Integrating Web-Based Emergency Management Collaboration Software into Airport Operations--A Primer

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AIRPORT COOPERATIVE RESEARCH PROGRAM

ACRP REPORT 94

Integrating Web-Based Emergency Management Collaboration Tools into Airport Operations—A Primer

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AIRPORT COOPERATIVE RESEARCH PROGRAM

Airports are vital national resources. They serve a key role in transportation of people and goods and in regional, national, and international commerce. They are where the nation's aviation system connects with other modes of transportation and where federal responsibility for managing and regulating air traffic operations intersects with the role of state and local governments that own and operate most airports. Research is necessary to solve common operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the airport industry. The Airport Cooperative Research Program (ACRP) serves as one of the principal means by which the airport industry can develop innovative near-term solutions to meet demands placed on it.

The need for ACRP was identified in *TRB Special Report 272: Airport Research Needs: Cooperative Solutions* in 2003, based on a study sponsored by the Federal Aviation Administration (FAA). The ACRP carries out applied research on problems that are shared by airport operating agencies and are not being adequately addressed by existing federal research programs. It is modeled after the successful National Cooperative Highway Research Program and Transit Cooperative Research Program. The ACRP undertakes research and other technical activities in a variety of airport subject areas, including design, construction, maintenance, operations, safety, security, policy, planning, human resources, and administration. The ACRP provides a forum where airport operators can cooperatively address common operational problems.

The ACRP was authorized in December 2003 as part of the Vision 100-Century of Aviation Reauthorization Act. The primary participants in the ACRP are (1) an independent governing board, the ACRP Oversight Committee (AOC), appointed by the Secretary of the U.S. Department of Transportation with representation from airport operating agencies, other stakeholders, and relevant industry organizations such as the Airports Council International-North America (ACI-NA), the American Association of Airport Executives (AAAE), the National Association of State Aviation Officials (NASAO), Airlines for America (A4A), and the Airport Consultants Council (ACC) as vital links to the airport community; (2) the TRB as program manager and secretariat for the governing board; and (3) the FAA as program sponsor. In October 2005, the FAA executed a contract with the National Academies formally initiating the program.

The ACRP benefits from the cooperation and participation of airport professionals, air carriers, shippers, state and local government officials, equipment and service suppliers, other airport users, and research organizations. Each of these participants has different interests and responsibilities, and each is an integral part of this cooperative research effort.

Research problem statements for the ACRP are solicited periodically but may be submitted to the TRB by anyone at any time. It is the responsibility of the AOC to formulate the research program by identifying the highest priority projects and defining funding levels and expected products.

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The research team would like to express its gratitude to the members of the project panel for their support and insightful comments throughout this research project. The team would also like to thank the many airport directors, county and state emergency management representatives, and federal agency representatives who took the time to share their insights, experience, and opinions and to respond to follow-up queries. Additionally, numerous software vendors shared the best features of their systems: their inputs were vital in identifying system capabilities and best practices within this document.

Finally, the team thanks the groups that participated in the case studies. This includes airport representatives Byron Harriger III, Emergency Planning Manager, Pittsburgh International Airport; Richard Wilson, Allegheny County Airport Director; Alan Black, Department of Public Safety, Dallas/Fort Worth International Airport; Tim O'Krongley, Assistant Aviation Director, San Antonio Airport; and Terry Sharpe, Operations Manager, El Paso International Airport. Software vendors who graciously took time to talk with us included Nancy Kensy of Buffalo Computer Graphics—DisasterLAN; Norbert Butler of NC4—E Team/E-Sponder Express; Bill Dunlap, Knowledge Center; Grant Schlosser, MissionMode; John Merlo of Alert Technologies—OpsCenter; Yohai West of Nice Systems—Situator; and Kim Frierson of ESi—WebEOC.

FOREWORD

By Theresia H. Schatz
Staff Officer
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ACRP Report 94: Integrating Web-Based Emergency Management Collaboration Tools into Airport Operations—A Primer provides information for use by operations, public safety and security, and information technology staff at airports of all sizes to evaluate and implement web-based collaboration tools that provide a common operating picture for both day-to-day operations and full emergency response management. The primer provides a better understanding of the functions of web-based emergency management systems and aids airports in establishing requirements, procuring and installing systems, and implementing training.

Various in-house and commercial off-the-shelf software and web-based collaboration, communication and control systems are being utilized as emergency management tools by municipalities and airports. There are a variety of tools used to coordinate between on-scene commanders and emergency operations centers for needed resources. While these web-based collaboration tools have proven useful in emergency management, they may also have applicability at airports for other non-routine activities/operations, such as weather events, diversions, and security incidents. As airport communications and emergency response becomes more sophisticated and the use of technology increases, guidelines are needed to help airports evaluate the benefits and costs of implementing or expanding existing web-based communications and controls systems. This research helps airports and municipalities integrate web-based collaboration tools into their day-to-day and emergency management operations, identify the features and functions appropriate for their unique needs, and implement an effective web-based collaboration tool.

This research was conducted under ACRP Project 04-12 by Innovative Emergency Management, Inc. in association with Smith-Woolwine Associates Inc., Kim Kenville Consulting, Newton and Associates, Inc., and Kimley-Horn and Associates, Inc. As part of the research, the research team interviewed 47 airport operators and representatives of state, county, and city emergency management organizations; conducted several case studies at airports; and provided a sampling of different web-based emergency management collaboration tools.

Additional Source material is contained in the contractor's final report, which provides background on the research conducted in support of the primer, and has been posted on the ACRP Project 04-12 web page that can be found by searching the TRB website (www.trb.org) for *ACRP Report 94.*

CONTENTS

Note: Many of the photographs, figures, and tables in this report have been converted from color to grayscale for printing. The electronic version of the report (posted on the Web at www.trb.org) retains the color versions.

SUMMARY

Integrating Web-Based Emergency Management Collaboration Tools into Airport Operations—A Primer

Web-based emergency management collaboration tools (WBEMCTs) can support managers facing the complex challenges inherent in airport operations. Many airport managers have access to emergency management software at low or no cost through their city or county emergency management agencies, and some use these systems to conduct training exercises and respond to emergency situations. However, to date, very few managers regularly use existing systems to their fullest extent.

In short, a valuable resource is often underutilized. When fully implemented, these systems can save time, conserve resources, and prevent miscommunication during responses to emergencies or other challenging events. In addition, during day-to-day operations, web-based systems can be used to create, maintain, and update reports and electronic logbooks as well as provide regular tracking of maintenance or operations issues affecting an airport on a daily, weekly, or monthly basis.

While these systems are potentially very useful, they may not present the best solution for every airport at this time. The information presented in this primer can help operators decide whether their airport would benefit from implementing such a system, and, if so, which system would best serve their specific situation. Airport operators will ideally avoid hasty implementation of a system without full consideration of their unique needs.

In order to develop and maintain the best solutions possible, operators need to make informed decisions based on careful evaluation of their unique environments and needs *before* weighing costs. They should assess available funding, their relationship to city or county emergency operations centers (EOCs), and internal emergency management requirements, as well as a variety of issues unique to their specific operations such as staff interest and perceived utility, frequency of extreme weather events, and the best timing for implementing new technology.

For most airports, there is no need to purchase, configure, and implement an individual WBEMCT. Instead, airports looking to enhance their working relationship with local emergency management agencies can consider employing those agencies' existing WBEMCTs to facilitate effective responses to emergencies and support efficient daily operations.

Currently no WBEMCTs have been developed specifically for airport operations requirements, and only a handful of software vendors have actually customized their products to support airport operations. In some cases, managers are finding that they can modify existing software, develop their own systems, or cobble together a piecemeal "system of systems." While this primer is not an illustration of best practices, it does illustrate how some managers find these tools useful.

This primer provides guidance for airport managers interested in and responsible for selecting, implementing, and operating a WBEMCT. The primer

- Evaluates the full spectrum of web-based solutions, ranging from airport emergency managers obtaining an account on an existing system in the city/county emergency management agency at little to no cost, to a fully integrated system of servers with airport-unique dashboards;
- Identifies key features of a WBEMCT;
- Spells out important issues to consider before acquiring and implementing a system;
- Suggests available federal, state, or local government grant monies for funding the acquisition of web-based tools;
- Addresses security concerns;
- Highlights best practices; and
- Identifies common pitfalls.

The primer also identifies and describes essential criteria and desired features of web-based tools, including the following:

- Operation within the airport's current information technology (IT) design;
- Status boards, dashboards, and a common operating picture (COP);
- Communication tools within an airport system that relay data to external emergency management systems; and
- Tracking and documentation of actions and resources.

IT staff should be included in the selection process, as integration of a WBEMCT into existing airport systems is vital to the success of the project. Appendix A provides a requirements matrix to help staff determine precisely how their airport could benefit from implementing web-based tools, and Appendix B provides a sampling of available systems from 10 different WBEMCT vendors to assist in the selection process.

Ideally, WBEMCTs can be used on a regular basis to maintain proficiency and ensure that staff feel very comfortable using the systems during stressful situations. In many cases, with careful selection and minimal training, managers can implement web-based systems to provide time- and cost-effective tools that will help their airports operate more efficiently and effectively both when disasters strike as well as during day-to-day operations.

Introduction

As airport communications, technology, and emergency response procedures become more sophisticated, airports need to carefully evaluate the benefits and costs of implementing or expanding this technology. This practical primer was developed under the ACRP Project 04-12 to aid operators of airports of all sizes and types who are responsible for selecting, purchasing, implementing, and operating a web-based emergency management collaboration tool (WBEMCT). It describes and discusses key criteria and best management practices for the selection, procurement, design, integration, and operation of scalable web-based collaboration tools.

WBEMCT technology is evolving, and vendors are continuously modifying and updating applications. While some airports are adopting state-of-the art systems, others are working more cautiously with low- or no-cost options, and still others are taking a "wait and see" approach. This primer provides an introduction to the systems for airport operators who do not currently have a WBEMCT, and it helps all airport operators learn more about how to purchase, implement, incorporate, and/or expand a WBEMCT in order to improve normal, irregular, and emergency management. It aims to assist airport operators in gaining a better understanding of the main attributes, benefits, and drawbacks of implementing and using a WBEMCT. It can aid operators in better understanding system capabilities, establishing requirements, funding and purchasing a system, determining installation and integration requirements, accessing available training resources, and maintaining adherence to regulatory requirements [Federal Aviation Regulation (FAR) Part 139].

Forty-seven diverse airport operators and representatives of state, county, and city emergency management organizations were interviewed regarding their use of web-based emergency management tools and programs. In most cases, the airports surveyed had not purchased their own standalone system, but rather received a system to use in conjunction with a local jurisdiction purchase. Additionally, the research team interviewed 20 software vendors regarding their capabilities and customer base. A case study of Pittsburgh International and Allegheny County Airports was developed to gain a greater depth of understanding of the requirements, processes, and opportunities for partnering with local jurisdictions and to illustrate how web-based tools are utilized in real-world situations.

CHAPTER 1

Overview of WBEMCTs

Definition of a WBEMCT

A WBEMCT is a web-based collaboration tool proven beneficial in navigating the challenges of airport emergency management and day-to-day operations. Many, but not all, users find these systems cost-effective, intuitive, and easy to operate. However, these benefits can only be realized when the personnel involved perceive utility and use them regularly.

Airports throughout New York use the New York State Department of Emergency Management's web-based emergency management system to coordinate responses, view information, and input data.

WBEMCTs can facilitate coordination of resources among on-scene incident commanders (ICs) and emergency operations centers (EOCs)[1] and link airports with other city, county, or state EOCs to support joint responses. WBEMCTs can also assist airports in achieving and maintaining National Incident Management System (NIMS) compliance. Moreover, they promise wide applicability for managing non-routine airport events such as severe weather, aircraft diversions, security incidents, and special events, as well as daily operations such as staffing, inventory, and recordkeeping.

Software as a Service (SaaS) may provide more functionality than an external EOC system (such as those provided by a state or local authority) and may cost less than purchasing a fully integrated system.

WBEMCTs are designed to operate within the airport's current network. The core capabilities of an airport's WBEMCT system include communication tools that relay data to external emergency management systems, resource tracking tools, and applications that document and archive records of actions taken.

Types of WBEMCTs

Fully integrated, **locally hosted emergency management systems**, also known as *client-server-based systems,* reside on the airport network; they can be implemented as separate systems or incorporated with a variety of systems within the airport. WBEMCTs can also be obtained through **secure access** via the city or county emergency management system or ***Software as a Service*** (**SaaS**), also known as *subscription services.*

Table 1 provides a brief overview and comparison of the capabilities of the three types of WBEMCTs.

[1] For various legal or historical reasons, an airport may call its functional equivalent of an EOC by some other term such as Departmental Operations Center, Coordination Center, Communication Coordination Center, or Airport Response Coordination Center. These are all functionally equivalent to EOCs.

Table 1. Types of WBEMCTs.

Capability	Locally Hosted System	Software as a Service (SaaS)	Secure Access to City or County Emergency Management System
Initial Cost	Funds needed to integrate additional features	Funds needed to integrate additional features	Funds and/or authorization needed to integrate additional features
Flexibility	Dedicated system for airports to use every day; airports control information sharing	Dedicated system for airports to use every day; airports control information sharing	Emergency management agency (EMA) controls system
Responsiveness and Reliability	Internal (airport system) controlled by airport IT experts; responsive to needs of airport	Server at alternate location (may enhance network survivability), with hot back-up; reliance on help desk and system administrator offsite	Server at alternate location, which may slow down response time, determined by bandwidth; reliance on offsite system administrator
Maintenance Cost	Repairs and replacement need to be funded (unless covered by maintenance agreement)	Repairs or replacement need to be addressed in maintenance agreement	Repairs or replacement need to be attained through the EMA

WBEMCT Features and Capabilities

The various features available through a WBEMCT, such as the status board, dashboard, COP, recordkeeping applications, training simulations, and the like, can help airports improve trouble-shooting and problem-solving procedures and capabilities during emergencies as well as during regular operations. Operators can employ these features to minimize the impact of and maximize the recovery from critical events and the "regular emergencies" common to airport management, efficiently mobilizing personnel and resources and assigning clear roles and responsibilities when time is of the essence.

