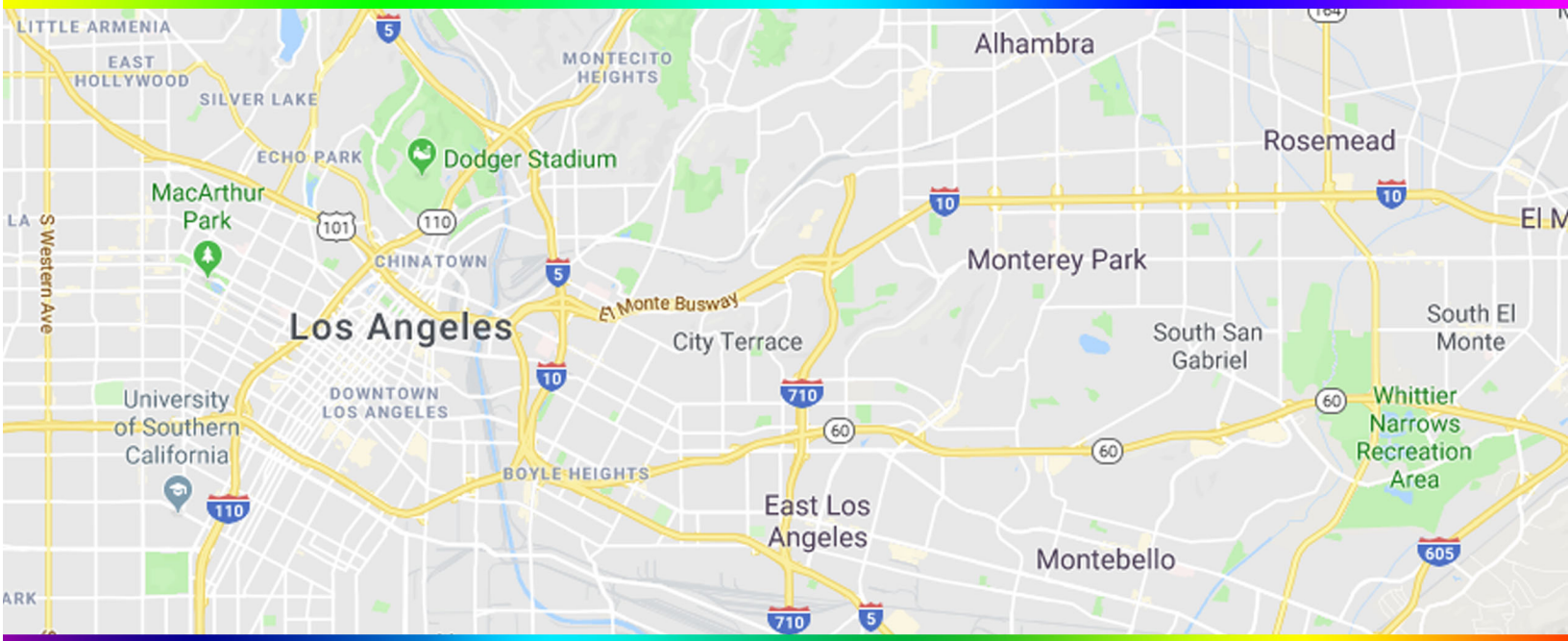
2019 Los Angeles Marathon
Mobility After Action Report



2019 LA Marathon Mobility AAR

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Executive Summary

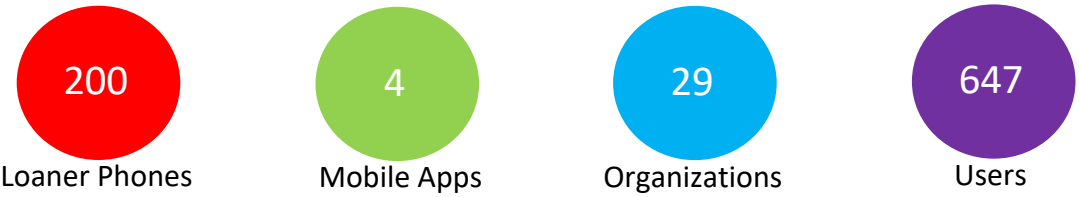
The Los Angeles Marathon (LAM) was the third pilot deployment of the Department of Homeland Security's (DHS) Mobility Acceleration Coalition (MAC). The MAC is an effort to share lessons learned between the Houston/Harris County and Los Angeles FirstNet Early Builder programs to establish best practices for regional adoption of interoperable, mobile data systems. LAM was the first major regional mobility deployment in the Los Angeles region which integrated mobile apps with customizable tools to support multi-agency public safety communications and information sharing. These tools enabled first responders to collaborate more efficiently and effectively with one another than has been possible with traditional communications and technology. The pilot deployment represented multiple public safety disciplines across five municipalities and exemplifies the benefits and importance of regional collaboration for the adoption of interoperable, mobile systems.

TACTICAL OBJECTIVES: provide a set of uniform metrics across agencies and improve real-time communications for first responders. These tools enabled multi-agency teams to:

1. maintain a reliable, common count of patient contacts and transports across all departments;
2. track mobile responder locations for dispatching; and
3. seamlessly share information across multiple agencies and jurisdictions.

STRATEGIC OBJECTIVE: assess the value of mobility technologies to augment public safety voice radio and determine the value of regional planning and collaboration for the adoption of interoperable mobile data systems.

The mobility deployment included:



The deployment focused primarily on medical response and security with additional users from transportation and public works being added during planning activities. Medics used a survey app to report patient contacts and transports which displayed on a common dashboard in all command posts. For the first time, all departments were able to report the same real-time information and details to the event organizer, elected officials and the media.

A secure collaboration app was also deployed to provide messaging, picture/video and file sharing amongst pre-established operational groups. An information architecture was developed which allowed for instant information sharing as operationally necessary. By broadcasting messages and pictures across all relevant "threads," command personnel used these apps to improve situational awareness between the field and the various command posts.

This unprecedented level of multi-agency collaboration and information sharing through these mobile technologies allowed all departments to report consistent patient contacts and transports, seamlessly share information for situational awareness, and significantly reduce radio traffic.

Event Summary

Quantifiable outcomes for this pilot include:

Surveys Pictures/Videos Messages

Conclusions/Lessons Learned

Historically, public safety practitioners have relied almost exclusively on land-mobile radio communications during large pre-planned events, like the LAM. Radio channels can get overloaded when multiple incidents are being reported and addressed simultaneously. The mobile data technologies enabled first responders to communicate incidents in real time across teams, agencies, and jurisdictions. The use of surveys, messages, images and videos provided supporting documentation such as time and location stamps to more clearly relay information. The written logging of messages allowed for visual reference in the event personnel did not hear what was said on the radio and allowed for consistent messages to be shared across teams mitigating "the telephone effect."

