Urban Operational Experimentation Plan for LifeRing, OpEx-T-PL-11. January 2017.

2.2.1 OPERATIONAL SCENARIO: POST HURRICANE EVENT

The participants were instructed to use LifeRing to respond to a fictional hurricane that had come through the area. In the scenario, trees have been knocked down, buildings have been damaged and debris has been scattered. The participants had a checklist of tasks to perform in response to the hurricane, which required them to use a variety of LifeRing's functions. They were also asked to consider the roles their agencies would play in response to a hurricane and to use LifeRing to perform those roles. Two broad roles were assigned based on the design of an application: a command center and response team.

2.2.2 COMPUTER PLATFORM: COMMAND CENTER

Participants who interacted with the computer-based version of LifeRing assumed the role of a Command Center operator. They used LifeRing to view the information collected by the response teams and communicate instructions back to the response teams. The checklist of tasks assigned to the command center are listed here:

- Use the Tactical Map to view the locations of the response teams.

- "Hook" a response team's marker to view their status information in the Multi-function Inset Area.

- Use the geo-fencing function to identify an area that response teams should not enter.

- Use the message function to send text messages to the "hooked" response team.

- Use the chat function to send text messages to all response teams.

- Use the whiteboard function to draw attention to specific areas on the map.

2.2.3 MOBILE DEVICE PLATFORM: RESPONSE TEAMS

While using LifeRing on a mobile device, participants assumed the role of response teams. They used LifeRing to collect and communicate data on the damage caused by the hurricane. Participants were given the option to walk around the park next to the NYCEM building or turn off the GPS on the mobile device and manually change their location within LifeRing to simulate going out in the field. The checklist of tasks for the response teams are listed here:

- Use the map to view the location of other response team members.

- "Hook" a marker on the map to see the status of that marker.

- Place a marker on the map to identify the location of damage done by the hurricane.

- Take a picture of the damage and attach it to the marker.

- Use the whiteboard function to draw attention to specific areas on the map.

- Use the PTT function to verbally communicate with Central Command.

2.3 DATA COLLECTION

Feedback from the evaluators was obtained in several ways. During the experimentation, a NUSTL data collector was paired with each group to record evaluator comments and concerns. After the experimentation, the participants completed a questionnaire that captured their opinions on the suitability of LifeRing's features for use by first responder and emergency management agencies. Finally, the Experimentation Director led a debrief session during which participants provided additional comments about LifeRing.

2.4 OPERATIONAL SCENARIO DEBRIEF

Following the experimentation, the Experimentation Director led a debrief session to gain a better understanding of the suitability, deficiencies, efficiencies and possible improvements to LifeRing. 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 not like 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?

The point of this discussion was to engage the users in a conversation that lead to feedback that might not be gained from the survey. Notes were taken and incorporated into the results report.

3.0 RESULTS

3.1 QUESTIONNAIRE FEEDBACK

The questionnaire focused on two categories: suitability to meet mission needs and ease of use. The first part of the questionnaire asked the evaluators to respond to a series of statements about LifeRing's suitability for use within their organization. A breakdown of these responses is provided in Table 3-1. The evaluators all agreed that LifeRing could be used to help fulfill their agency's mission. A majority of the evaluators felt that LifeRing was an improvement over technology they currently use. Overall feedback about LifeRing's user interface was positive, but the evaluators did note that the user interface on a mobile device was easier to use than the user interface on the computer. Most of the evaluators felt that LifeRing would improve their ability to communicate and share information.

Table 3-1 A breakdown of the evaluator's responses to questions of suitability

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Unable to determine
This technology can help me fulfill my mission.	0	0	0	4	1	0
This technology is an improvement on the technology I currently use.	0	1	0	2	1	1
The computer user interface was intuitive and easy to understand and engage with.	0	0	2	2	0	1
The mobile device user interface was intuitive and easy to understand and engage with.	0	0	0	4	1	0
This technology increases my ability to communicate and disseminate information during an event or incident	0	0	2	2	1	0
This technology can improve my ability to communicate and coordinate with other agencies and groups.	0	1	0	2	2	0
This technology can improve my ability to review and report information back to my leadership.	0	0	1	3	1	0

The second part of the questionnaire asked the evaluators to rate how easy and intuitive it was to use several of LifeRing's functions. A breakdown of these responses is provided in Table 3-2. There were only two negative responses from this portion of the questionnaire. One of the issues that was identified in the questionnaire was with the PTT feature; it was determined that there was a faulty connection between the mobile devices and the LifeRing server.

Table 3-2 A breakdown of the evaluator's responses to questions on ease of use

The following functions were easy and intuitive to use:	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Unable to determine
Whiteboard	0	0	2	1	2	0
Geo-Fencing	0	0	3	1	1	0
Push-to-talk	1	0	2	2	0	0
Message/chat	0	0	2	3	0	0
Placing markers and attaching pictures/data	0	1	0	3	1	0

3.2 DATA COLLECTOR NOTES

A NUSTL data collector was paired with each of the participant groups. During the experimentation, data collectors recorded issues that participants experienced with LifeRing:

- Participants using the computer had trouble reading the soft switches on the menu of the user interface.

- Participants using the computer struggled to find the zoom-in and -out functions.

- Participants using the computer felt that adding markers to the map was not intuitive.

- The PTT function did not work properly for portions of the OpEx event.

- The time required to operate LifeRing, either inputting new information or reading information, might be too long for use during an emergency.

3.3 DEBRIEF SESSION FEEDBACK

During the debrief session, the participants shared ideas on how LifeRing could be improved to fill their agency's needs. NUSTL data collectors recorded the following ideas:

- Adding the ability to overlay additional map layers such as infrastructure/building blueprints, subways, flood zones, real time traffic, etc.

- Having the ability to assign tasks and designate a priority to markers placed on the map

- Adding a heat map around markers placed on the map to identify hot/warm/cold zones around markers

- Having built-in decision trees associated with different types of markers, so first responders can quickly see how to respond when they make it onsite.