To date, the majority of airports use their systems primarily when they activate their EOC. For example, while Phoenix Sky Harbor International Airport (PHX) has yet to integrate their system into day-to-day operations, they regularly use their system to manage a wide variety of events, from bowl games and the departure of the Arizona Cardinals football team, to fire exercises and triennial training, to bomb threats and monitoring the aftermath of the 2011 tsunami. Their system tracks event timelines, involved or needed resources, and the current status of the event response. Real-time information is made available to airport executives, airport tenants, city emergency managers, U.S. Customs and Border Protection (CBP), Federal Aviation Administration (FAA), the Air National Guard, and so forth. They are currently deploying their system in their new mobile command vehicle, which will keep all parties on the same page while greatly reducing the necessity of radio communication.

Status Board

A status board tracks and communicates pre-selected data (e.g., aircraft alert levels) and the status of critical systems (e.g., power supply) (Figure 1). It automatically updates and displays data at regular intervals to provide a user-friendly application for monitoring key operations and addressing the logistical challenges that arise during the course of both emergency and day-to-day operations. By providing stakeholders the ability to share detailed data across platforms, it increases situational awareness and saves time during circumstances where every minute counts.

Web-based collaboration tools can save time and money.

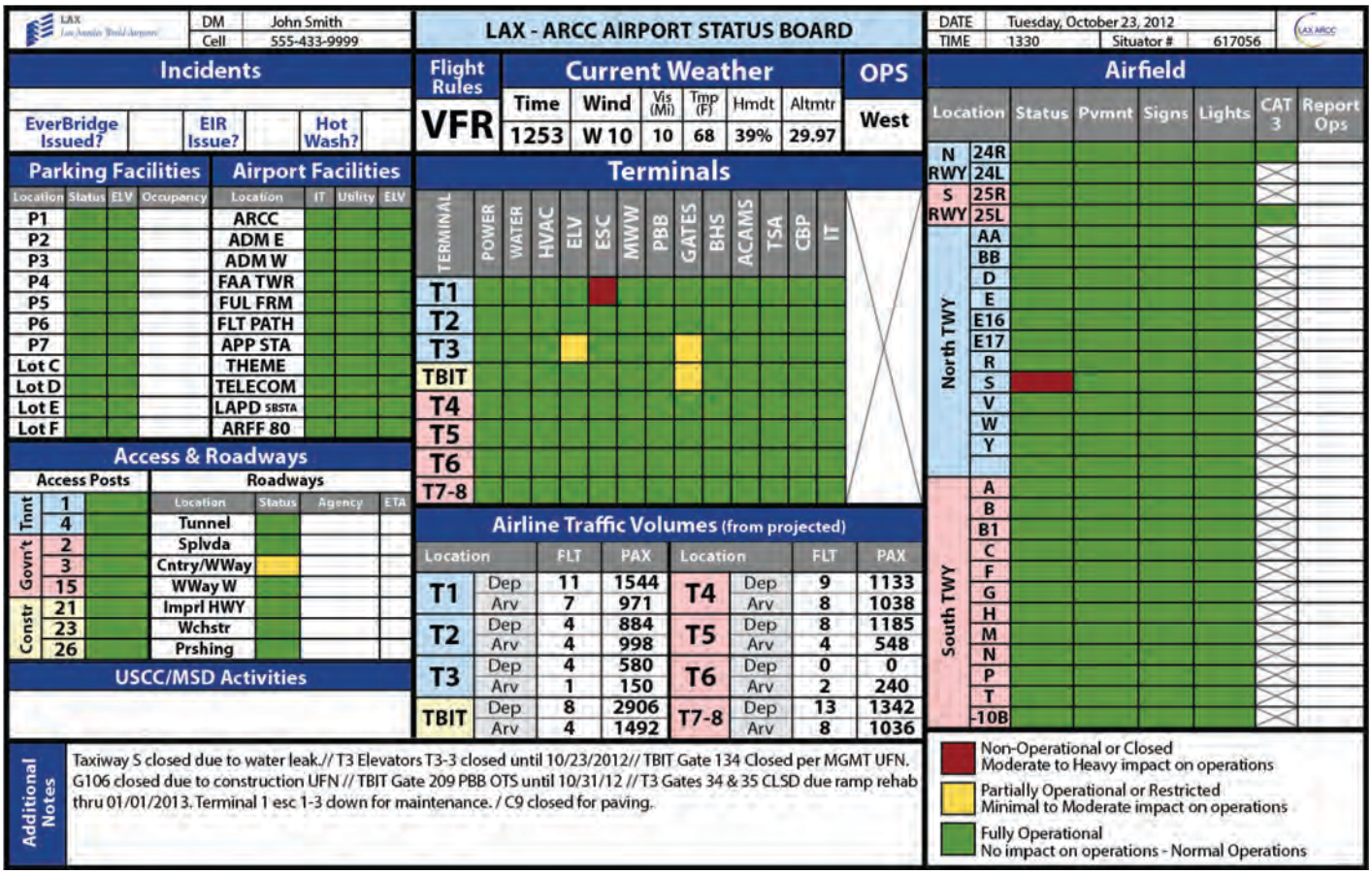

Figure 1. Example of a status board.

Dashboard

A dashboard consolidates data and displays a snapshot of the current status of major airport operations (Figure 2). Multiple applications utilizing high-level data are displayed, typically via overlapping screens. Lower levels of data are easily accessed by clicking on a tab or icon, providing a user-friendly visual presentation that facilitates timely and informed decisions. Dashboards can be customized to communicate concerns with local emergency management agencies and to track various aspects of operations such as staffing, inventory, logistics, and security. Video from the airport's closed-circuit television (CCTV) cameras can be integrated as part of the system.

When responding to emergencies, managers can use WBEMCT dashboard views to aid in the decision-making process by quickly communicating real-time operational information while minimizing negative impacts to airport operations. The use of dashboards expands situational environmental awareness, which can enhance the forecasting, planning, and executive decision making needed to effectively manage an emergency.

Dashboard views can also be used as a decision support tool to aid personnel during day-to-day airport operations. They can quickly provide operational personnel with the status information necessary to make sound decisions, such as runway in use, peak-demand periods, FAA flow/restrictions, delay and average taxi times, and so on. For example, if an airfield maintenance crew needs 15 minutes to make a quick repair on a runway, the operator can consult the dashboard and find a 15 minute space in operations where the work can be completed without impacting flights.

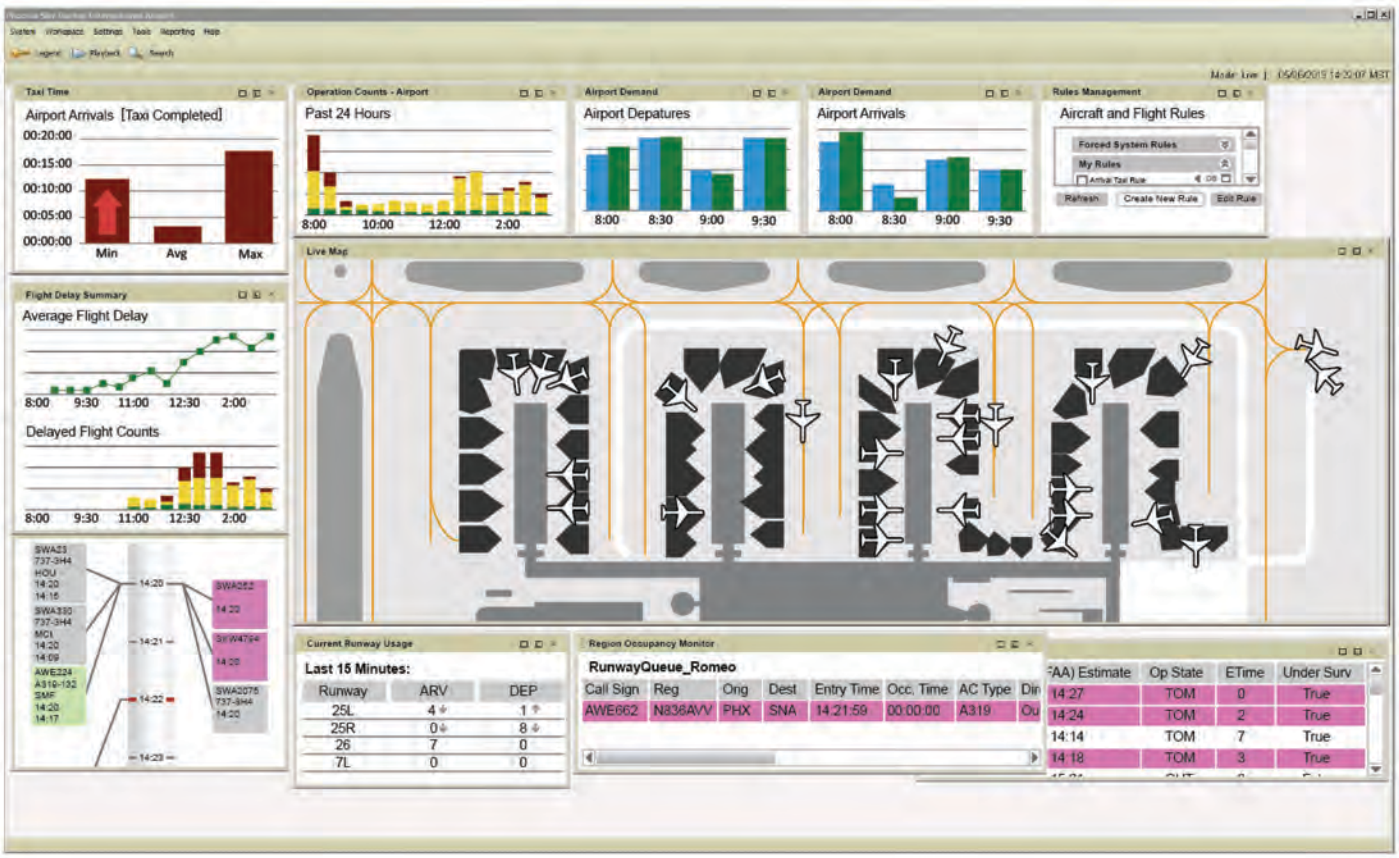

Figure 2. Example of a WBEMCT dashboard for day-to-day operations.

Common Operating Picture

A common operating picture (COP) is an online graphic representation of an event, scene, location, or situation that can enhance coordination and collaboration and increase efficiency among all stakeholders during emergency responses as well as day-to-day operations Figure 3). Geographic information systems (GIS), sensors, cameras, and wireless devices can be integrated into a COP. Web-based tools that are already in use and interoperable with internal and external agencies can be employed, which can help promote and streamline the adoption of a COP.

Making the best decision is critical to both minimizing impacts and avoiding conflict during the management of an emergency. A unified and coherent visual depiction can help representatives share and present information easily to more fully understand the "big picture." The COP and associated status boards and dashboards provide quick access to answers to typical questions first responders have such as what assets are on the scene, where the assets are located, and which roles and tasks are assigned. Position tracking using GIS can automatically display the best resources available. Responding units can consult the COP to determine their most appropriate approach to the scene and designate the most appropriate staging locations. Senior managers can view the COP to quickly determine if all appropriate responders are on scene, and can use it to anticipate the best next steps in the response based on established protocols.

As additional resources arrive on scene, the COP expands to help build common situation and environmental awareness. The COP and associated status boards and dashboards can help managers accurately determine when recovery has been fully realized through continuous monitoring of the real-time data display.

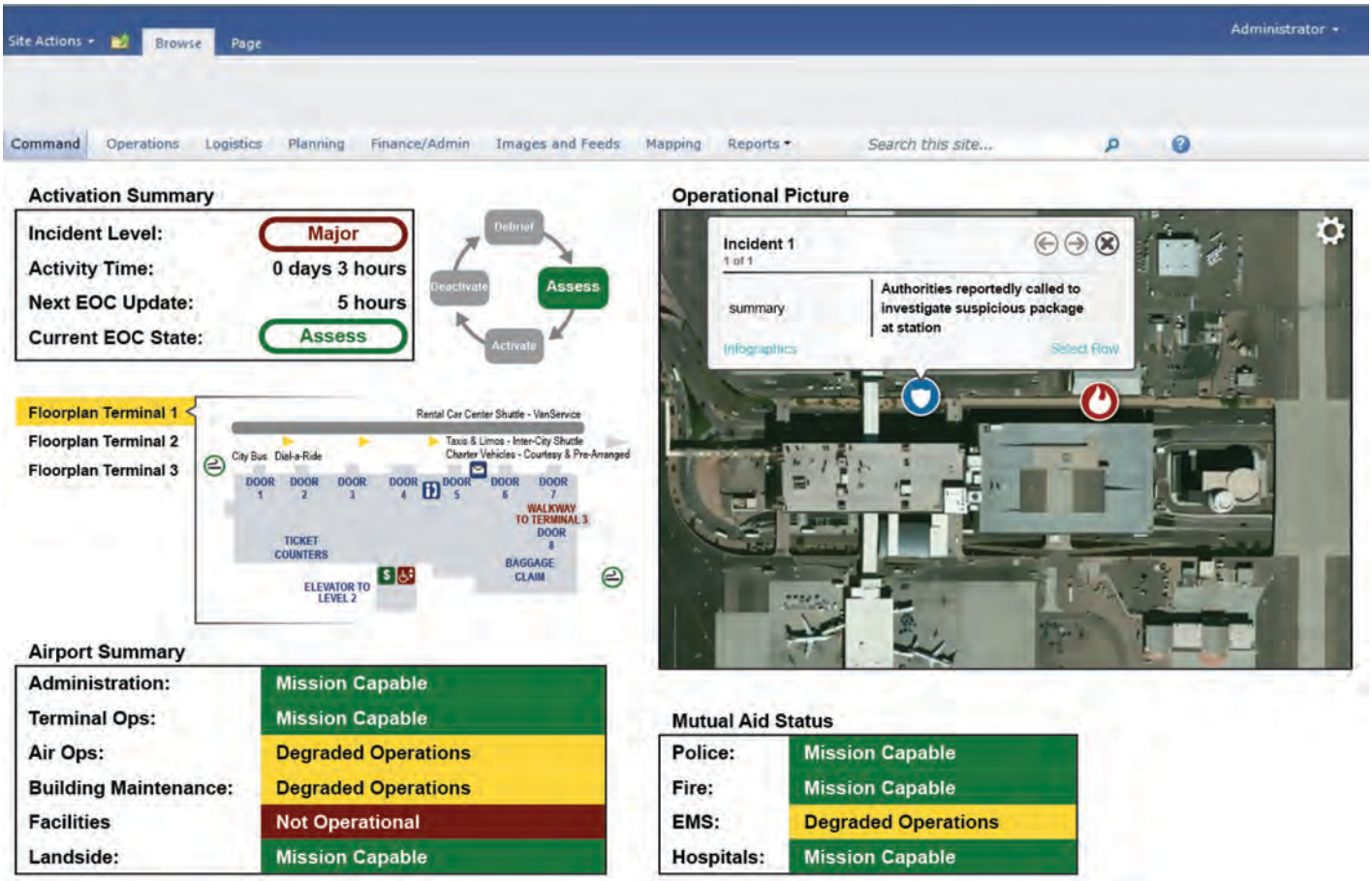

Figure 3. Example of a COP for emergency operations.