The overall feedback was that the mobility deployment was a success and provided a solid foundation for the regional coordination of mobility technologies to support multi-agency communications during special events, daily operations and disaster response.

Operational benefits from the use of mobility technologies include:

1. Coordinated social media & consistent reporting
2. Improved multi-agency situational awareness
3. Multi-agency broadcast capabilities
4. Automatic logging of patient contacts/transports
5. Secure picture & file sharing
6. Immediate redistribution of information
7. Reduced Rrdio Traffic

Benefits of regional collaboration and planning for coordinated mobility adoption:

1. Common dashboard
2. Improved information sharing and interoperability
3. Rapid multi-agency issue resolution

While the deployment was a success and exceeded expectations, there were a number of challenges worth noting for future deployments:

1. Difficulty innovating within ICS for planned events without a truly Unified Command model
2. Limited availability & affordability of mobile technology
3. Limited user proficiency
4. Provisioning of phones and mobile app accounts was excessively time consuming
5. Security issues using generic accounts and shared credentials
6. Need to streamline data entry for field personnel

Funding and interoperability are constant challenges for public safety. The LAM proved that unconventional approaches to regional collaboration, technology adoption and product acquisition can produce transformational results for public safety. Technology is evolving rapidly, but without new models for achieving multi-jurisdictional coordination and funding mechanisms, the industry is at risk of facing significant interoperability problems with mobile data technologies and miss the opportunity to achieve the vision of public safety broadband and the corresponding investment of billions of dollars to provide first responders better tools to perform their missions of saving lives and protecting property.

Introduction

The Los Angeles Marathon brought more than 24,000 runners and spectators to the city. Since marathons are planned mass casualty incidents (MCI) and thousands of runners and spectators gather, it is important for EMS, law enforcement, transportation and public works departments to work together to ensure safety of participants and the local community by keeping the course clear, dispatching medics, transporting patients, managing the opening and closing of roadways, and fighting complacency to maintain a state of readiness during this annual event.

In December 2018, MAC Working Group members recommended the LAM to be the third pilot program under the MAC. As the largest annual multi-jurisdictional event in the Los Angeles area, LAM was selected because it offered the opportunity to engage the greatest number of regional stakeholders. The goal of the deployment was to test whether mobile technologies could be applied to address three main problems typically encountered during LAM and similar multi-agency, multi-jurisdictional events:

1) inconsistent reporting of patient counts and transports;
2) lack of awareness of responder locations for efficiently dispatching mobile assets;
3) limited information sharing across 4 jurisdictions with command personnel operating at 5 separate physical locations.

Within a month, the pilot program secured buy-in from the other regional agencies involved in public safety coordination for the event and established common goals of mobile deployment technologies to enable participating departments to:

- track and report consistent patient contact and patient transports across jurisdictions,
- deploy mobile resource tracking for expedited dispatching of medical personnel; and
- enhance information sharing across jurisdictions as well as between field and command personnel.

Public safety agencies included:

1. City of Los Angeles Fire Department (LAFD)
2. City of Los Angeles Police Department (LAPD)
3. City of Los Angeles Department of Transportation (LADOT)
4. City of Los Angeles Office of Emergency Management (LA OEM)
5. City of West Hollywood Public Safety (WeHo)
6. Los Angeles County Fire Department (LACoFD)
7. Los Angeles County Sheriff's Department (LASD)
8. Beverly Hills Fire Department (BHFD)
9. Beverly Hills Police Department (BHPD)
10. Beverly Hills Office of Resilience
11. Santa Monica Fire Department (SMFD)
12. Santa Monica Police Department (SMPD)
13. Santa Monica Public Works (SMPW)
14. Federal Bureau of Investigation (FBI)

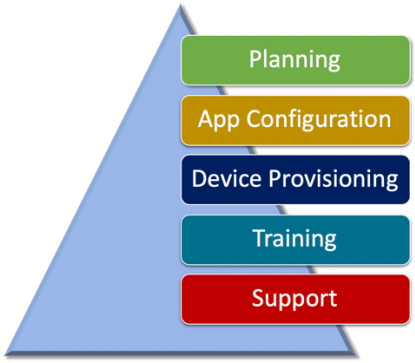
Goals/Objectives

The control objectives for public safety officials were to 1) implement and maintain close interagency communications for unified command across multiple physical locations; 2) maintain multi-jurisdictional situational awareness; 3) provide accurate and up-to-date information to the community, event organizers, and public officials; and 4) minimize the financial and resource impact on the cities of Los Angeles, Beverly Hills, Santa Monica, West Hollywood and Los Angeles county.

Level of Effort

Mobility 4 Public Safety (M4PS), Sonim Technologies and Homeland Security Advisory Council (HSAC) contributed over 1,000 hours to the planning and support of the mobility deployment for LAM. This does not include the time from the participating departments or the various supporting companies such as AT&T, Verizon Wireless, ESRI and MobileIron who provided products and configuration assistance.

The tasks necessary to support the mobility deployment fell into the following categories:

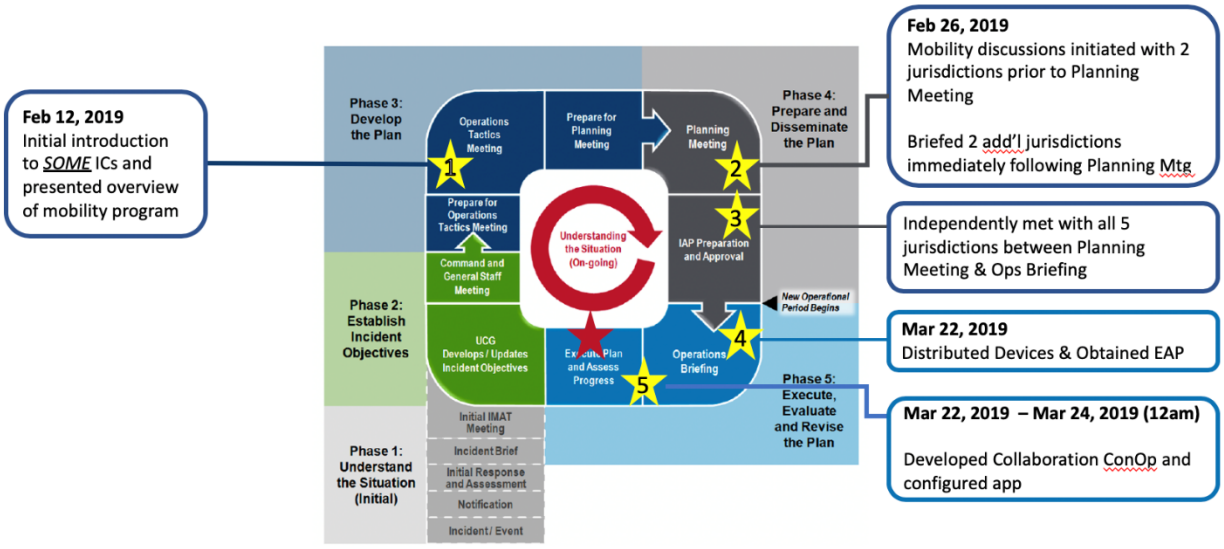


Planning

The planning for the mobility deployment began In January 2019 when MAC Working Group members agreed for the LAM to be the 3rd pilot under the program. M4PS personnel met with MAC Working Group members from LAFD to define requirements, develop action items, and establish priorities for deployment. Ideally planning efforts would have begun during Phase 1 of the ICS planning process so that mobility objectives could have been agreed upon by all parties from the onset. Unfortunately, this was not possible due to the timing of the MAC kick-off in December 2018. The first formal introduction of the MAC and the concept of utilizing mobile data technologies to augment voice radio during the 2019 LAM was during the Operations Tactics meeting on February 12, 2019