Most airports continue operations during a typical emergency response; therefore, timely and accurate operational information can help responders anticipate and manage possible conflicts before they happen. For example, knowing precisely when a targeted aircraft will arrive and what other activity may occur around an emergency response can aid managers in making good decisions, which can significantly reduce the overall risk and impact of the events.

Managers can also effectively use COP information to help minimize the potential impacts of the emergency event on normal airport operations; for example, a manager can determine whether a scheduled flight should be held or allowed to depart depending on its relation to the targeted aircraft's expeditious path. Finally, web-based technology can help minimize future impacts of unforeseen events. Appropriate responses to possible events can be proactively preselected; for example, if an alarm is activated, the system can automatically dispatch security personnel, redirect security cameras, and restrict access to the area in question, saving valuable time during a critical situation.

During day-to-day operations, a COP can provide a useful overview of the multifaceted dynamics of airport operations. Airport managers can use the COP to update airfield maintenance items, handle work orders, dispatch units, track the effects of inclement weather, or view an incident on the airport. For example, if the FAA decreases the aircraft arrival rate due to inclement weather, and the airport's public information officer wants to know how this action affects passenger traffic, he or she can use information from the dashboard to quickly and accurately determine average arrival and departure delays. Or if aircraft rescue and fire fighting

(ARFF) personnel want to conduct airfield driver familiarization training, they can consult the dashboard to determine the current flow of air traffic and areas with the least aircraft movement to determine the best location to conduct the training.

Record Keeping

Airports can develop unique dashboards to track critical airport systems such as implementation and tracking for safety management systems as well as general record keeping for FAR Part 139. During emergency situations, accurate and accessible web-based records can help expedite activation and implementation of mutual-aid agreements. In the wake of a disaster, WBEMCTs provide after-action reporting and metrics. Events can be played back to assist forensic investigations, and actions taken (such as staffing utilization) can be reliably documented, which helps justify costs for reimbursement from local or state partners or from federal agencies such as the Federal Emergency Management Agency (FEMA).

These tools also have great value in day-to-day operations. Airport managers deal with many more internal, airport-specific events than regional events, and many airports experience "regular emergencies." Web-based tools can help operators handle work orders and dispatch units more efficiently. The use of electronic logbooks can help airports track, document, and record events that occur throughout the day, automatically archiving records of activities.

Web-based collaboration tools can be used to streamline the process of manually entering information for documenting and sharing daily updates with airport officials. However, there will always be cases in which the use of handwritten checklists or logbook entries is more effective and efficient. Following the completion of the training curve, web-based tools should not be employed if they encumber a process; their purpose is to help personnel complete their assigned tasks with greater ease, not greater difficulty.

Almost every WBEMCT available has the capability to produce daily/monthly or incident status reports. Most can recover data based on date/time stamp or incident number. Some web-based systems can track and assign resources and provide documented reports highlighting hours allocated to specific tasks. Finally, internal budget and resource tracking can aid in departmental budget recovery, providing added value in day-to-day operations.

Airport operators might note that this added flexibility requires training for personnel and may raise some standardization issues that would need to be resolved.

The Role of WBEMCTs in Communication and Collaboration Both on and off the Airport

Clear, effective communication among employees and agencies is essential to smooth airport operations not only for crisis situations, but also for everyday operations. Web-based tools allow for a holistic approach to incident management wherein stakeholders can utilize cross-platform communication (e.g., from radio to cell phone to tablet) and instantly share critical information.

During emergency operations, airports and emergency management agencies rely heavily on the unique services they provide each other. Airport managers need to understand precisely what emergency management agencies expect from them, especially during the response and recovery phase of an incident. Emergency management agencies may need information about delays or diversions of flights as well as critical facility and resource

Boise Airport finds the record-keeping function of their WBEMCT invaluable; their system greatly facilitates tracking of hours and attachment of costs.

information such as the status of open or closed runways, ARFF capabilities and indices, and the status of the air traffic control tower.

WBEMCTs can support seamless emergency activities with local law enforcement, first responders, and medical personnel. Commercial service airports are mandated by FAR Part 139 to maintain a FAA-approved Airport Emergency Plan, using the FAA Advisory Circular 150-5200-31C as revised for guidance. Well-developed plans include guidelines and procedures for contacting emergency management agencies. Currently, tools for contacting outside agencies range from paper checklists used by dispatch centers or airport emergency management personnel to web-based systems that allow airport operators to electronically submit requests for support.

WBEMCTs can also facilitate airport participation in local emergency management exercises and drills. Just as web-based systems can be vital when responding to, containing, recovering from, and recording an actual event, they can also help airports meet training objectives and document lessons learned from simulations. For example, during training exercises, these tools may be utilized to track vehicle traffic and the locations of key individuals throughout the airport. Recorded data can be analyzed to improve exercises. Moreover, use of WBEMCTs during training exercises provides much-needed practice to ensure the highest degree of functionality during emergency situations.

Oregon Emergency Management uses its WBEMCT to track and monitor incident response throughout the state. County and airport officials can log on to request support from the state and provide local situational updates.

Intensive information flows that occur during emergencies and training exercises also occur during the normal operations of an airport, such as the management of construction and maintenance. Regular collaboration with internal agencies during routine operations is just as important as collaboration with external agencies during a crisis, and the need for internal collaboration is far more common. Airport personnel use a variety of internal communications protocols and share information using handheld radio communications, cell phone calls, text messages, telephone calling systems, manual call down trees, mutual aid radio frequencies, and push-to-talk communications. Airport personnel share information within the airport via a dispatch center, communications center, or EOC.

WBEMCTs can enhance these internal communication and collaboration systems by providing cross-platform capabilities. Utilizing web-based systems can result in reduced phone calls, e-mail messages, and greater efficiency between stakeholders. With web-based tools, electronic logbooks can help document information; the automated process can save time and money, ensure accuracy, and improve the effective dissemination of information. In much the same way that airports share aviation information internally using International Civil Aviation Organization—and FAA-approved language and actions—a single shared platform such as a WBEMCT can facilitate critical and timely communications among airports and their external emergency management/mutual-aid partners as well as within airports among colleagues.

Using WBEMCTs at Pittsburgh International and Allegheny County Airports: A Case Study

Under the Allegheny County Airport Authority, Pittsburgh International Airport (PIT) and Allegheny County Airport (AGC) airports use the same WBEMCT system employed by county and state emergency management agencies throughout much of Pennsylvania. Other users of the same system include the Pittsburgh Fire Department, the Pittsburgh Police Department, the TSA, Airport Operations, and the Airport Communications Center (dispatch). Their system can integrate with other systems and is used in approximately 58 counties throughout Pennsylvania. It was used by PIT and AGC during the G-20 summit in 2009.

The county emergency management agency (EMA) purchased the system for PIT and provided it to both airports at no cost. The EMA paid for installation and also pays for annual licenses and other costs. The vendor provides a maintenance plan, technical support, and training support via webinar or in person, relying on the train-the-trainer method. Updates affecting other airports are shared with PIT and AGC.

The system is web-based, and certain individuals are assigned system administrator privileges. The PIT emergency manager is one of the system administrators for their web-based system. It consists of a series of four servers hot-linked to another series of four servers in another location. It runs on existing hardware platforms, with enhancements available from multiple sources. Airport personnel access the system from their laptops or desktops through a username/password.

Both airports are required to notify the EMA when activating triggers through the Pennsylvania Incident Reporting System, following internal policies; authorities report incidents through their WBEMCT. The airports follow manual checklists and notify the airport authority, county EMA, or other agencies as the situation dictates. PIT uses a separate computer-aided dispatch (CAD) system to track incidents on the airport, and the fire chief uses a separate system for day-to-day operations.

While the system does not currently serve as a Reverse 911 system, it is capable of displaying plume model data resulting from an event. This information can be used to notify affected populations in the area through a third-party notification system.

Research shows that airports that obtain web-based systems from city or county emergency management agencies tend to interface with those agencies with greater regularity. For example, the PIT emergency manager routinely participates in meetings, conference calls, and exercises with the Allegheny County EMA. Building this close working relationship adds even more value to the enhanced capabilities of their web-based system. Increased communication and collaboration helps the county better understand the needs and requirements of the airports, which can prevent misunderstandings and result in more effective outcomes for all parties.

WBEMCTs for both PIT and AGC support effective collaboration on issues or incidents, as follows:

- Multiple agencies see information as it is entered, saving time and ensuring that everyone is informed.
- Airport information is available for display on a dashboard and on a graphical interface system. The dashboard tracks and monitors status information and is used to assign and track resources. (The two airports do not currently use the dashboard to follow up on actions.)
- Data elements required on dashboard screens are automatically filled in at the county and commonwealth EMA.
- Automatic text alerts are sent to airport operations personnel through their phones, desktops, and/or tablets.
- Updates occur every 2 minutes, providing sufficient data reliability for the EMA.
- The system tracks hours to report to FEMA or other agencies.
- The system generates daily, weekly, or monthly reports.
- The system archives information.
- According to the county EMA representative, data entered into the system can be used in a court of law.

Users at PIT and AGC advise that the ideal system should be configurable as opposed to programmable. The system administrator should be able to configure a screen to avoid having to develop individual modifications for each user.

Having everyone on the same system improves the ability to collaborate on issues or incidents. PIT uses the system day to day to track and respond to accidents, emergencies, and disasters. AGC officials have access to the system, but they do not use it on a daily basis; instead, they log in to report or respond to incidents. Airport officials at both locations have found the system to be reliable, accurate, highly intuitive, and easy to use; they report that the dashboard in particular is a very useful feature. Airport personnel feel there are beneficial aspects of the system they have not yet fully explored or integrated into regular operations.

CHAPTER 2

Areas of Consideration Prior to the Acquisition and Utilization of a WBEMCT

When considering whether or not to purchase, implement, and/or upgrade a WBEMCT, airport managers will need to take a wide array of issues into account, including the following:

- The specific management needs of the airport based on its unique environment and circumstances;
- The aptitude and interest among key personnel to sustain a commitment to training through the initial learning curve to achieve competence and comfort with the system;
- The nature of the relationships with partners in the community, their needs, and their current use of web-based systems;
- The features and capabilities of available web-based systems;
- How those features would best serve airport management in real-world operations in terms of saving time and money; improving accuracy, accountability, and security; enhancing connectivity to individuals and agencies in the community; upgrading safety and emergency management procedures, and so forth;
- The types and pricing levels of available systems;
- Maintenance costs;
- How closely the vendors are willing to work with the airport in choosing a WBEMCT, training personnel, and the like; and
- Available funding.

At any point during the decision-making process, managers may decide that the timing is not right for purchasing and/or implementing a WBEMCT. However, the decision-making process has value in and of itself, as it helps managers define their needs and environment in specific detail, leading to a more solid understanding of how to best meet those needs in the future.

This chapter identifies the personnel and agencies that ought to be involved in determining an airport's needs for developing a WBEMCT, as well as how the chosen system can best be acquired. Pertinent stakeholders would be identified and consulted and a cost breakdown matrix developed to identify systems that need to be integrated into the WBEMCT, keeping in mind that integrating more systems entails higher probable cost. The chapter ends with an overview of system integration, security, staffing, and a process guide for using this primer.

Communication with Internal and External Stakeholders

Internal Stakeholders (Within the Airport)

Airport emergency managers or operations managers are generally the primary point of contact between airport personnel and emergency management agencies. The airport emergency manager must have knowledge of the emergency management tools available to connect

with EMAs when requesting additional assets or reporting the status of incidents affecting the airport.

When an event necessitates the need for an IC, communication between the IC and the support staff or EOC is imperative. The designation of the role of IC will vary from incident to incident. Typically a representative from law enforcement or ARFF will be the on-scene IC; very rarely will the police chief or ARFF chief serve as IC. At some airports, operations personnel serve in the IC role.

ICs should be familiar with the available WBEMCTs, as providing key situational awareness to airport officials and EMAs is paramount during incident management. Airport security concerns must involve key entities such as ARFF, law enforcement, the Federal Bureau of Investigation (FBI), etc. In addition to first responders, other key stakeholders involved in response and recovery may include the following:

- Passenger airlines,
- Cargo operators,
- TSA,
- CBP,
- FAA,
- Concessionaires, and
- Other airport tenants and contractors.

Airport directors and their deputies provide support and necessary resources during an incident. Executives need to understand how best to utilize these systems and what their specific roles should be during an event. A good reference for an introduction to the Incident Command System (ICS) can be found on the FEMA Emergency Management Institute Independent Study website: http://training.fema.gov/EMIWeb/IS/IS100b.asp. Additionally, the Emergency Data Exchange Language (EDXL)-SitRep Specification (Appendix D.1 ICS209 Web Form Example) provides a sample ICS form using situation reporting data for completion.

Lastly, the public affairs representative needs to be aware of information available on emergency management systems in order to ensure accurate and timely messaging to the airport terminal, the media, and the public.

External Stakeholders (Outside the Airport)

City and county EOC personnel need to be aware of significant activities within the airport and should be familiar with the airport's emergency management systems. Federal stakeholders who might utilize information from these web-based collaboration tools include the following:

- FEMA and the DHS,
- FAA under the U.S. Department of Transportation,
- Centers for Disease Control and Prevention under the U.S. Department of Health and Human Services, and
- U.S. Department of Defense.

Cost (Initial, Maintenance/Upgrades, Ongoing Operational Costs)

Even though available (or unavailable) funding imposes obvious limitations, in order to develop the software solution most capable of increasing efficiencies and meeting the needs of the airport, ideally requirements will be determined before funding is considered. After defining

the optimal WBEMCT capability, management can then identify how to best fund the purchase of necessary hardware and software. Table 2 and Figure 4 highlight the relationship between costs and requirements.

Figure 4 provides another view of the requirements process. Funds determine available capability. Airports can obtain systems through their emergency management agencies or install a locally hosted system that may be expanded into a fully integrated system on site. The more systems integrated into the WBEMCT, the higher the final cost.

Table 3 provides a checklist to walk operators through the decision-making process, incorporating input from both internal and external stakeholders and exploring options for funding.

Current Systems and Integration

Effective emergency management requires the following core functional capabilities:

- Evacuation management;
- Victim tracking;
- Facility availability reporting (e.g., hospitals);
- Resource management;

Table 2. Cost matrix.

Capability	Server	Initial Operating Cost	Annual Maintenance Cost
Airport officials have access to existing city, county, or state web-based system	Located within municipal emergency management agency	From no cost up to $25,000 based on airport requirements	From no cost up to $25,000
Subscription Services ▪ Some support to develop or customize dashboard screens unique to airports ▪ Most systems include weather data as part of GIS maps	Located at vendor site	Up to $25,000 based on airport requirements	Up to $25,000
Dashboard screens developed for airport use and GIS maps to help form a COP ▪ Most systems include weather data as part of GIS maps ▪ Same system that is used by municipal emergency management agency ▪ Some integration with airport systems	Located at airport, with backup server at airport (or off-site)	$25,000—$100,000	Up to $25,000
Dashboard screens developed for airport use and GIS maps help form a COP ▪ System is integrated with (dissimilar) emergency management system ▪ Most systems include weather data as part of GIS maps	Server located at airport with backup server at airport or off-site	$100,000—$300,000 or more, depending on level of integration	$25,000—$100,000
Fully integrated system with dashboard screens, GIS maps, CAD, communications, weather, security cameras, door alarms, radio frequency identification badges	Server at airport ties into redundant backup server at airport or off-site	$100,000–$300,000 or more, depending on integration requirements	$50,000–$100,000 or more, depending on system enhancements

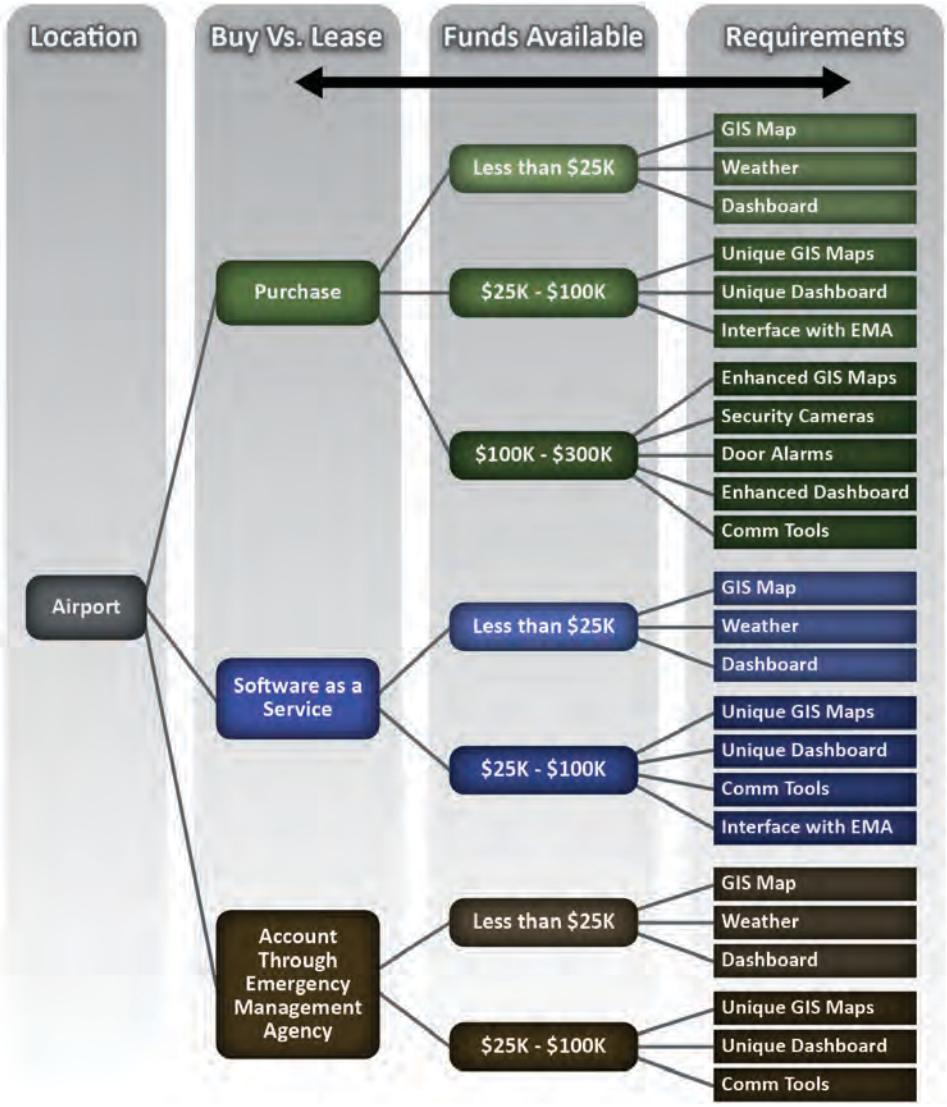

Figure 4. Requirements considerations.

- Event/situation reporting;
- Alerting and broadcasting; and
- Intelligent message distribution.

Various local and distributed services may need to be interconnected through computer networks to achieve all of these capabilities. As a result, interoperability is key when exploring options and determining best solutions. Airports should look for systems that support standardized data structures and protocols and can be integrated with other web-based systems, mass notification systems, and other web-based communication tools that comply with accepted standards.

Full integration of the various systems located within the airport will require establishing contracts with software vendors and choosing products that coordinate with the airport's systems of interest; this is especially true when looking to integrate disparate or standalone systems. If a WBEMCT used by an airport implements a common alerting protocol (CAP), it may be more easily integrated with emergency management applications.

Systems that adhere to the same standards can interoperate without additional costs; conversely, non-interoperable systems will need to convert messages, requiring additional effort, tools, and costs. If a WBEMCT used by an airport implements EDXL standards such as CAP or

Table 3. Checklist for airports considering implementation of a web-based collaboration tool.

	Action	Responsibility	Done
	Convene Internal Meeting with Airport Stakeholders		
1	Consider inviting pertinent airport and local, state and federal emergency management partners	Airport Senior Manager (as appropriate)	☐
2	Determine requirement for standalone system, or system linked to city/county system	Airport Emergency Manager	☐
3	Identify the requirements column (refer to Figure 4)	Airport Senior Manager (as appropriate)	☐
4	Identify integration requirements—which in-house systems need to be incorporated into emergency management system (e.g., security cameras, door alarms, ID badges)	Airport Senior Manager (as appropriate)	☐
	Convene Meeting with External Stakeholders		
1	Consider inviting pertinent airport and local, state and federal emergency management partners	Airport Emergency Management, Public Safety Staff, Operations Staff (as appropriate)	☐
2	Discuss or review airport emergency action plan to understand information required by city/county emergency management agency and support required by airport	Airport Emergency Management	☐
3	Identify and validate the functional capabilities of the local emergency management system(s)	Airport Emergency Management	☐
4	Determine whether city/county system will satisfy airport requirements	Airport Emergency Management	☐
5	Evaluate ability to integrate airport systems into city/county system	Airport Emergency Management	☐
	Funding Considerations		
1	Identify operations funds	Airport Finance	☐
2	Identify grant options	Airport Finance	☐
3	Identify other funding sources (e.g., DHS, FAA)	Airport Finance	☐
4	Identify options for city/county emergency management agencies to fund or support airport system	Airport Finance	☐

resource management (RM), interoperability with other EDXL-compliant emergency management applications is ensured. The EDXL family of open standards produced by the Emergency Management Technical Committee at the Organization for the Advancement of Structured Information Standards (OASIS; www.oasis-open.org/committees/emergency) makes it possible to share information among emergency response and management service providers. It covers a growing range of the emergency management core functions. (For an overview of products that support EDXL standards, see www.oasis-emergency.org/products).

However, complete conversion may not always be possible in both directions. Some web-based systems establish non-standard protocols for sharing information with stakeholders using e-mail or data-sharing techniques, while other systems do not inherently have these capabilities. Either case may prevent broader scale interoperability.

System Security

Airport IT managers need to understand and apply airport system administrator rules to new systems being installed at their airport. This is especially true of WBEMCTs, which may contain sensitive security information (SSI) or proprietary information generally considered for official use only. As such, WBEMCTs should be considered mission critical software, and IT managers

The Pittsburgh Airport emergency manager serves as one of the system administrators for their web-based system. At other airports, the IT manager or the IT department fulfills this role.

will need take all appropriate security measures and establish standard operating procedures to ensure that daily usage of the system is in compliance with regulatory requirements associated with SSI and/or proprietary information.

To enhance system survivability, some vendors offer products that provide the ability to maintain a server at the airport with a backup server at another location, or even in a different city, and some vendors offer SaaS, where network data resides at the vendor location. At least one vendor maintains networks on each coast.

Nearly all systems require the use of a valid username and password for access, and most web-based systems have functional accounts where certain information is restricted or accessible only to those persons or agencies with a valid need to know. These functional accounts are based on emergency management naming schemes or functions such as operations, plans, or security. Web-based systems maintain historical records to show who entered data at what time, so incidents can be traced back to the source, which helps maintain accountability and reliability of the data source.

The Texas Division of Emergency Management uses 35 jurisdictional servers within its Interoperability Project.

Virtually all of the systems evaluated require an airport system administrator who can ensure that those persons or agencies with a valid need to know and who are consequently granted access meet the requirements for entering data into the system. Accounts are generally set up based on roles within the airport, and individuals are granted access to dashboard screens or maps as appropriate to their function within the system. Systems that contain sensitive law enforcement information, such as the National Law Enforcement Telecommunications System, grant access strictly on a need-to-know basis.

Cyber security is broadly defined as "the protection of personal or sensitive information stored in a computer or in a digital memory device." Cyber security is also concerned with the protection of physical information technology assets (hardware) from random attacks targeted to destroy or disable computer networks and workstations. The Radio Technical Commission for Aeronautics DO230D Integrated Security Systems for Airports standards address cyber security issues, and a proposed ACRP project for fiscal year (FY) 2013 seeks to address airport cyber security concerns in detail.

Airport IT staff work every day to protect users from malware, spyware, and more serious viruses that can wipe out a system. Ascertaining a threat and its source is an ongoing challenge, so IT managers need to remain vigilant in their cyber security efforts and work with software developers to enhance airport security. Cyber security threats can come from a variety of sources, such as social networks and cross-site scripting web attacks.

An airport's network consists of a number of disparate software applications. Sound cyber security measures are vital to making these applications available to those who need them while restricting access to potential threats. Nearly all of the applications evaluated utilize secure socket layer (SSL) protection procedures to enhance cyber security measures.

Airport IT managers can consult several sources when seeking to boost cyber security measures, including recent DHS-approved government guidelines on open-source cyber security tools for securing information shared across the Internet. Government agencies required to use cryptographic software validated to Federal Information Processing Standards now have access to Open Secure Socket Layer (Open SSL v2.0), which is free, publicly available security software that meets federal security guidelines.

Staffing

Web-based systems provide enhanced capability for the rapid sharing of information between departments and agencies both on and off the airport. Fewer phone calls, less messaging, and improved accuracy contribute to greater efficiency in communication among all stakeholders.

IT staff should expect a slightly increased workload resulting from the installation and maintenance requirements of web-based systems. The typical expected increase is 0.5 full-time equivalents for those systems that reside within the airport network infrastructure. SaaS applications will result in a negligible increase in staffing requirements, as those systems are maintained by the vendor.