The late introduction into the planning process created challenges for gathering a consolidated set of requirements across all participating agencies and developing a single Concept of Operations (ConOp) for the mobility deployment. The LAM has a complex operational environment as the course runs through four separate jurisdictions. The utilization of the ICS framework without a single Unified Command (UC) structure added an additional level of complexity for mobility planning. Each jurisdiction developed an independent Event Action Plan (EAP). Many of the challenges could have been reduced or eliminated with a longer planning timeline and introduction into the process from the beginning of Phase 1; however,

participating departments agreed that the development of 4 separate EAPs caused challenges for various aspects of planning and operations beyond the mobility deployment.



10 days prior to the marathon, LAFD hosted a simulation exercise with approximately 90 marathon first responders onsite for practice simulations of event injects for command, multi-agency coordination center (MACC) and Field personnel. During the simulation, the collaboration app was used to demonstrate capabilities. Due to limited participation by field personnel, the app simulation was less effective than the simulation of operational tactics.

Mobility Product Deployment

Due to the short planning timeline, it was important to utilize products that were already available to the local departments or could be provided under the DHS MAC program.

Hardware:

AT&T and Verizon both loaned 100 Sonim XP8 ruggedized smartphones (200 total) for the event. Both carriers provided public safety priority service so that first responders would not be competing with commercial users for capacity in congested areas along the route. The Sonim phones were issued to medical response personnel as well as law enforcement supervisors who did not have access to agency-issued devices.

Loaner phones were provided to LAFD, LAPD and LACoFD. Other departments utilized agency-provided phones and tablets.

Mobile Applications

SALUS is a crisis and event management platform provided by HSAC which offers customizable, web-based tools and fully integrated mobile apps. SALUS is utilized by multiple departments in the Los Angeles Region. In 2018, the Santa Monica Fire Department (SMFD) utilized SALUS with a mobile app, Survey 123, to track patient contacts and transports. Due to the success of the pilot deployment, SMFD suggested Survey 123 be utilized for all medical operations during the 2019 LA Marathon.

Survey data of patient information along with data captured from RFID tags on runners' bibs fed the SALUS dashboard which was visible in all CPs for real-time information sharing across all departments.

LAFD Ready is a robust mapping application utilized by the City of Los Angeles Fire Department (LAFD) which was also utilized to monitor the real-time location of LAFD apparatus which significantly reduced dispatch times for patient transports.

Moxtra is a collaboration app which has been utilized during special events and daily operations in the Houston area and was provided under the DHS BAA. Moxtra allowed for secure groups to be setup for messaging, picture/video sharing, file sharing and the rapid dissemination of information across operational groups.

Response is a mobile Situational Awareness app which provides real-time personnel tracking. Response has been utilized during special events in the Houston area and was provided under the DHS BAA. Response was utilized by mobile assets such as cycle teams and medic carts that do not have Automated Vehicle Location (AVL) for tracking through the LAFD Computer Aided Dispatch (CAD) system. User colors can be assigned based on teams and icons delineate roles.

App Configuration

Mobile apps require user credentials. Each app handled user credentials differently.

LAM 2019 Aid App built using Survey123 utilized generic accounts with a common password. Generic accounts were strictly based on the number of generic accounts needed and did not correspond to the user of the particular device. Example: LAM19_User1

The advantage of this approach for shared devices was that each account did not need to be logged in on a particular device. This model is easier to administer on shared devices than the models described below. Since it was not critical to know the designated person who was submitting the surveys, this was an acceptable model and allowed user account creation to be conducted earlier in the planning process.

The app is designed to periodically time itself out. A label was affixed to the back of each phone with the username and password for users to have the credentials to log back in as necessary. While this approach would ordinarily present security concerns, the app was providing one-way information pushes through the submission of surveys, so if a phone were lost the credentials would not be of any value without knowing the name of the app and how to access the particular survey.

Response utilized generic credentials that were named based on the specific resource being tracked. Example: ct1@lacity.org to designate the user as “LAFD Cycle Team 1”. These accounts had to be tied to the phone that was assigned to LAFD Cycle Team 1. A generic password was used for all Response accounts for simplicity of logging in the phones. Response holds user credentials, so the app will automatically re-authenticate without the user re-entering the credentials. Credentials were not shared with the end users.

Moxtra had a combination of personalized accounts and generic accounts. Individuals who were utilizing the app on a regular basis or who it was important to know the person versus the post/position were issued individual accounts. Users who needed to be identified by post were provided a generic account. Unlike the other apps which allow administrators to assign a username and password, Moxtra requires individual account activation with a valid email address for accounts not

managed through integration with organizational directories. This process is difficult in both situations. While individual user names and passwords are certainly more secure, it puts the onus on the user to accept the email invitation and create a password. The process for manually creating generic email addresses and passwords and then completing the account activation process is incredibly manual and time consuming.

None of these approaches is ideal. The industry is generally lacking a comprehensive Identity, Credentialing and Access Management (ICAM) solution. The overall scalability of secure, regional mobility deployments is limited by the current state of the technology. There is no common authentication standard for all public safety app vendors to adopt. Current mobile architectures on Android and iOS are designed for individual users and do not easily support shared device models. These issues are less challenging for departments who can afford to provide phones to all first responders; however, that is not practical for most departments.

Device Provisioning

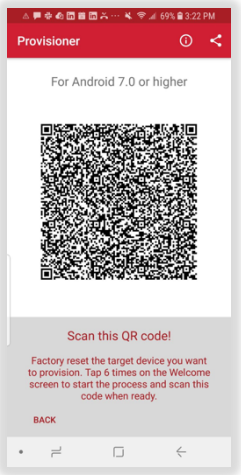
Device Configuration

The provisioning and management of 200 phones is a difficult undertaking. Every phone has a unique identifier called an IMEI. FirstNet Built by AT&T requires that the SIM card be tied to the IMEI of the specific device in order to activate public safety priority and preemption. Due to a delay in the purchasing approval process, AT&T loaned the phones for the event. With such short notice, the loaner phones were shipped with the SIMs not installed. The process of matching the SIM to each individual phone was incredibly time consuming. Once the SIMs were matched to the correct phones, they then had to be installed. The overall process added approximately 14 hours, or roughly 8.4 minutes per phone, to the provisioning process.

A Mobile Device Manager (MDM), MobileIron Go, was utilized to automate provisioning of the phones and ensure remote management capabilities to track and recover all devices after the event. The use of the MDM significantly expedited configuration by automating the majority of otherwise manual tasks.

Automated Provisioning Process

1) Power on phone
2) Tap screen 6 times to exit “Setup” mode and open the QR scanner
3) Scan the QR code to install MobileIron Go
4) Enter the username / password
5) MDM auto-configured phone



Device Management

In addition to automating most provisioning tasks, MobileIron Go provided security mechanisms to mitigate some of the risks of utilizing generic accounts and shared credentials. The kiosk mode was utilized to prevent unauthorized use of the loaner equipment and provide a simplified end user experience by only presenting the apps being utilized for the event.

App Logins

A significant amount of the overall time for device provisioning was for logging in user credentials. Each phone had to be logged in with specific account credentials assigned to the designated user across multiple apps.

Device Assignments				Moxtra			Response					Survey 123
Device No	Carrier	Department	Role	Moxtra First Name	Username	Password	Needs Access	Username	Password	Callsign	Color	Icon	Have Salus Credentials
9	AT&T	LAPD	Sgt Torres	Sgt Torres	1@lapd.org		Y	capt2@lacity.org		CPT EMS2	Grey		lam19_user9
10	AT&T	LAFD	Med Aid Station Capt (EMS13)	Capt Aid Station (EMS13) Lewis	capt10@lacity.org		Y	capt10@lacity.org		CPT EMS10	Grey		lam19_user10
11	AT&T	LAFD	Med Aid Station Capt (EMS12)	Capt Aid Station (EMS12) - Herr	capt12@lacity.org		Y	capt12@lacity.org		CPT EMS12	Grey		lam19_user11
12	AT&T	LAFD	Pasadena Med Cart 3	Pasadena Med Cart 3	mc3@pasadena.gov		Y	lamcapt@lacity.org					lam19_user12
13	AT&T	LAFD	Cycle Team 1	Cycle Team 1	ct1@lacity.org		Y	ct1@lacity.org		CT1	Green	Cycle	lam19_user13
14	AT&T	LAFD	Cycle Team 2	Cycle Team 2	ct2@lacity.org		Y	ct2@lacity.org		CT2	Green	Cycle	lam19_user14
15	AT&T	LAFD	Cycle Team 3	Cycle Team 3	ct3@lacity.org		Y	ct3@lacity.org		CT3	Green	Cycle	lam19_user15
16	AT&T	LAFD	Cycle Team 4	Cycle Team 4	ct4@lacity.org		Y	ct4@lacity.org		CT4	Green	Cycle	lam19_user16
17	AT&T	LAFD	Cycle Team 5	Cycle Team 5	ct5@lacity.org		Y	ct5@lacity.org		CT5	Green	Cycle	lam19_user17
18	AT&T	LAFD	Cycle Team 6	Cycle Team 6	ct6@lacity.org		Y	ct6@lacity.org		CT6	Green	Cycle	lam19_user18
19	AT&T	LAFD	Cycle Team 7	Cycle Team 7	ct7@lacity.org		Y	ct7@lacity.org		CT7	Green	Cycle	lam19_user19
20	AT&T	LAFD	Cycle Team 8	Cycle Team 8	ct8@lacity.org		Y	ct8@lacity.org		CT8	Green	Cycle	lam19_user20
21	AT&T	LAFD	Cycle Team 9	Cycle Team 9	ct9@lacity.org		Y	ct9@lacity.org		CT9	Green	Cycle	lam19_user21
22	AT&T	LAFD	Cycle Team 10	Cycle Team 10	ct10@lacity.org		Y	ct10@lacity.org		CT10	Green	Cycle	lam19_user22
23	AT&T	Pasadena	Pasadena CT 1	Pasadena CT 1	ct1@pasadena.gov		Y	ct1@pasadena.gov		PASCT1	Green	Cycle	lam19_user23
24	AT&T	Pasadena	Pasadena CT 2	Pasadena CT 2	ct2@pasadena.gov		Y	ct2@pasadena.gov		PASCT2	Green	Cycle	lam19_user24
25	AT&T	LACoFD	LACoFD Cycle Team	LACoFD Cycle Team	CT@fire.lacounty.gov		Y	CT@fire.lacounty.gov		LACOFDCT	Green	Cycle	lam19_user25
26	AT&T	LAFD	Med Cart 1	Med Cart 1	mc1@lacity.org		Y	mc1@lacity.org		MC1	Green	Cart	lam19_user26
27	AT&T	LAFD	Med Cart 2	Med Cart 2	mc2@lacity.org		Y	mc2@lacity.org		MC2	Green	Cart	lam19_user27
28	AT&T	Pasadena	Pasadena CT	Pasadena CT	mc@pasadena.org		Y	mc@pasadena.org		PASMC	Green	Cart	lam19_user28
29	AT&T	LAFD	Start Line Medical (E9)	Start Line Medical (E9)	E9@lacity.org		Y	E9@lacity.org		E9	Red	Fire Engine	lam19_user29
30	AT&T	LAFD	Medical Aid Station 6 (E12)	Medical Aid Station 6 (E12)	E12@lacity.org		Y	E12@lacity.org		E12	Red	Fire Engine	lam19_user30
31	AT&T	LAFD	Medical Aid Station 8 (E35)	Medical Aid Station 8 (E35)	E35@lacity.org		Y	E35@lacity.org		E35	Red	Fire Engine	lam19_user31

Device Check out/in:

A Google Form was created to populate contact information for the personnel receiving loaner phones. The kiosk mode was utilized to provide a custom URL on the home screen of each phone with a link to the form which captured user name, phone number, department, and position worked along. The device number was pre-populated to prevent users from mis-typing the device number.

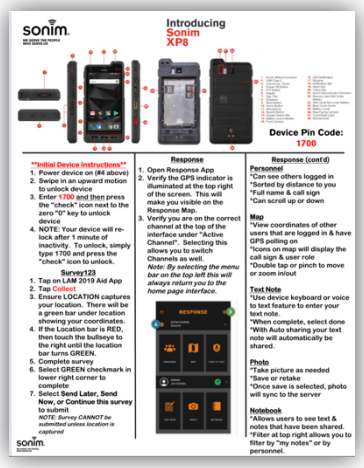
Due to the short planning timeline, the majority of device assignments were not provided until a few days before the Operations Briefing. Without knowing who the phones were being assigned to, we could not proactively develop a device distribution plan. The day before the Operations Briefing, the decision was made to issue the phones to the supervisors at the briefing who would then distribute them to their team members.