Different airports address their needs for system administrators in different ways. For example, the PIT Emergency Manager is one of the system administrators for the airport's web-based system. At other airports, the IT manager or IT department head fulfills this function. Airports that use web-based SaaS systems rely on the vendor's system administrator. Several airports use web-based systems within their communications centers, dispatch centers, or airport command center. The ARFF chief, police chief, and their staffs also have access to these capabilities.

During critical events, ICs and EOC may require additional personnel for data entry. This will require extra training and associated costs.

Training

Airport personnel who connect through the city, county, or state system often receive very little training or support for their unique requirements. Software vendors often provide system administrator training for IT staff and can train any and all stakeholders at an airport. They can provide a wide variety of training resources, from computer-based tutorials and online resources to on- or off-site classes. Vendors generally employ the train-the-trainer method of instruction, so that designated employees who receive training can train others in the office. Nearly all web-based systems have online user manuals, and all offer advanced system administrator training.

Operations personnel need to be aware of the following concerns regarding training:

- It takes time to work with a vendor to train staff on new software releases. Based on the information provided by vendors and airport users, airport operators and IT staff can generally expect to spend 1 to 3 hours of training every quarter, depending on the impact of changes to a system.
- New version releases—generally one to two major updates annually—provide challenges to ensuring that all users receive appropriate training.
- WBEMCTs are not typically accessed on a daily basis. Currently, most users only log on periodically or during exercises. Since in these cases using these tools is not an ingrained habit, the tools can be less likely to be accessed when actually needed. For those who want to fully benefit from the capabilities that these systems can offer, daily use and/or regular training and refreshing helps create familiarity with the system and enhances proficiency, especially during critical situations.

CHAPTER 3

How to Fund a WBEMCT

The City of Indianapolis Division of Homeland Security's system was purchased using a combination of SHSP and UASI grants.

In order to purchase a WBEMCT, airports need to be apprised of available funding options. Funding sources may include emergency management project funding mechanisms and budgets. Airports can seek support through passenger or customer facility charges, Capital Improvement Plans (CIPs)/National Plan of Integrated Airport Systems (NPIAS), emergency management agencies (DHS/FEMA), bond issues, state block grants, public/private enterprises, strict revenues, special facilities charges and the like.

Airport Capital Purchase

Large hub airports often use their own revenue streams to purchase emergency management software systems that are usually tied into each airport's jurisdiction. Many airports receive funding for their systems through their city/county EMAs. Other grant opportunities exist from the DHS and state aeronautical agencies.

Airport Improvement Program

WBEMCTs are not eligible for Airport Improvement Program funding. Passenger facility charge personnel and training for emergency management are not eligible needs.

U.S. Department of Homeland Security Grant Funding

The El Paso City and County Emergency Management Agency purchased a system for the El Paso International Airport (ELP) with funding from a UASI grant.

DHS programs that provide grants to fund emergency management software systems include the Urban Area Security Initiative (UASI) and the State Homeland Security Program (SHSP); these programs are administered by the Homeland Security Grant Program (HSGP). Another grant program that may provide funding for WBEMCTs is the Operation Stonegarden program, which is also administered by HSGP. Additional information on HSGP can be found at http://www.fema.gov/fy-2012-homeland-security-grant-program.

- **UASI:** The 31 eligible urban areas are identified in the HSGP Funding Opportunity Announcement.
  - Total Funding Available: $490,376,000 (FY 2012).
  - Purpose: UASI program funds address the unique planning, organization, equipment, training, and exercise needs of high-threat, high-density urban areas and assist stakeholders in building an enhanced and sustainable capacity to prevent, protect against, mitigate, respond to, and recover from acts of terrorism.

  - Eligible Applicants: The State Administrative Agency (SAA) is the only entity eligible to apply to FEMA for UASI funds. A total of 31 high-threat, high-density urban areas were eligible for funding under the FY 2012 UASI program.
  - Program Awards: The allocation methodology for FY 2012 UASI is based on DHS's risk methodology and anticipated effectiveness based on the strength of the investment justification (IJ). Eligible candidates for the FY 2012 UASI program had been determined through an analysis of relative risk of terrorism faced by the 100 most populous metropolitan statistical areas in the United States, in accordance with the 9/11 Act.
- **SHSP:** The Homeland Security Act of 2002 (Public Law 107-296), as amended by section 101 of the Implementing Recommendations of the 9/11 Commission Act of 2007 (Public Law 110-53), provides funds for eligible applicants.
  - Total Funding Available: $294,000,000 (FY 2012)
  - Purpose: SHSP supports the implementation of state Homeland Security Strategies to address the identified planning, organization, equipment, training, and exercise needs to prevent, protect against, mitigate, respond to, and recover from acts of terrorism and other catastrophic events. SHSP also provides funding to implement initiatives in the State Preparedness Report.
  - Eligible Applicants: The SAA is the only entity eligible to apply to FEMA for SHSP funds. Recipients include all 50 states, the District of Columbia, Puerto Rico, American Samoa, Guam, the Northern Mariana Islands, and the U.S. Virgin Islands.
  - Program Awards: The allocation methodology for FY 2012 SHSP was based on three factors: minimum amounts as legislatively mandated, DHS's risk methodology, and anticipated effectiveness based on the strength of the IJ. Each state and territory received a minimum allocation under SHSP using the thresholds established in the 9/11 Act. All 50 States, the District of Columbia, and Puerto Rico received 0.35 percent of the total funds allocated for grants under Section 2003 and Section 2004 of the Homeland Security Act of 2002, as amended by the 9/11 Act, for SHSP. Four territories (American Samoa, Guam, the Northern Mariana Islands, and the U.S. Virgin Islands) received a minimum allocation of 0.08 percent of the total funds allocated for grants under Section 2003 and 2004 of the Homeland Security Act of 2002, as amended by the 9/11 Act, for SHSP.
- **Investment Justification (UASI and SHSP):** As part of the FY 2012 HSGP application process for SHSP and UASI funding, the IJ needed to demonstrate how proposed projects addressed gaps and deficiencies in delivering one or more core capabilities outlined in the National Preparedness Goal. Applicants were also required to describe engagement with and/or impacts on the general population, including children and persons with disabilities and others with access and functional needs. A successful IJ demonstrates the ability to provide enhancements consistent with the purpose of the program and guidance provided by FEMA.
  - In FY 2012, DHS required that at least one fusion center investment from a state provide funding support to the state's primary fusion center, as designated by the governor. In addition, FY 2012-eligible UASI urban areas were required to provide an IJ for the DHS-recognized fusion center within the urban area. Note that fusion center-related funding requests were required to be consolidated into a single investment for state or urban areas in which recognized fusion centers reside. Grantees were required to coordinate with the fusion center when developing a fusion center investment prior to submission.
  - The following process was used to evaluate the anticipated effectiveness of the proposed investments and to make awards under the UASI and SHSP:
    - FEMA verified compliance with all administrative and eligibility criteria identified in the funding opportunity announcement, including required submission of the IJ by the established due dates.
    - IJs were evaluated for completeness, adherence to program guidelines, and anticipated effectiveness of proposed investments. Only the information included in the IJ was

assessed in the review process. State and urban area homeland security strategies were reviewed to ensure overall strategic alignment of the investments, but were not scored.

Acquiring a System or the Rights to a System Under a Regional Entity (City or County)

Financial support from airports' representative state aeronautical agencies may provide a source of funding for WBEMCTs. The flexibility of these agencies applies only to state appropriations that they control, not to federal pass-through funds or block grants.

CHAPTER 4

Creating a Successful WBEMCT

Operational Requirements for WBEMCT Implementation

Line managers determining the costs and benefits of obtaining or installing a system can begin by contacting their local EMA(s). In most cases, these local agencies have the capability to provide airport operators with a username/password to access their WBEMCT, which often results in improved communications and coordination functionality among the airport and involved agencies. While there may be no direct purchase cost, minimal costs will be incurred for site/user license(s), time, and materials training.

On an operational level, the following core capabilities can satisfy the basic requirements for an airport's WBEMCT system:

- Operation within the airport's current network design,
- Communication tools within an airport system that help relay data to external emergency management systems, and
- Resource tracking tools to document and preserve time-stamped records of actions taken.

Effective WBEMCTs track the following areas of concern for an airport:

- *Internal Inventory.* Provides the status of key internal airport items including airport emergency facilities, systems and equipment, and personnel.
- *Immediate and Long-Term External Provisions.* Provides the status of emergency facilities, regular facilities, systems and equipment, personnel, sustenance, and so forth.
- *Intelligence and Communications.* Provides tools to support real-time monitoring and situational awareness through the use of radio, telephones, video, public address systems, and video displays.
- *Logistics.* Provides tools to support procurement efforts, production, distribution, recovery, and disposal.
- *Conditions.* Provides information regarding ongoing internal situations such as crowd control, traffic control, and airspace management, as well as external conditions such as weather, unexpected events, and disaster relief efforts.
- *Access.* Provides tools for communicating with internal and external stakeholders such as government, commercial entities, and public and private users.

Schematics

To determine the best approach to meet their needs, the sample network architecture depicted in this section can guide airport IT staff through follow-on discussions.

Hierarchies and command links should be unambiguously wired into the architecture of any system adopted by an airport so that the role, responsibility, and status of each EOC (e.g., airport

EOC, city/county EOC) and web-based system is clear. The greater the degree of interconnectedness, the clearer the lines of command must be.

Integrating application solutions into a cohesive system is a challenge for any airport, and as the number of systems incorporated increases, so does the cost. Software vendors can provide a fully integrated solution, but initial costs will be more substantial.

If it is necessary to maintain data integrity within an airport, a dedicated server can be established for airport personnel. There are several positive aspects to hosting a network within the airport, foremost of which are the speed of the application, direct access to the system at the airport, and protection from external access. The most prohibitive drawback is cost, as installing a central server (or a strategically distributed collection of servers) and interfacing with the appropriate systems require time and money.

Figure 5 depicts a sample design for an airport-based server as well as the usual key participants.

Two alternatives to a central server-based WBEMCT are SaaS (also known as a subscription service) and a direct tie-in to an EMA. While more cost-effective, connection to a SaaS system through a web-based server, which is stored and maintained at a host location, can often be sluggish, so access to needed applications may be delayed. Furthermore, if the connections pass through the Internet or other public networks, the security and integrity of data may not be guaranteed.

For airports looking for purely emergency management software solutions, or for those unable to support a more robust system, a more cost-effective solution involves a direct tie-in with the system of the local or state EMA. Airports that tie in with their local EMA may have access to those systems at little to no additional cost, and most software vendors can provide this level of support at a significantly reduced price. These solutions can be cloud-based (purely web-based

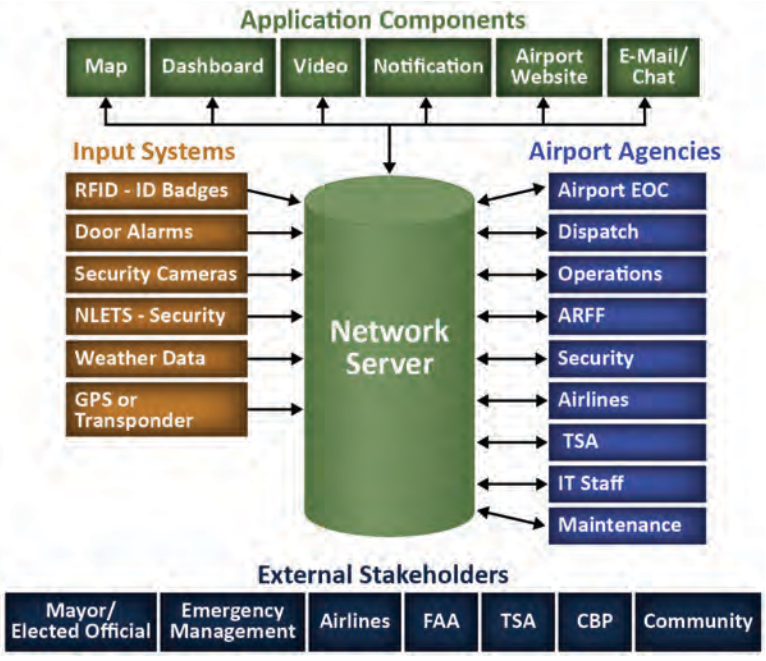

Figure 5. Sample WBEMCT features and users [RFID = radio-frequency identification, NLETS = National Law Enforcement Telecommunications System (justice and public safety information sharing network)].

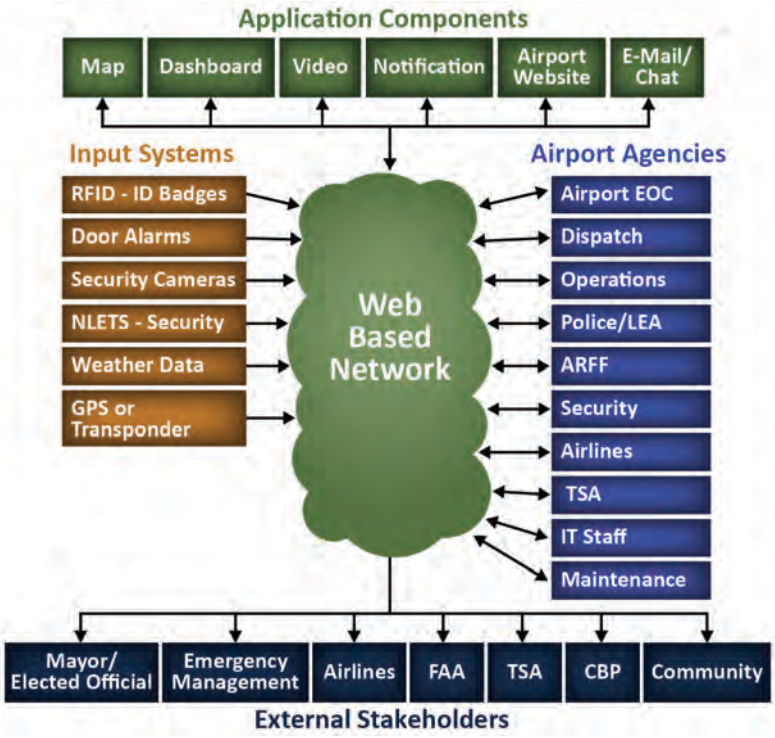

Figure 6. Sample SaaS WBEMCT network features and users (LEA = law enforcement agency).

collaboration) or supported by a central server at the airport. Figure 6 illustrates how software vendors can provide these services through SaaS by establishing servers at a primary location (i.e., at the airport) and a secondary location, perhaps in another city. Multiple servers improve redundancy and survivability.