End User Training

We utilized a combination of classroom-style end-user training, printed/electronic training handouts and video tutorials.

In-Person Training Sessions - About a week before the event, we held a training event to build and ensure user proficiency and ease of use. We also created and distributed training videos and step-by-step guides for users' reference that were also posted on the mobility platforms so that they could be easily accessed during the operation, if necessary.

Training Handouts - Each product came with its own custom or boilerplate training materials/user guide. Using the originally provided content would have required distribution of a 7-page training pamphlet. We consolidated the materials into a single 2-sided handout, but the material was very "busy" with so much content condensed from 7 to 2 pages.

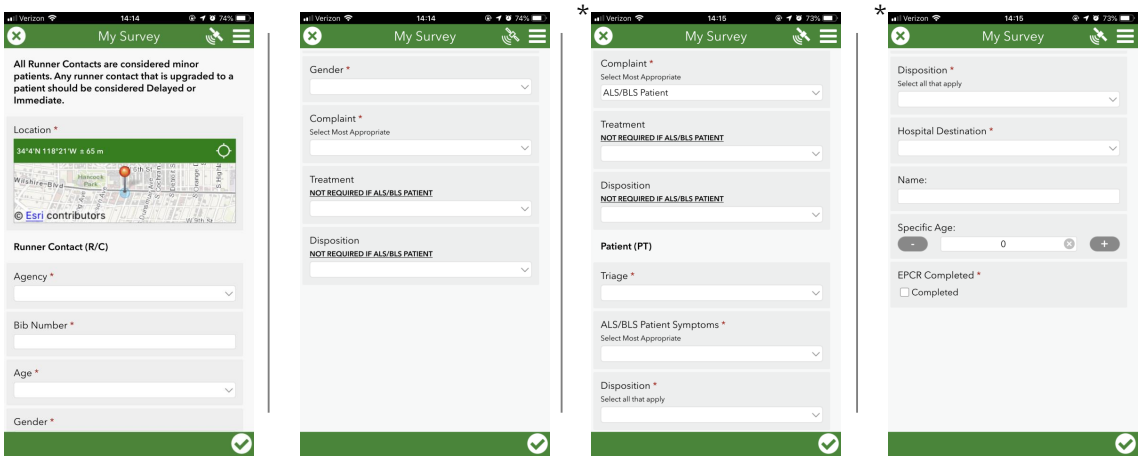


Video tutorials - Use of video tutorials was beneficial for training in advance of the event but can have limited applicability during operations.

Mobility Use Cases

Patient Surveys

Survey 123

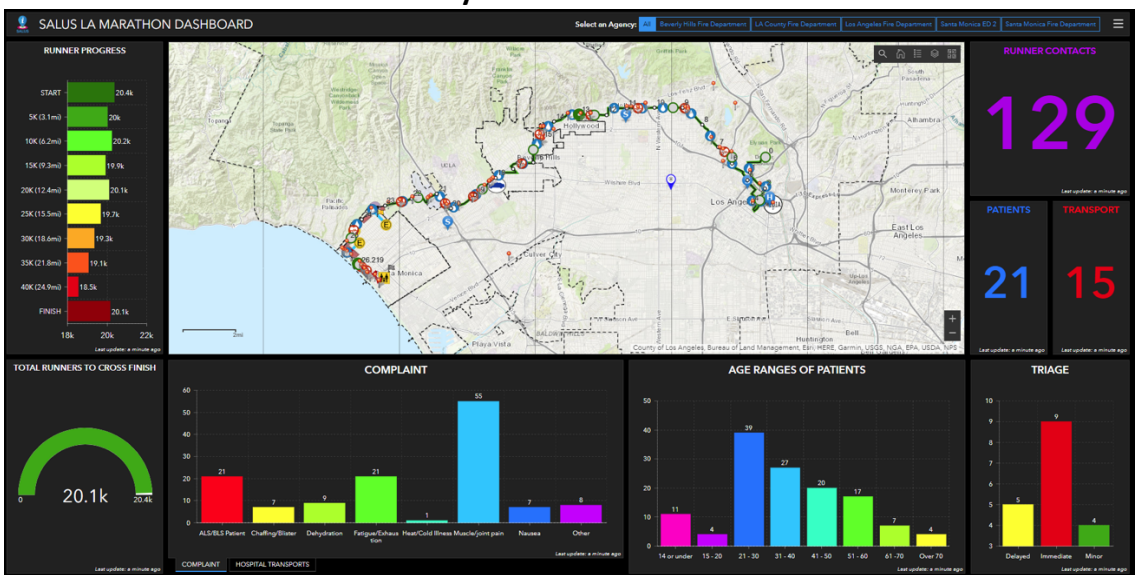


**If ALS/BLS Patient is selected for Complaint, Treatment and Disposition under Runner Contact (R/C) are skipped and forwarded to Patient (PT) questions.*

A simple, logic-based survey which allowed medical personnel to populate key information regarding medical aid to runners.

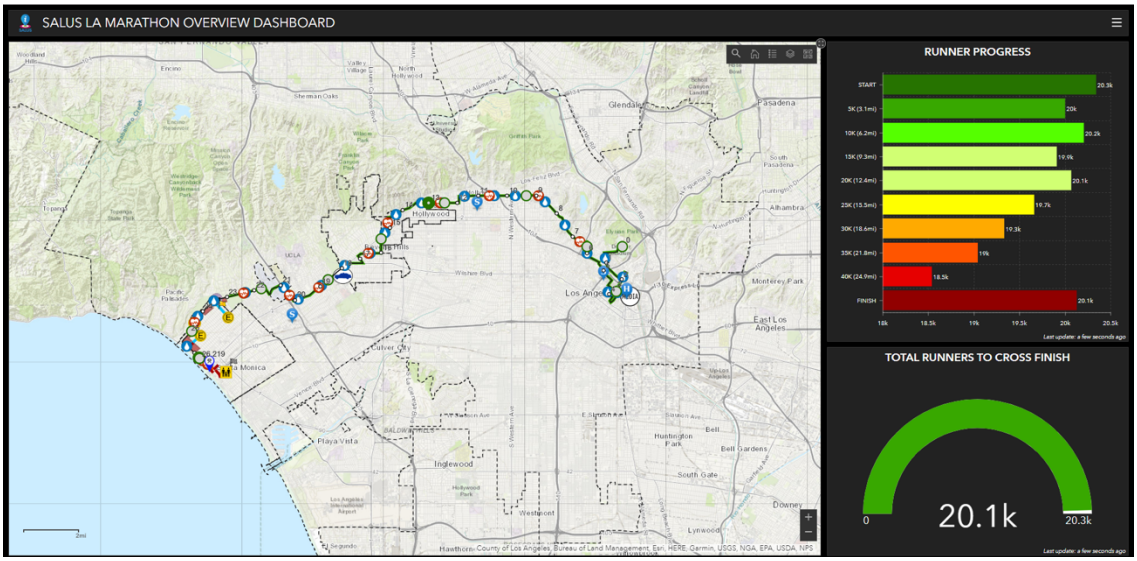
SALUS Dashboard

SALUS: Survey123 Patient Data & LAM Race Stats



Surveys were submitted from the field in the LAM 2019 Aid App and viewed on a common dashboard in all five command locations. Runner information was collected from RFID chips on the bibs to provide race statistics in a single view. The SALUS dashboard could be customized by user group to filter the content pertinent to their specific jurisdiction.

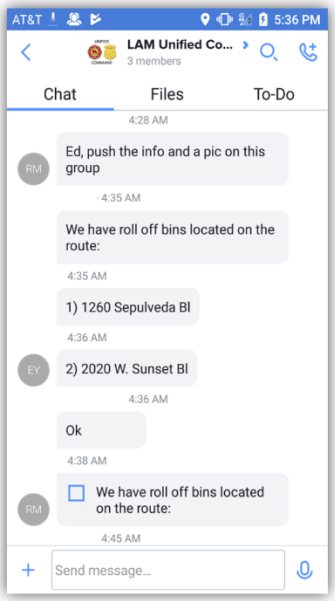
SALUS – Race Stats

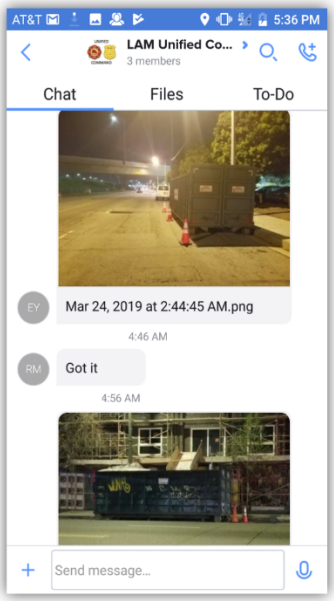


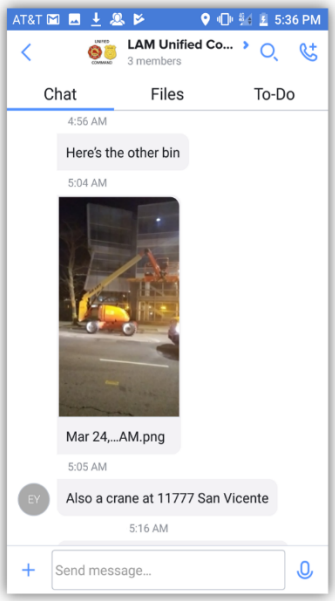
The SALUS Race Stats Dashboard is an Overview Dashboard with references to split counts and total number to cross the finish line. All of the info in this overview dashboard is also displayed in the SALUS Dashboard.

Collaboration Use Cases

Multi-Agency Collaboration

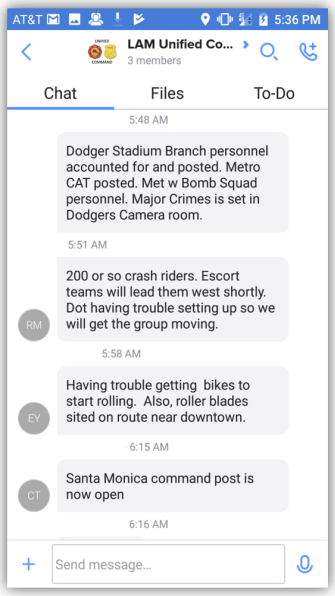


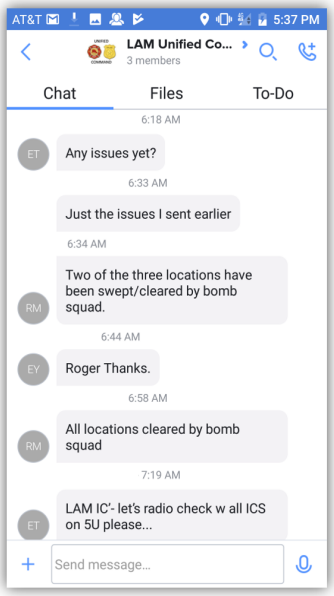


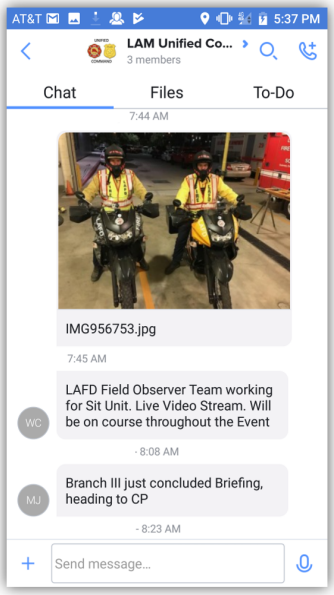


The ability to share messages and photos across agencies in the Unified Command thread helped expedite multi-agency collaboration for a variety of situations including the removal of course obstacles.

Situational Awareness

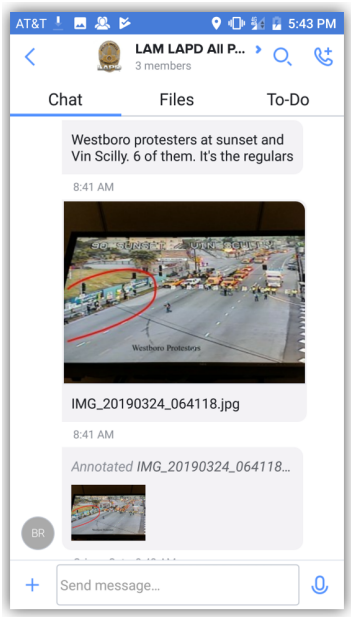






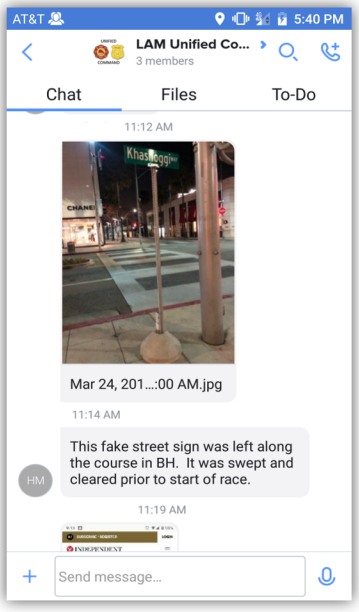
General updates were provided through a Unified Command thread to broadcast information such as runner stats, opening and closing of streets, bomb sweeps, and other relevant information such as the announcement and explanation for the LAFD Field Observer Team with Live Video Streaming.