A great deal of integration is still required between systems. Some software vendors can provide a fully integrated solution, or the airport's own software team may integrate the vendor's locally hosted system. Vendors can guide airport IT staff in follow-on discussions to determine the approach that best meets their requirements.

Figures 7 and 8 provide examples of Web-based emergency management configurations.

System Security and Concerns

All of the systems surveyed require usernames and passwords for access, and most web-based systems have functional accounts where certain information is restricted or only accessible to those with a need to know. These functional accounts are generally based on emergency management naming schemes or functions such as operations, plans, or security. Law enforcement-sensitive information is available on some systems, again strictly accessible on a need-to-know basis. Additional restrictions and procedures may be needed to ensure compliance with DHS requirements.

For airports looking to tie into a web-based system such as an SaaS or vendor-hosted system, the vendor will provide enhanced security measures to mitigate cyber security concerns. For airports with a system hosted on an airport server, the IT manager or system administrator will need to address cyber security issues. Transport mechanisms such as the Emergency

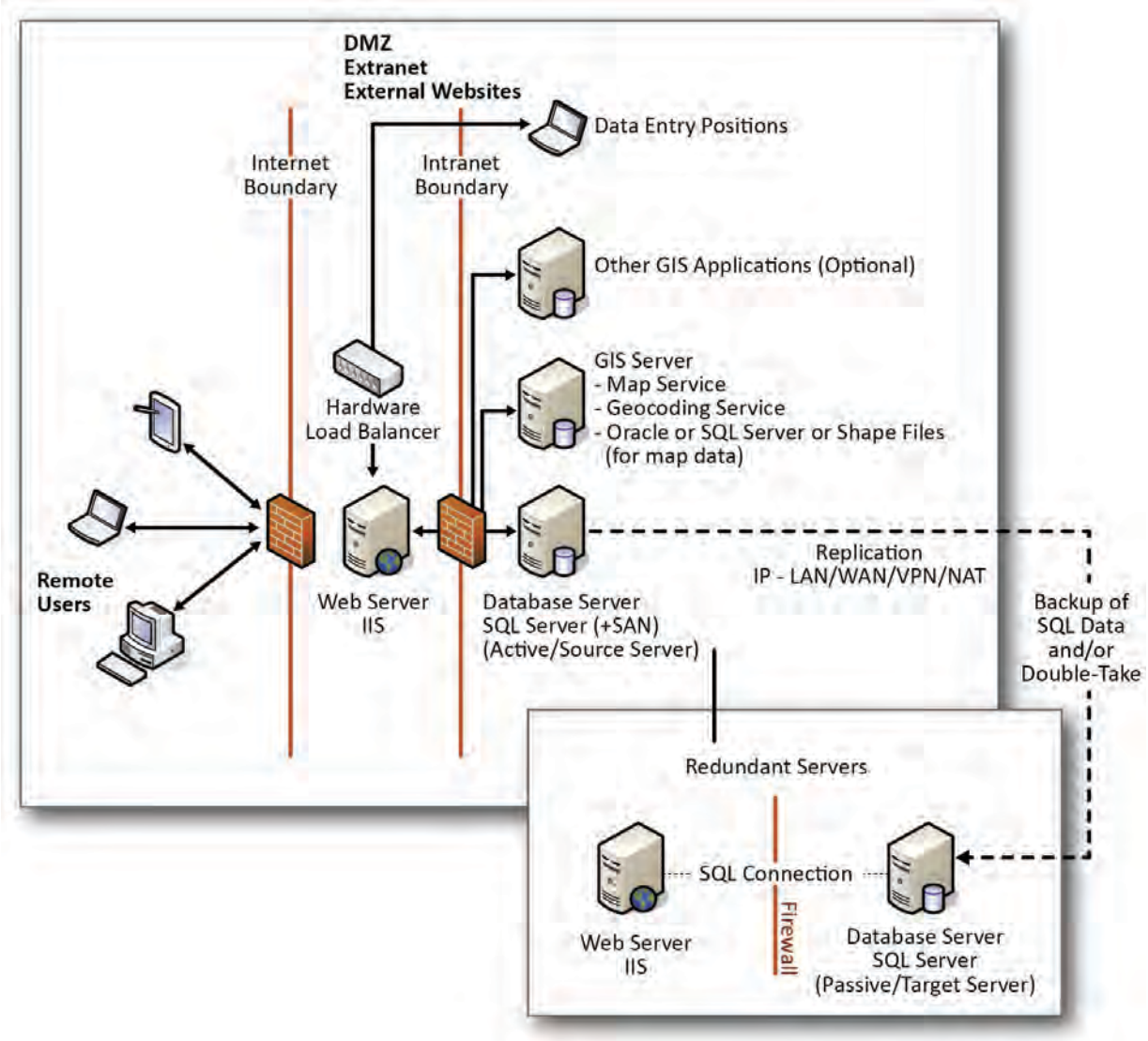

Figure 7. Example of web-based emergency management configuration (DMZ = demilitarized zone, SQL = structured query language, IIS = Internet information services, SAN = storage area network, IP = Internet protocol, LAN = local area network, WAN = wide area network, VPN = virtual private network, NAT = network address translation).

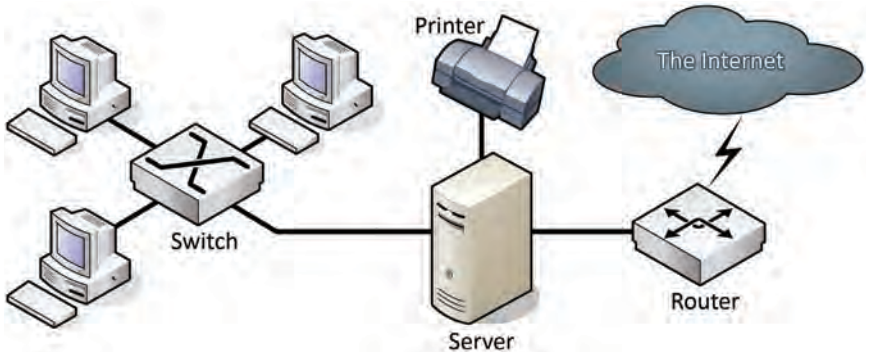

Figure 8. Example of web-based emergency management configuration.

Data Exchange Language-Distribution Element (EDXL-DE) also provide policy-based routing of messages, proper sequencing, tracking, and non-repudiation. Suggested WBEMCT security details are as follows:

- Login and password should be required.
- Biometrics should be used for access to sensitive areas.
- Security measures should be inherent in application.
- Input should be based on duty, position, or role.
- Application should support secure socket layer.
- Application should implement access controls.

Regardless of where the software or hardware is hosted, all users should remain diligent about computer security procedures. A WBEMCT can also document and record actions taken, so, in the event of legal proceedings, the system can provide a useful historical record of actions taken by airport personnel.

CHAPTER 5

WBEMCT Best Practices

Best Practice Recommendations for Day-to-Day Operations

All of the vendors surveyed utilize standard desktop workstations to provide web-based access to their emergency management systems. While a number of airports primarily use their web-based systems only during city/county emergency management exercises and drills, a WBEMCT has aspects that can prove useful for daily airport operations. Users can do the following:

- Develop or configure unique dashboards to make the system more applicable for daily use.
- Replace manual logbooks with a logbook feature, which streamlines the process and ensures compliance and accuracy.
- Track and document maintenance issues at the airport.
- Track and document internal security issues as they arise.
- Use GIS mapping features integrated with aircraft transponders to track inbound and outbound aircraft.
- Use global positioning system (GPS) tracking devices to integrate vehicle movement in the COP map.
- Incorporate video from the airport's CCTV cameras into the system.
- Establish interfaces with all airport systems (e.g., video, door alarms, employee badges, video of airside vehicles and aircraft) and incorporate them into a single application.

A cloud-based WBEMCT was used during the 2008 Democratic National Convention in Denver, Colorado, to set up page-based forums—or "situation rooms"—almost instantly.

Table 4 identifies the airports surveyed that currently employ WBEMCTs. Note that of the 47 airports interviewed, very few currently utilize their systems on a daily basis.

Available Training

Specific training for system administrators is generally conducted on site, although several vendors offer classes specifically designed for IT personnel. Vendors offer training upgrades when new version releases are distributed. The primary method used to relay this information throughout the airport is "training the trainer." Depending on the type of maintenance package in place, vendors offer recurring training or introductory training to users.

Sample Exercises

Users who do not utilize a system on a routine basis (i.e., weekly) can quickly forget how to maneuver around the numerous screens within a web-based system. For example, many infrequent users generally cannot recall their username and password. The best solution to this problem is for

Table 4. Airports interviewed with WBEMCTs.

Airport	Size	System Used	System Used	Funding Source	Individual Interviewed or Airport Manager
DEN	Large	WebEOC	Exercises	Operations	Scott Field
LAX	Large	E-Sponder/ Situator	Exercises	UASI	Dominic Nessi
DTW	Large	E-Team	Daily	County	Sandy Altschul
SEA	Large	WebEOC	Exercises/ Emergencies	Operations	David Smith
SEA	Large	OPSNET	Daily	Operations	Mark Reis
MCI	Medium	Everbridge	Exercises	Operations	Ian Redhead
MEM	Large	Everbridge	Exercises	Operations	Connie Brown
AUS	Medium	WebEOC	Daily	City/Airport	Jim Smith
PIT	Large	KnowledgeCenter	Daily	County	Byron Harriger III
BUR	Medium	WebEOC	Exercises	City	Airside Operations
MKE	Medium	E-Sponder	Exercises	County	CB Bateman
RNO	Small	WebEOC	Daily	Operations	Mike Scott
ELP	Small	WebEOC	Daily	County	Terry Sharp
COS	Small	WebEOC	Exercises	County	John McGinley
BOI	Small	WebEOC		County	Rebecca Hupp
VNY	General Aviation	Everbridge		Operations	Jess Romo
DVT	General Aviation	E-Sponder	Exercises	Operations	Art Fairbanks

personnel to utilize the system on a regular basis so that they remain comfortable and proficient with the software. Operator training is a perishable skill whose loss could result in the unnecessary use of airport or vendor resources and/or serious repercussions in an emergency. Here are some tips for retaining skills:

- Use the features of the electronic logbook to document and track maintenance efforts throughout the airport.
- Create weekly or monthly reports to highlight maintenance updates.
- Participate in frequent emergency management discussions, drills, and exercises with local, state, and federal EMAs and participants.

CHAPTER 6

Developing a Successful WBEMCT

Airport operators usually rely on a single person in their operations or emergency management departments to handle their emergency management function. Therefore, personnel using these systems typically use them only to request mutual aid through their local EMAs when the need arises. Even fewer airports utilize web-based systems for routine airport-specific operations. Ideally, airport operators will look for systems that satisfy the following:

- Pass FEMA NIMS Supporting Technology Evaluation Program testing requirements;
- Are cost effective; and
- Are highly configurable so they can be customized to meet user requirements.

Airport operators appear to be more satisfied with the system they use when they work with city or county emergency management agencies. It follows that the more they use the system, the more comfortable they are using it. This partnering approach—when airports systems mirror those of city and county systems—results in better working relationships, which are critical during actual incident management.

The following questions may be considered by not only the airport operator, but by all of the various stakeholders, prior to initiating a WBEMCT:

- What information needs to be shared between airports and EMAs?
- What is the purpose associated with sharing data between agencies?
- How often does this information need to be updated?
- Are there policies in place to guide airport operators?
- Will updates from the airport WBEMCT automatically update appropriate EMA dashboard screens?
- Who is responsible for these updates?
- Are airport managers willing to implement and commit resources to updating these systems?
- Are airport managers willing to commit, implement, and review security obligations and data protection schemes?

Criteria for Choosing a WBEMCT

This section provides guidelines for criteria an airport should consider when evaluating software vendors or applications, documented via a review of current literature, airport interviews, and case studies. While not all-encompassing, it provides a good starting point. Appendix A provides a sample checklist that identifies features to consider when selecting a WBEMCT. This checklist is not all-inclusive, as airport operators will always seek unique features suited to their specific needs.

Most of the systems reviewed were purely web-based. Airport operators can access web-based systems from their desktop workstations or from most Internet-accessible devices. Network

administrators are generally responsible for airport systems throughout the system's entire life cycle, from selection of the appropriate number of workstations to maintenance and replacement.

For those airports that utilize city or county web-based emergency management systems, only a username and password is required. Site or user licenses, brief user training, and internal support may also be necessary. Airport personnel may be assigned the role of planner or operations, with dashboards available to view, edit, run reports, and perform other functions.

While unique airport requirements may necessitate operators adopting a system different from that of their associates, the necessity of extra cost and training is an important factor to keep in mind. Airports using a web-based emergency management system different from that of their city or county emergency management agencies may have to bear the cost of integrating the two disparate systems. In addition, EMA representatives may be reluctant to come into the airport EOC and use a different system than the one they are accustomed to using.