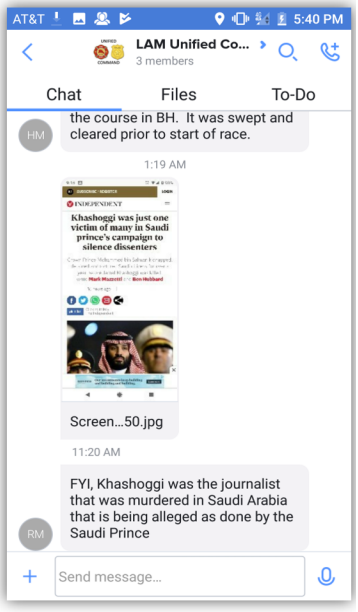
Protestors



Images of protestors from fixed cameras were shared and photos could be annotated to highlight the size of the group such as the red circle above.

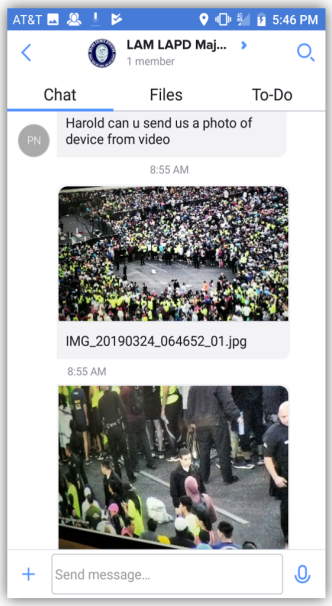
Fake Street Sign / Intel Sharing

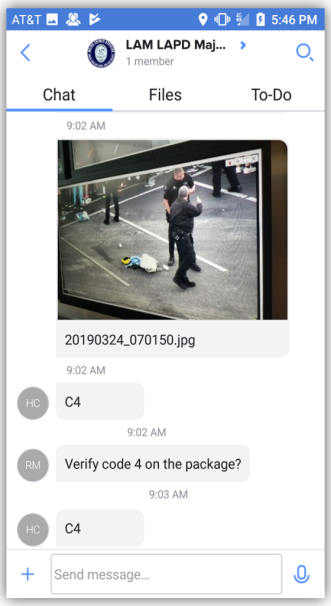


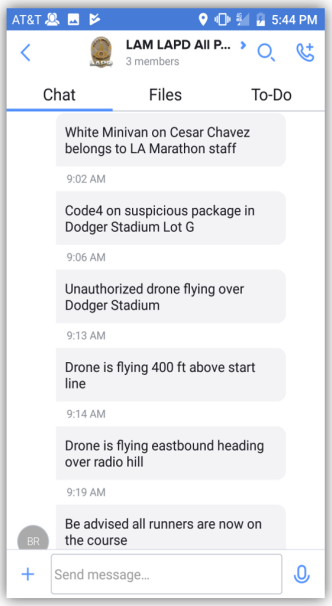


A fake street sign was found in Beverly Hills on the course with the name of a journalist recently executed in Saudi Arabia. This intel was shared across agencies in the event it indicated possible terrorist activity.

Suspicious Package

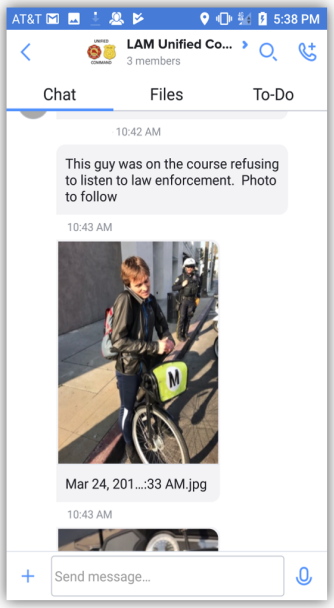


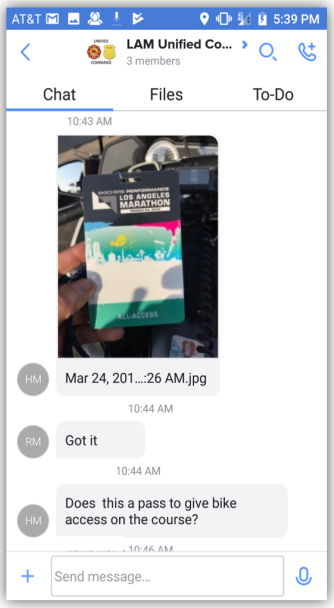


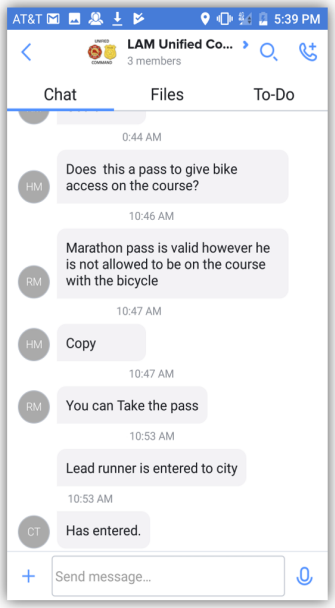


LAPD Major Crimes Division was able to efficiently collaborate between field and command personnel in the City of LA Command Post as well as the officer posted at Dodgers Stadium video room by obtaining video of the suspicious package and disseminating updates as the package was cleared.

Unauthorized Credentials







A cyclist attempted to enter the course with fabricated credentials in an attempt to keep up with the elite runners. Beverly Hills Police was able to snap a photo of the cyclist and credential and share it with Unified Command who within minutes confirmed that the credential was not authorized and the cyclist should not be allowed onto the course. This situation would have ordinarily required multiple phone calls and a much longer time to resolution.

Lessons Learned

Benefits

Mobile technologies significantly improved situational awareness and multi-agency information sharing during the Los Angeles Marathon.

Coordinated social media & consistent reporting: The use of mobile apps to augment radio communications achieved the overarching goal of having all agencies report consistent numbers and information.

This pilot showed how inconsistences that result from manual radio log transcription and siloed communication channels across agencies can be reduced and, in some cases eliminated altogether, with automated logging and tracking systems using multiple data points—from surveys to messaging and secure picture/file sharing.

Improved multi-agency situational awareness: A combination of map-based data/intel on a common dashboard and real-time collaboration tools yielded the best multi-agency coordination and information sharing of any LAM to-date.

Multi-agency broadcast capabilities: By allowing for multi-agency broadcasts and the immediate redistribution of information to keep all teams on the ground informed and up to speed, these mobile technologies also helped to expedite multi-agency issue resolution and improved the overall efficiency of the public safety personnel.

Automatic logging of patient contacts/transports: Survey123 uses device location to track patients and enables the documentation of information in one database, which ensures consistent data and uniform reporting.

Secure picture & file sharing: Communicating pictures and visual information is a clear, instantaneous way to share evidence that makes it easier for agencies to coordinate their responses by getting a clear picture of what the field teams need to address.

Immediate redistribution of information: We've established a solid foundation for the multi-agency/jurisdictional information sharing requirements for large special events. Deploying collaborative technologies in the field for this special event helped to organize communications for rapid redistribution across multiple threads. The ability to redistribute original messages and pictures mitigated "the telephone effect" that typically happens as information gets verbally relayed multiple times.

Reduced radio traffic: Submitting surveys and posting messages allowed radio airwaves to be free for high priority communications and supported better situational awareness because of fewer distracting low priority transmissions.

Challenges

Innovating within ICS for planned events: A truly Unified Command structure and agreement on use of mobile technologies earlier in the process would have simplified planning efforts. Adoption of new technology is most successful when it is inserted into the planning process as early as possible so that initial assessments and incident management strategies can fully leverage mobility technologies by integrating them into their event action plans, sufficiently training end users and utilizing the full range of capabilities.

Availability & affordability of mobile technology: The app market is still in its infancy, so there are risks of choosing a single app too early. Without having products to demonstrate value and solve operational problems, there is limited interest/value in strategic planning efforts. There is also concern about user frustration/fatigue if we are constantly testing different apps.

Investing in mobile technologies, integrating them into upcoming events, and developing plans for coordinated mobility adoption and acceleration will be critical to operationalizing these tools and ensuring a strong return on investment. It will also be important to Identify funding and governance structures to build a scalable and sustainable regional program.

User Proficiency: Using apps only for a few hours for a special event is not adequate for users to fully benefit from training opportunities or to gain proficiency, comfort, and familiarity with these new tools. There is a consensus that user proficiency and access to mobility tools through regular operational use is necessary for these technologies to continue to be effective during pre-planned events and incident response.

Manual provisioning: Distributing, administering, and collecting loaner devices significantly increased the level of effort required for this pilot deployment. A lack of agency-provided mobile devices resulted in a lot of time spent manually installing SIM cards, provisioning device caches, setting up the mobile device manager, implementing device distribution models, and user account activations. These costly and time-consuming processes hinder adoption.

Once the phones have been initially provisioned and MDM installed, the process is significantly easier for re-deployment to different operations as software updates and app configurations can be pushed automatically through the MDM. Maintaining a dedicated cache of devices in the region or expanding the issuance of department-provided smartphones will reduce the setup time and allow for larger, more frequent deployments. Development of a regional identity solution would automate the issuance of app credentials and significantly reduce currently manual processes.

Use of generic accounts and shared credentials: Using generic logins and shared credentials enables users to login with less risk of forgetting a personalized password created for a single use scenario. But this ease of use create security vulnerabilities and limits the effectiveness of real-time auditing of these devices since tracking is not tied to a specific user, but rather to a specific device that may be used by multiple users using the same generic login.

Many public safety operations require that resources be identified by a post or unit number rather than an individual person. This operational dynamic makes it difficult to utilize personal credentials without a robust identity management solution in place which allows individualized logins with aliases designating the post that person is assigned to during the operation.

Under-utilization of tools: Response does not integrate with ESRI maps, so the tool was under-utilized because of a lack of monitor real-estate in the CP to view personnel positions. Due to the short planning timeline, it was not feasible to find a personnel tracking solution that could integrate onto the common map to provide a true Common Operating Picture (COP) with all information for LAFD apparatus, patient stats, runner stats, and mobile personnel positions. Response was viewed by a few members of the Operations Unit on an iPad, but the ability to integrate those positions onto a single map view would have provided significantly better utilization of the tool and greater value to the overall operation.

Streamline data entry for field personnel: Several survey entries were either incomplete, missing information, had the wrong item selected from the drop-down menu, or selected the "Other" field when an appropriate drop-down existed. These incomplete or incorrect entries were the result of the volume of patients being treated towards the end of the race. By having a QR code on each bib with runner information such as bib #, age, and gender will reduce the data entry required to just type of contact and chief complaint. Streamlining the data entry through QR scanning and/or other automation will improve the quality of data submitted.

Conclusion

The 2019 LAM was a highly successful demonstration of mobility technologies and multi-agency collaboration. The event could not have been such a success without the strong leadership support from each of the participating departments. Despite a very short planning timeline and late entry into the event planning process, the various public safety agencies were able to work with M4PS, HSAC, Sonim Technologies, FirstNet Built by AT&T, Verizon Wireless, MobileIron, ESRI and others to develop a ConOp to support the diverse stakeholder requirements for such a complex operation.

The mobility deployment would not have been such a success if the participating agencies had not agreed on a common set of technologies to support streamlined information sharing and collaboration across all participating organizations. The success of the event demonstrated the importance of regional strategic planning for the adoption of mobile technologies to avoid the types of interoperability issues experienced with other public safety communications technologies such as Land-Mobile Radio and CAD.

The mobility deployment was a true demonstration of regional collaboration; however, the success of this event was possible because of "artificial" circumstances. Planning, configuration, device/app administration and collaboration technology were funded by DHS through the MAC. SALUS is a regional platform available at no cost to public safety agencies in the region; however, adoption of mobile apps is limited by departments' availability of mobile devices and/or approval from IT departments to install them on agency-managed equipment. The deployment would not have been as wide-scale without the phones provided by commercial carriers.

This represents a fundamental challenge for achieving regional interoperability with new, innovative technology. The value of the products must be demonstrated to justify regional funding. Most innovation begins within individual departments, or even units, to address specific operational challenges. By the time it is proven enough to obtain larger-scale funding, there are often competing products deployed by different departments. In many cases, integration of competing products is expensive or not possible. Having access to phones and apps at no charge to the participating departments to prove the value of mobile technologies and regional coordination prior to investments being made is unusual. HSAC is a local non-profit that offers SALUS at no charge to crisis managers, first responders, and the public . As a 501(c)(3), HSAC's mission is to catalyze a multi-jurisdictional and comprehensive approach to preparedness, security, and resilience in the Los Angeles (LA) region by providing innovative technology and opportunities for engagement, capability building, and partnerships for the public, private, and civic sectors. This sort of creative model of using philanthropy to fund public safety technology should be explored to promote regional collaboration, coordinated technology adoption, alleviate the economic burden of technology acquisition and overcome resource disparities across departments for equitable and consistent adoption.

Funding and interoperability are constant challenges for public safety. The LAM proved that unconventional approaches to regional collaboration, technology adoption and product acquisition can produce transformational results for public safety. Technology is evolving rapidly, but without new models

for achieving multi-jurisdictional coordination and funding mechanisms, the industry is at risk of facing significant interoperability problems with mobile data technologies and miss the opportunity to achieve the vision of public safety broadband and investment of billions of dollars to provide first responders better tools to perform their mission of saving lives and protecting property.