Appendix B provides a sampling of some of the emergency management systems available in the marketplace as of mid-2012.[2]

Core Capabilities

For airports that lack the funds to install a fully integrated or SaaS system, some core capabilities are available at little to no cost, as follows:

- The dashboard provides the status of systems and airport capabilities and is the core function of any WBEMCT.
- The COP incorporates maps, icons, and other features and provides a GIS displaying exact locations and their surrounding environments.
- Weather applications are incorporated into dashboards and COPs and are an integral element of all WBEMCTs.
- Record-keeping tools track inventory, budgets, actions taken, and the like.

Level 1 Enhanced Features

Airports that are able to obtain grant funds, operations funds, or funding from other sources may consider entering into a contract with the software vendor to integrate these additional features into their WBEMCT, as follows:

- Unique Airport Dashboard: Software vendors can create or modify dashboards to meet the unique needs of airport operations.
- Integration into Emergency Management Systems: Airports need to integrate their systems to automatically populate data on EMA dashboards. This integration can occur from the data-element level through to the COP.
- Unique COP: Enhancement of the basic COP provides airport-unique maps and the ability to add specific features helpful to the airport.

Level 2 Enhanced Features

In an environment where airports are willing and able to incorporate even more features into their WBEMCT, the following system enhancements are available:

- Enhanced GIS Maps with more icons and tools for airport emergency management personnel.
- Integration with airport CCTV systems.

[2] Information listed here reflects research conducted in March 2012; refer to systems' websites for changes and enhancements to these applications.

- Integration with security systems (tracking badges and locations).
- Integration with GPS tracking (vehicles).
- Integration of GPS/transponder (aircraft).
- Integration of communication tools to include reverse 911, broadcast messages, and notification system with the ability to contact airport employees.
- Integration with social media tools.
- Access to WBEMCT on cell phones, tablets, and so forth.

Lessons Learned

What to Do

For those who desire their own standalone system, SaaS is as an alternative to purchasing a separate server (with backup); this option may be more cost effective. When purchasing an emergency management system, it is important to do the following:

- Understand all costs up front, including costs for installation, integration, training, system administrator training, version upgrades, enhancements, and licensing.
- Consider recurring or annual costs for maintaining the system.
- Develop an end-to-end list of requirements, including operational needs and information flow requirements.
- Evaluate the software's ability to exchange data with the municipal EMA.
- Ensure that the requirements and costs for notification systems that may include an integrated public alert and warning system capability are understood. Several software vendors include a mass notification capability or tie in to a third-party vendor to provide this service.

What *Not* to Do

First, to avoid a poor fit, it is best not to favor a specific system before evaluating requirements. Rather, the process of determining the airport's needs will ideally be completed *before* evaluating available systems. It is best to allow actual needs to guide the choice of web-based tools, instead of purchasing and/or implementing systems that do not serve the specific, unique requirements of an individual airport.

Second, operators will ideally avoid purchasing a system different from the one used by their city and/or county EMA, as additional funds may be required to integrate the two disparate systems.

And third, forcing a solution upon the end user can result in added frustration and lower productivity for the people who actually use the system. Administrators who ultimately decide on a system need to consult with end users and keep their needs in mind during the selection process. When consulting with stakeholders, the following questions can be helpful:

- How can the people who will use the system best be involved in the requirements process?
- What are the current procedures?
- What needs are identified; what gaps are the stakeholders trying to fill?
- How can airport operations be more efficient and effective?

Reliability and Accuracy of Shared Data

Airports routinely utilize command centers and emergency operations centers during incidents. To be truly useful, information shared on web-based emergency management systems must be accurate: it is only as good as the data provided. Further, in today's world of instantaneous

communications, incidents can rapidly go viral, so dissemination of information must be managed carefully, and release of misinformation must be prevented. As Mark Twain observed, "A lie can travel halfway around the world while the truth is still putting on its shoes."

With these points in mind, the following questions should be considered during the selection of a WBEMCT:

- What is the purpose associated with sharing data between agencies?
- What policies are in place to guide airport operators?
- What information needs to be shared between airports and emergency management agencies?
- How often does this information need to be updated?
- Will updates automatically transmit to the appropriate EMA dashboard screens?
- Who is responsible for these updates?
- Are airport managers willing to commit resources, both staffing and funding, to update these systems?
- Are airport managers willing to commit, implement, and review security obligations and data protection schemes?

Conclusions

While existing web-based emergency management collaboration systems are generally not tailored to airports at this time, a number of available systems have the potential to support more fluid and effective airport operations both in crisis situations and during day-to-day operations. This primer provides an initial roadmap for airports to consider when identifying their unique requirements and engaging in the decision-making process. At this point, a comprehensive list of requirements for an all-inclusive dedicated airport emergency management system does not exist; however, as more airports adopt these types of systems, more lessons will be learned and improved best practices will be developed, documented, and disseminated.

There is no one-size-fits-all solution. Airports that currently do not use WBEMCTs, especially those with limited funds, will ideally first work in conjunction with their local or state EMAs to see if they can obtain free or low-cost access to their emergency management systems. Those with more funding available need to explore their options carefully. Currently, no standalone web-based system is developed specifically for airports, but most emergency management software vendors can custom tailor their applications for an additional cost.

Developing and implementing a WBEMCT promises other benefits not fully discussed herein. For example, a fully-integrated web-based system may help airports and airlines improve customer service and avoid the negative consequences of irregular operations. The use of these systems may also help airports meet the needs imposed by TSA requirements and FAA Part 139 for NIMS/ICS, efficiency in planning and recording drills, and assessing after-action reports for use of resources and possible reimbursement documentation. In addition, new requirements are looming for the adoption of safety management systems and safety records management; web-based systems may generate efficiencies and improve the quality of information used in making safety decisions.

Enhancements implemented at one airport can benefit all airports utilizing a specific system, and use of WBEMCTs may yield unanticipated direct and indirect benefits in the future. As more and more airports explore the benefits and drawbacks of utilizing these systems, further research and updates will yield useful insights into the practical applicability of WBEMCTs in airport management.

APPENDIX A

Requirements Matrix

	Current Use of System	Responsible Individual	Applicable to Airport	Score (1–5, 5 is highly applicable)
1	Software is tailored for use at airports	Software selection team	☐	_____
2	Airports use this system day to day	Software selection team	☐	_____
3	Airports use this system during contingency operations	Software selection team	☐	_____
4	County/parish/city emergency management agencies use the system for their day-to-day operations	Software selection team	☐	_____
5	State emergency management agencies use this system for their day-to-day operations	Software selection team	☐	_____
	Software Specifications–Basic Capabilities	**Responsible Individual**	**Applicable to Airport**	**Score (1–5, 5 is highly applicable)**
1	Tracks and manages multiple incidents generally well	Software selection team	☐	_____
2	Software can be used at multiple locations simultaneously	Software selection team	☐	_____
3	Incorporates networked video sensor systems	Software selection team	☐	_____
4	Can be used to assign resources	Software selection team	☐	_____
5	Can be used to track resources	Software selection team	☐	_____
6	Can track hours by individual against specified task or project	Software selection team	☐	_____
7	Can remind operator to follow up on specified task based on time increment	Software selection team	☐	_____
8	Tracks all incident responses and their history	Software selection team	☐	_____
9	Provides status change notification/auto refresh	Software selection team	☐	_____
10	Dashboard available for airport managers	Software selection team	☐	_____
11	Allows a user to query by incident number, time, and event	Software selection team	☐	_____
12	Allows manual input of restricted areas	Software selection team	☐	_____
13	Provides ability to produce daily/monthly incident status reports	Software selection team	☐	_____

	Map Display	Responsible Individual	Applicable to Airport	Score (1–5, 5 is highly applicable)
1	Offers the ability to control visibility of geospatial layers to include meteorological, roads, and terrain	Software selection team	☐	_____
2	Can automatically zoom in/out between mapping systems	Software selection team	☐	_____
3	Can import/export mapping data from/to other systems (publish)	Software selection team	☐	_____
4	Uses hot keys to return display to home screen	Software selection team	☐	_____
5	Allows center on cursor	Software selection team	☐	_____
6	Allows center on object (stationary)	Software selection team	☐	_____
7	Allows center on moving object	Software selection team	☐	_____
8	Allows display, and center on latitude/longitude location	Software selection team	☐	_____
9	Allows the user to add and display incident site information	Software selection team	☐	_____
10	Allows the user to display data in multiple coordinate systems	Software selection team	☐	_____
11	Can track aircraft in real time on the runway	Software selection team	☐	_____
12	Can track vehicles in near real time on the tarmac	Software selection team	☐	_____
13	Tracks emergency response vehicle locations in near real time	Software selection team	☐	_____
14	Can display crash, spill, fire, accident, or incident sites	Software selection team	☐	_____
15	Allows various airport agencies to input data	Software selection team	☐	_____
16	Displays regional jurisdiction boundaries	Software selection team	☐	_____
17	Integrates external medical, emergency management, security forces, fire, and EOC information	Software selection team	☐	_____
18	Displays security sensor locations and nominal coverage or fields of view	Software selection team	☐	_____
19	Displays security alarm activation status	Software selection team	☐	_____
20	Displays security gate locations and status	Software selection team	☐	_____
21	Displays gate status	Software selection team	☐	_____
22	Generates and displays guard post locations, assets, weapons, and coverage	Software selection team	☐	_____
23	Displays local airport emergency facility locations	Software selection team	☐	_____
24	Provides measurement tools (distance between objects on a map); follows roadways	Software selection team	☐	_____
25	Allows user input and display of on-scene command post locations	Software selection team	☐	_____
26	Displays sectors, patrol routes, and restricted areas	Software selection team	☐	_____
27	Displays building numbers, addresses, and points of contact	Software selection team	☐	_____

28	Displays collection areas such as evacuation, casualty, and staging areas	Software selection team	☐	_____
29	Depicts and displays destroyed and affected facilities	Software selection team	☐	_____
30	Allows the user to manually create/modify response routes	Software selection team	☐	_____
31	Generates optimal routes for incident response	Software selection team	☐	_____
32	Provides graphical situational awareness of the scenario	Software selection team	☐	_____
33	Allows for input or link to video systems (CCTV feeds)	Software selection team	☐	_____
34	Provides array of drawing tools, text boxes (and icons) that can be shared across the network	Software selection team	☐	_____
35	Integrates and displays chemical, biological, radiological, nuclear, and high yield explosives (CBRNE) air dispersion model results	Software selection team	☐	_____

	Weather	Responsible Individual	Applicable to Airport	Score (1–5, 5 is highly applicable)
1	Displays weather information	Software selection team	☐	_____
2	Allows a user to manually override weather information	Software selection team	☐	_____

	Networking	Responsible Individual	Applicable to Airport	Score (1–5, 5 is highly applicable)
1	Installation of a central server required	Network administrator	☐	_____
2	Installation of a backup server required for redundancy	Network administrator	☐	_____
3	System operates as software as a service	Network administrator	☐	_____
4	Software vendor provides sample topography for network design	Network administrator	☐	_____

	Internal and External Communications	Responsible Individual	Applicable to Airport	Score (1–5, 5 is highly applicable)
1	Provides built-in mass notification system (with updates)	Software selection team	☐	_____
2	Integrates with mass notification system (third-party)	Software selection team	☐	_____
3	Integrates with reverse 9-1-1 systems	Software selection team	☐	_____
4	Accepts inputs from social media tools	Software selection team	☐	_____
5	Sends information to social media tools	Software selection team	☐	_____
6	Third-party frameworks are used by the applications	Network administrator	☐	_____
7	Supports third-party application programming interface (API)	Network administrator	☐	_____
8	Creates any API	Network administrator	☐	_____
9	Supports the use of Facebook	Software selection team	☐	_____
10	Supports the use of Twitter	Software selection team	☐	_____
11	Supports the use of Short Message Service (text messages)	Software selection team	☐	_____

	Standards, Interoperability, Checklists, and Reporting	Responsible Individual	Applicable to Airport	Score (1–5, 5 is highly applicable)
1	Provides NIMS-compliant forms and incident reports	Software selection team	☐	_____
2	Derives requirements from internal emergency management policy guidance	Software selection team	☐	_____
3	Ability to incorporate locally developed emergency checklists	Software selection team	☐	_____
4	Automated tools to populate incident action plans	Software selection team	☐	_____
5	Provides automated updates to county or state EOCs	Network administrator	☐	_____
6	Compliant with common alerting protocol (CAP) to enable enhanced sharing with emergency management agencies	Network administrator	☐	_____
7	OASIS emergency data exchange language – distribution element	Network administrator	☐	_____
8	OASIS emergency data exchange language-hospital availability exchange	Network administrator	☐	_____
9	OASIS emergency data exchange language-resource messaging	Network administrator	☐	_____
10	Software is configurable—can be modified by system administrator	Network administrator	☐	_____
11	Software is compatible with other systems used by county or state emergency management agencies	Network administrator	☐	_____
12	Accepts inputs from external systems	Network administrator	☐	_____
13	Automatically updates data on city/county WBEMCT	Network administrator	☐	_____
14	Exports information into various formats [keyhole markup language (KML), extensible markup language (XML), JavaScript object notation (JSON)]	Network administrator	☐	_____
15	Provides an information archive capability	Software selection team	☐	_____
16	Easily integrates with airport geographic information systems (GIS) maps	Software selection team	☐	_____
17	Provides portability to various hardware platforms	Network administrator	☐	_____
18	Software can run on existing hardware at the airport	Network administrator	☐	_____
19	Functions on standard desktop configuration	Network administrator	☐	_____
20	Uses data supplied by the third-party vendor	Network administrator	☐	_____
21	Exports data to hand-held devices, laptops, and wireless	Network administrator	☐	_____
22	System is built using open-source frameworks	Network administrator	☐	_____
23	Available as open source for other developers	Network administrator	☐	_____
24	Software supports any open protocols	Network administrator	☐	_____
25	GIS supports the Open Geospatial Consortium (OGC)	Network administrator	☐	_____
26	GIS adheres to published standard for communicating geographic data [e.g., Esri/shapefile (SHP), KML, National Geospatial-Intelligence Agency (NGA)]	Network administrator	☐	_____

	Security	Responsible Individual	Applicable to Airport	Score (1–5, 5 is highly applicable)
1	Login/password required	Network administrator	☐	_____
2	Security measures inherent in application	Network administrator	☐	_____
3	Input based on duty/position/role	Network administrator	☐	_____
4	System is available as open source for developers	Network administrator	☐	_____
5	Supports secure socket layer (SSL)	Network administrator	☐	_____
6	Supports remote access	Network administrator	☐	_____
7	Supports system logs	Network administrator	☐	_____
8	Supports access control	Network administrator	☐	_____

	Maintenance and Technical Support	Responsible Individual	Applicable to Airport	Score (1–5, 5 is highly applicable)
1	Vendor provides technical support during regular business hours	Software selection team	☐	_____
2	Company provides customer training classes on site	Software selection team	☐	_____
3	System administrator training is required	Network administrator	☐	_____
4	Vendor supports 24-hour service center	Network administrator	☐	_____
5	Vendor supports daylight hours service center	Network administrator	☐	_____
6	Web-based training available for customers	Software selection team	☐	_____
7	Web-based documentation provided	Software selection team	☐	_____
8	Software has documented user manuals and reference guide	Software selection team	☐	_____
9	New software versions are released quarterly	Software selection team	☐	_____
10	New software versions are released annually	Software selection team	☐	_____
11	Software customization support available	Software selection team	☐	_____

	Liability Issues and Mitigation Measures	Responsible Individual	Applicable to Airport	Score (1–5, 5 is highly applicable)
1	Sensitive law enforcement data available on system	Software selection team	☐	_____
2	Security measures in place to ensure access only to law enforcement personnel as appropriate	Software selection team	☐	_____
3	Displays restricted area and critical assets and infrastructure	Software selection team	☐	_____
4	Captures and displays status of facilities	Software selection team	☐	_____
5	Can incorporate building, floor, utility, and evacuation plans	Software selection team	☐	_____

	System Reliability and Reponsiveness	Responsible Individual	Applicable to Airport	Score (1–5, 5 is highly applicable)
1	System manages a timely refresh rate	Software selection team	☐	_____

	Funding	Responsible Individual	Applicable to Airport	Score (1–5, 5 is highly applicable)
1	Initial operational set-up costs (using existing desktop computers and assuming there is a requirement for 10 workstations at an airport):	Software selection team	☐	_____
1.1	Less than $25,000	Software selection team	☐	_____
1.2	$25,000—$50,000	Software selection team	☐	_____
1.3	$50,000—$100,000	Software selection team	☐	_____
1.4	$100,000—$300,000	Software selection team	☐	_____
1.5	More than $300,000	Software selection team	☐	_____
2	Annual operating and maintenance costs (does not include desktop refresh):	Software selection team	☐	_____
2.1	Less than $25,000	Software selection team	☐	_____
2.2	$25,000—$50,000	Software selection team	☐	_____
2.3	$50,000—$100,000	Software selection team	☐	_____
2.4	$100,000—$300,000	Software selection team	☐	_____
2.5	More than $300,000	Software selection team	☐	_____
3	Purchase of vendor-provided software licenses required	Network administrator	☐	_____
4	Vendor provides annual maintenance (licensing) options	Network administrator	☐	_____
5	Additional cost for periodic version upgrades	Software selection team	☐	_____
6	Defects are covered under maintenance agreements	Network administrator	☐	_____
7	Enhancements to the system are available	Software selection team	☐	_____
8	Specific customization options are included in initial setup	Software selection team	☐	_____
9	Additional costs for mapping, charting, imagery license fees	Software selection team	☐	_____

APPENDIX B

A Sampling of WBEMCTs

The following list contains a brief description of some of the emergency management systems available in the marketplace as of mid-2012.[3]

CommandCore

Developed by TechRadium
Website: http://www.domesticpreparedness.com/Industry/Industry_Updates/TechRadium_Inc._Introduces_CommandCore_-_The_Next_Generation_in_Emergency_Management/

CommandCore provides an integrated platform to prepare for, respond to, and recover from emergencies, disasters, and threats. As a technology tool for emergency management, CommandCore is used to strengthen and improve the acquisition of information, analyze data, coordinate activities, and initiate mass communications. The CommandCore dashboard accomplishes the following:

- Provides information in real time while conforming to the National Incident Management System (NIMS).
- Uses a variety of methods to communicate with essential personnel—including one-to-one and one-to-many—through the use of mobile devices, land and mobile radios, and the like.
- Utilizes the GPS to identify individuals on a map (using multi-point polygons or circles) and to contact them.

DisasterLAN

Developed by Buffalo Computer Graphics
Website: http://www.buffalocomputergraphics.com/content/pages/dlan-crisis-info-mgmt-system

The DisasterLAN incident management system with status board tracking capability accomplishes the following:

- Collects, tracks, and reports incident information and resources;
- Uses a color-coded situation awareness module that highlights call center entries;

[3] Information listed here reflects research conducted in March 2012; refer to the systems' websites for changes and enhancements to these applications.

- Includes NIMS-compatible ICS forms;
- Provides the ability to develop incident action plans;
- Links to emergency management agencies;
- Maintains graphical interface system mapping capability;
- Provides a streaming video module;
- Provides a weather module with local, regional, and national weather data;
- Has broadcast message capability; and
- Produces customized reports.

E Team, E-Sponder Express, E-Sponder Alerts, and NC4 Risk Center

Developed by NC4
Website: http://www.nc4.us/ESPONDER.php

This collaboration tool assists first responders in effective incident management by facilitating data tracking and real-time communication. It requires servers, but may be able to reside on an existing airport system, and it could also be set up as SaaS. It is secure and interoperable with emergency management agencies. It includes the following features:

- Configurable templates that enhance flexibility;
- The capability to develop incident action plans;
- A dashboard to track incidents and responses;
- Position logbook, chat capability, checklists, and customized reports;
- Automated field updates on various dashboard screens based on a single data entry;
- Documented resource accountability that supports after-action reporting;
- NIMS-compatible ICS forms;
- Message capability through E-Sponder Alerts;
- Maps recognized by E-Sponder Express, which can be imported and exported;
- GIS mapping capability that visually communicates critical information using Bing maps or Esri map services; and
- A Risk Center that includes active weather alerts, monitors global risk inputs, and alerts operators about areas of concern.

Knowledge Center

Developed by Knowledge Center
Website: http://www.knowledge-center.com/

Knowledge Center is an intuitive, daily-use tool that helps emergency managers prepare for, respond to, and recover from large-scale incidents such as floods and chemical spills. It can be used to monitor significant planned events such as conventions and sporting events. Installed in various configurations, it is generally installed as a server at primary and back-up site, but can also be set up as SaaS. It is currently in use throughout Pennsylvania (47 out of 58 counties), and provides the following:

- COP and graphical displays through Esri;
- A status dashboard used to track, log, and update incidents;
- An internally developed message notification system; and
- ICS-based methodology for tracking incidents and events.

MissionMode Alert and Situation Center

Developed by MissionMode Solutions
Website: http://www.missionmode.com/solutions/incident_management/features.htm

MissionMode is used by control centers and emergency management personnel to manage daily operations issues with seamless escalation into emergency management when a crisis hits. It can be tuned to fit airport operations and their people, teams, processes, checklists, resources, and notifications and is currently used by eight airports across the United States and Europe.

MissionMode is offered as subscription SaaS with no additional hardware to purchase and has on-site, web-based, or computer-based tutorials available. It provides logging, collaboration, checklists, contacts, resources, and notification capability with user-friendly drag and drop fields such as text, dropdown lists, checkboxes, and date selectors, and COP. It has the capability to do the following:

- Provide a clear overview of activities through the dashboard;
- Log activities, status, and progress, situational awareness, and incidents to form an audit trail;
- Build NIMS-compliant forms using a visual forms designer;
- Document foreign object debris, airside and landside activities, maintenance, weather events, Notices to Airmen, and other activities;
- Set up notifications (the notification feature is integrated into logging); and
- Send and receive information from mobile devices.

MissionMode combines smartphone functionality, web-based control console, and emergency notification in one integrated system. Two-way messages and location-based services are available even when traditional text, email, and voice communications channels are not functioning.

OpsCenter

Developed by Alert Technologies Corp
Website: http://www.alerttech.com/OpsCenter/emergency/management/software/content/opscenter-emergency-management-software-suite

OpsCenter provides a dashboard for tracking incidents and status information on an airport or in a municipality. It is installed within the airport architecture, but may require a separate server. It includes the following features:

- Automated journaling, maps, status boards, and checklists;
- The capability to assign tasks and track actions taken;
- Position-based login and permissions authorized based on requirement;
- Adaptable, configurable screens that allow users to modify required information they need access to;
- NIMS-compatible ICS forms; and
- A graphic user interface to view incidents on a map.

Response Management Information System

Developed by Public Safety Systems, Inc.
Website: http://www.pssi.com/

Response Management Information System provides the following features:

- Standard mapping functions that apply to the display, including the ability to pan, zoom, apply and remove labels, and layer control;

- Integration with RESPONSE™ CAD that allows real-time transfer of information to a database;
- Canned reports for units, incidents, operators, time analysis, and summaries, plus capability to create ad-hoc queries and reports;
- The ability to perform flexible queries against CAD incident and unit data elements, including remarks;
- A button to map search results on a pin-map and then click on pins to view incident details;
- The ability to perform queries to help define hot spots, provide up-to-the-minute data for roll call, and utilize many other crime analysis features; and
- Multiple displays that can be viewed, saved, or printed.

Situator

Developed by NICE Systems
Website: http://www.nice.com/situation-management/nice-situator

The NICE Situator is a situation management software platform that enables situation planning, response, and analysis. It provides the following features:

- A planning tool that can be used to plan complicated procedures and respond to routine and emergency situations;
- Rule-based task activation with event-triggered and time-triggered activation, sensor commands, automatic notifications, resource assignment, and escalation policies;
- Control room and mobile applications that provide real-time unified activity monitoring and control for all connected devices and systems;
- The capability to deploy and monitor the status of pre-planned procedures and send multimedia messages using all types of communication systems; and
- Simulation and analysis tools that enable detailed incident reporting and debriefing with time-coded playback of events.

Virtual Agility

Developed by Virtual Agility
Website: http://virtualagility.com/6836/index.html

Virtual Agility is a customized and configurable dashboard for tracking incidents and assigning resources. The system's geospatial capabilities work with widely established open-source and commercial mapping products, and its technology partners include IBM and Cisco. The system can be web based, server based, or SaaS. It provides the ability to do the following:

- Support various formats for mapping depending on user requirements;
- Accept feeds from weather data, video, radio frequency identification, and a number of other sources;
- Interface with FEMA forms; and
- Integrate social media into a single source that bridges the public/private community.

WebEOC

Developed by ESi
Website: http://esi911.com/esi/index.php/products-mainmenu-68?id=387

WebEOC is a web-enabled and locally configurable incident and event management system. This collaboration tool creates a COP, allowing responders and emergency managers to share

information and make sound decisions quickly. It is currently used by numerous states, counties, and airports nationwide. It requires a server installed at airport, and may be able to reside on an airport network environment.

Various levels of pricing and support options are available. WebEOC provides the following:

- A dashboard to track incidents and response updates;
- A position logbook, chat, checklists, and customized reports;
- NIMS-compatible ICS forms;
- Secure interoperability with emergency management agencies;
- The ability to develop incident action plans;
- Links to emergency management agencies; and
- Graphical interface system mapping capability.

APPENDIX C

Glossary of Acronyms

AGC	Allegheny County Airport
API	Application Programming Interface
ARFF	Aircraft Rescue Fire Fighting
CAD	Computer Aided Dispatch
CAP	Common Alerting Protocol
CBP	Customs and Border Protection
CBRNE	Chemical, Biological, Radiological, Nuclear, and High Yield Explosives
CCTV	Closed Circuit Television
CIP	Capital Improvement Plan
COP	Common Operating Picture
DE	Distribution Element
DMZ	Demilitarized Zone
EDXL	Emergency Data Exchange Language
ELP	El Paso International Airport
EMA	Emergency Management Agency
EOC	Emergency Operations Center
FAR	Federal Aviation Regulation
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
FY	Fiscal Year
GIS	Geographic Information System
GPS	Global Positioning System
HSGP	Homeland Security Grant Program
IC	Incident Commander
ICS	Incident Command System
ID	Identification
IIS	Internet Information Services
IJ	Investment Justification
IP	Internet Protocol
IT	Information Technology
JSON	JavaScript Object Notation
KML	Keyhole Markup Language
LAN	Local Area Network
LEA	Law Enforcement Agency
NAT	Network Address Translation
NGA	National Geospatial-Intelligence Agency
NIMS	National Incident Management System

NLETS	National Law Enforcement Telecommunications System (justice and public safety information sharing network)
NPIAS	National Plan of Integrated Airport Systems
OASIS	Organization for the Advancement of Structured Information Standards
OGC	Open Geospatial Consortium
PHX	Phoenix Sky Harbor International Airport
PIT	Pittsburgh International Airport
RFID	Radio-Frequency Identification
RM	Resource Management
SAA	State Administrative Agency
SaaS	Software as a Service
SAN	Storage Area Network
SHP	Shape File
SHSP	State Homeland Security Program
SQL	Structured Query Language
SSI	Sensitive Security Information
SSL	Secure Socket Layer
UASI	Urban Area Security Initiative
VPN	Virtual Private Network
WAN	Wide Area Network
WBEMCT	Web-Based Emergency Management Collaboration Tool
XML	Extensible Markup Language

Abbreviations and acronyms used without definitions in TRB publications:

A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation