



National Public Safety Telecommunications Council

Radio Interoperability Best Practices

Best Practice #7: Interoperability Resources—After Action Reviews

This Best Practice is part of a larger, ongoing effort on the part of NPSTC to identify best practice recommendations for a variety of topics dealing with interoperability. Readers are encouraged to read the Radio Interoperability Best Practices Report companion document for a more detailed explanation of the history, development process, and intent of this document.

Best Practice Statement

Any After Action Review (AAR) generated when Interoperability resources are used to support a significant/working incident¹ or event should include both operational and technical components.

Scope of this Best Practice

The general perception of an AAR involves a formal, detailed report following a large scale or highly complex incident and centers around the operational intent and outcomes of the event. In reality, many AAR sessions involve an EMS crew sitting on the back of the ambulance or a small group of law enforcement officers at a briefing room table discussing the call they just returned from. AARs may also generate a thorough and detailed account of the incident and be hundreds of pages in length following group discussions, individual interviews, and detailed incident review.

Though the interoperability and operational aspects of an AAR may intersect, the scope of this best practice is limited to the need to add a technical component and include any interoperability resource issues as a formal component of each AAR.

This best practice is not intended as a guideline for the creation of an AAR.

¹ The definition of a significant or “working” incident is determined by the local agencies and varies based on the size and capacity of the public safety agencies involved.

Statement of Importance

An AAR should document incident or exercise findings, bringing operational, technical, and policy issues to the forefront with the intent to improve overall emergency response while also addressing communications interoperability for the safety of first responders.

AARs are normally conducted at the end of an incident or training exercise though many agencies are taking the time to incorporate AARs during the planning stage. This approach provides review of potential failures before they happen, ranging from radio programming opportunities to specialized equipment needs. On extended incidents, such as a wildland fire, it may be necessary to conduct a brief version of an AAR at the end of each operational period to capture lessons learned for incorporation into the next day's planning process. Most agencies do a debriefing on the day's operations, but an AAR is distinct in that it begins with a clear comparison of intended vs. actual results achieved and identifies the successes and areas of improvement.

Proactive agencies conduct critical examinations of their operations and look for ways to enhance their operable and interoperable communications. Agencies which do not include communications specific discussions during their AARs miss an opportunity to examine and resolve familiar failures including: channel/talkgroup assignment errors, first responder equipment knowledge gaps, and underutilization of console and gateway resources. Public safety agencies benefit by becoming engaged with established local and regional communications working groups and by becoming involved in the AAR processes that provide a safe and more positive outcome for future events.

Supporting Elements

An AAR is a simple process used by public safety agencies to capture the lessons learned following a recent incident, to include both the successful and challenging components of the response. The goal of an AAR is to improve future performance. It is an opportunity to reflect on an incident, training exercise, or planned event so the agency may perform better the next time. It is recommended that both technical and operational² personnel be involved in the entire AAR review process. Many radio systems today provide a large amount of performance data that can be leveraged to better understand the root cause of operational successes and failures. Likewise, CAD systems also provide an abundance of documentation on minute-by-minute actions at the scene. This information can significantly enhance the quality of the AAR discussions and resulting recommendations.

² Operational personnel include both responders and dispatchers.

The components of the interoperability section of an AAR are identical to the overall report itself, but should provide information on communications specific issues:

- What was supposed to happen?
- What actually happened?
- What caused the differences?
- What went well and why?
- What could be done differently the next time?
- Who needs to know?

The goals of the AAR Interoperability section are also identical to the overall goals of the review:

- Capture observations of the incident/exercise.
- Identify best practices and lessons learned.
- Highlight strengths/acknowledge successes.
- Ascertain specific improvement actions if needed.
- Assign those actions to the responsible parties.
- Establish target date for action completion.
- Test, document, and train upon the improvements.

While there are many ways to conduct an AAR the process should be kept as simple and as easy as possible for stakeholders, with the intent to address any concerns discovered during the review. Challenges and concerns documented during the AAR should be turned over to appropriate subject matter experts who will focus on the desired outcome and make necessary changes or suggestions. Any changes arising from an AAR need to be formally documented. This includes the need to update SOP manuals and written policy.³ These updates should reach all affected parties and training should occur to ensure knowledge of the operational and technical changes.

SAFECOM Continuum

This best practice touches the Governance, Standard Operating Procedures, Training, and Usage lanes of the SAFECOM Interoperability Continuum.

Incident Use Case Examples

³ See Best Practice #2 – Interoperability Systems Change Management Practices - http://npstc.org/download.jsp?tableId=37&column=217&id=3856&file=BP_2_IO_Sys_Change_Mgt_Practices_Final.pdf

Oceans County Sheriff's Office (OCSO) owns and operates a countywide 800 MHz radio system. Dade City Police Department (DCPD) is an agency within Oceans County which operates as a partner on the county's 800 MHz system. The DCPD is responding to a disturbance call and shots are fired upon the arrival of the first officer. An area-wide alert is broadcast by DCPD dispatch for mutual aid. An OCSO unit is in the vicinity and responds to the DCPD call. The telecommunicator coordinates activation of an interoperability solution, announces control of the patch, and directs responders to select the agreed upon interoperability talkgroup. DCPD made the console patch providing the necessary interoperability and OCSO responders selected the assigned talkgroup in their radio equipment. This successful process was based on changes which were approved following recent challenges highlighted in another AAR report. Lessons learned in a prior incident resulted in updated policy and training. A prior AAR had revealed that once a talkgroup has been patched by an agency console, it cannot be patched with other resources by another console.

Migration Path

The inclusion of an interoperability component to an agency's AAR process can be easily accomplished, especially if the agency/region has an AAR or other review policy already in place.

Interoperable resources are typically shared on a regional, state, or nationwide basis; and the interoperability components of an AAR are common to the larger AAR format. Therefore, adding an interoperability component to a local, regional, or statewide AAR policy can be done with minimal effort. Likewise, if an individual agency does not have an AAR policy in place, it is recommended they develop a policy of their own or modify one from another agency within the region. Areas with a high occurrence of mutual aid incidents may consider developing a regional approach to the AAR process including both operational and interoperability components.⁴

Recommended steps to create the Interoperable Section of an AAR should include:

- Review the policy and procedures manual with a combined group of operational, communications, and technical personnel.
- Identify areas related to interoperability resources that are not addressed in the overall AAR.
- Modify the policy as needed.
- Plan an exercise to confirm the recommendations are valid.

⁴ See BP #5 – Infrastructure Management - http://npstc.org/download.jsp?tableId=37&column=217&id=3936&file=BP_5_Infrastructure_Management_Final_170517.pdf

- Distribute revised information to all stakeholders.
- Define a process for addressing future AAR recommendations.

When reviewing interoperability policy and procedure, the following issues should be examined as they directly impact future AAR recommendations:

- Which agency is responsible for each piece of I/O equipment?
- What are the operational parameters of each I/O resource? (console patching, gateway devices, conventional repeater coverage, etc.)
- Who is responsible for completing the AAR report? (Logistics Chief, Communications Officer⁵, etc.) and what is the process to distribute the findings and recommendations?
- What is the testing process to ensure I/O equipment is in a ready state?
- What is the SOP update process, to include telecommunicator and first responder training?

The situations faced by public safety vary significantly depending on location, resources, and incident type. And the intricacies of a multi-agency event make it difficult to create an AAR that covers all of the possibilities. Appendix A provides an extensive list of topics that may need to be addressed in the communications section of an AAR. This document is not an AAR template, but intended as a checklist to assist in identifying items to be considered, including operational, interoperability, and technical components. This list is not all inclusive and not every topic listed will be relevant on every incident or event.

Related Documents

The following links point to reference materials used in developing this Best Practice or otherwise referenced in the document. Additional supporting documents can be found on the Radio Interoperability Best Practice Working Group page on the NPSTC website at www.NPSTC.org or by joining NPSTC Committees Community on the National Interoperability Information eXchange at www.NIIX.org.⁶

The [Homeland Security Exercise and Evaluation Program \(HSEEP\)](#) provides a set of guiding principles for exercise programs, as well as a common approach to exercise program management, design and development, conduct, evaluation, and improvement planning. HSEEP exercise and evaluation doctrine is flexible, adaptable, and is for use by stakeholders across the whole community and is applicable for exercises across all mission areas – prevention,

⁵ The COML may not be with the same agency as incident command.

⁶ Select Interoperability Committee -> Best Practices -> Shared Documents

protection, mitigation, response, and recovery. - https://www.fema.gov/media-library-data/20130726-1914-25045-8890/hseep_apr13_.pdf

The **NPSTC Best Practice Report and other Best Practice Statements** can be found on the NPSTC website at <http://npstc.org/radioInteropBP.jsp>.

[NPSTC Communications Unit AAR – Example Checklist for Event Incident/Exercise Report](#)

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Contributors List

Numerous members of the Radio Interoperability Best Practices Working Group representing the public safety, government, academia, and industry communities contributed to the creation and review of this document.

NPSTC would in particular like to thank the participants of the writing group who were instrumental in the development of this individual Best Practice document.

Appendix A

Example Checklist for Event Incident/Exercise Report



**National Public Safety Telecommunications Council
Radio Interoperability Best Practices
Communications Unit AAR –
Example Checklist for Event Incident/Exercise Report**

The following is an extensive list of topics that may need to be addressed in the communications section of an After-Action Report (AAR). This document is not an AAR template, but intended as a checklist to assist in identifying items to be considered, including operational, interoperability, and technical components. It is understood that this list is not all inclusive and that not all incident or events will touch every topic.

Incident	Does the report contain the following incident information?	
		Incident/Event/Exercise Name
		Incident/Event Location
		Incident/Event Date(s)
		Brief description of the incident/event
		A complete list of units on the scene
		Response Agencies Involved: Local /State/ Federal /Tribal/Non-Government Organizations
		Commercial Vendors Involved
		Agencies Providing Communications Equipment or Assistance
		Commercial Vendor(s) Providing Assistance
		Is the Comm Plan, ICS205, and 217A included in the AAR
		Is there a copy of the CAD event entry information available for reference
Overview	Overall Communications and Technical Review	
		Things that went well
		Areas for improvement
		Recommended steps for correction ⁷
Communications Unit:	Include list of positions filled, including name, agency, and ham call sign	
		Communications Unit Leader (COML)
		Communication Technician (COMT)
		Radio Operator (RADO)
		Telecommunications Specialist (THSP)
		Incident Communications Manager (INCM)
		Auxiliary Communications Personnel (AuxComm)
		Incident/Tactical Dispatcher (INTD)
		Messenger or Runner
	Were personnel evaluations performed?	

⁷ Areas flagged for correction should be forwarded to the responsible party in accordance with the agency policy and change management process.

Communication System Types	What communications system types were used? ⁸
	Trunked
	Conventional
	Analog
	P25
	Other digital formats
	Cellular/Satellite
	Amateur Radio
	FirstNet/Broadband
Other	
Interoperability Continuum	SAFECOM Continuum
	Were there any Governance/Policy Issues?
	Were there any SOP / TIC-P / FOG issues?
	Were there any technology issues?
	Were there any usage issues?
Mobilization and Demobilization	Mobilization and Demobilization
	Were there any notification issues with mobilization?
	Were there any response issues with mobilization?
	Were there any technical issues with mobilization?
	Were there any credentialing issues with mobilization?
	Were there any notification issues with demobilization?
	Were there any response issues with demobilization?
	Were there any technical issues with demobilization?
	Were there any documentation or check out issues with demobilization?
	Were there any safety issues?
Were there any accountability issues?	
PSAP Operations	
PSAP/ Communications Center/ EOC	E9-1-1/Emergency Number/NG9-1-1
	Were there any issues with the public calling in to E9-1-1?
	Were there any issues with the PSAP receiving incoming E9-1-1 calls?
	Were there any issues with the non-E9-1-1 emergency phone lines?
	Were there any issues with the non-emergency phone lines?
	Were there any issues with dedicated phone lines or ring down lines?
	Did the roll over process perform as expected?
	Were there any issues with text to 9-1-1?
	Were there any issues or usage of video to 9-1-1?
	Notifications in the PSAP/EOC
	Were there any issues with the outgoing notification system?
	Was a dispatch network notification used to broadcast situational awareness to affected agencies, i.e., announcement of 911 overflow, announcement of channels in use, etc.?
	Was Reverse 911 (Community Emergency Notification Service) used?

⁸ Include both first line and support personnel in each position

	Communications Center	
		Were there any operational issues with the dispatch console?
		Were there any issues with resource availability in the communications center?
		Was emergency power needed, and, if so, was the transition seamless?
		Were all communication channels managed through PSAP and PSAP telecommunicator or were additional channels managed by field positions or onsite tactical telecommunicators (tactical, air, etc.) ?
		Was the telecommunicator familiar with the I/O resources?
		If needed, were back up positions available and operating correctly?
		Was the communications center staffing level sufficient to meet the needs of the incident?
		Did CAD withstand the influx of data entry and query requests?
Resource Requests	Deployable and Fixed Resource Requests	
		Were there any requests for deployable resources?
		What resources were requested?
		Who were requested resources through/from?
		Who (agency) provided resources?
		Who made the request and how was it transmitted?
		Were there any notification issues with deployment of requested resources?
		Were there any technical issues with deployable resources?
		Were there any response issues with mobilization?
		Did sufficient manpower and instructional support arrive with the deployable resource?
		Did a resource briefing take place ensuring resource awareness? E.g., operational knowledge, reference materials, supplies etc.
		Was the equipment returned in the same condition as it was when assigned? E.g., missing antenna, knob, cracked display.
		Were there any concerns with the return equipment process? Flowed effectively? Was this accomplished in a reasonable amount of time?
Handheld Subscriber Devices	Portable Radios	
		Were any cache radios utilized and, if so, how many were deployed?
		How many of the cache radios deployed were actually utilized?
		What channels were used?
		Any radio maintenance issues?
		Any lost radios or accessories?
		Any issues with radio programming?
		Was the battery management plan effective?
		Multi-unit chargers
		Disposable batteries
		Clam Shells
		Any battery issues identified?
		Was there ample manpower to prepare and deliver the supplies in a timely manner?
Gate way	Was a gateway or console patch utilized?	
		Were there any issues with the gateway and/or patch?

		What channels were used in the gateway and/or patch?
		What agency initiated the gateway and/or patch?
		How was the patch created? (ACU/ICRI/RIOS/Other/Console Patch)
		Was the gateway/patch initiated in a timely manner?
Portable Repeater or Base Station	What Channels were used in the repeater/base station?	
		VHF (Lo/Hi)
		UHF
		700 MHz
		800 MHz
		Local system
Interoperability Channels	Nationwide / Regional / State / Local Mutual Aid or Interoperability Channels Utilized:	
		V/U/7/8 CALL or V/U/7/8 TAC
		Interop Talk Groups
		Direct or TA
		Any other frequency resource used? HAM, Marine, AIR, etc...
Deployable Infrastructure Support Resources	Were any of the following resources used?	
		Radio Tower Trailer(s)
		Conventional / Trunked Sites on Wheels
		Generator(s) on Wheels
		Agency Leased Satellite Services (PTT, Voice, Data)
		Tactical Bi-directional Amplifier (BDA)
		Tactical Digital Vehicular Repeater System (DVRS)
		Mobile Communication Unit (MCU) or Mobile Communications Vehicle (MCV)
		WIFI/ Internet Access
		Microwave, Fiber, Inter-Connect System
		Airborne repeaters (Maned or Unmanned)
	Airborne Video	
Radio Communication Sites	Were there any issues regarding the following?	
		Site Access
		Shelter
		Site Security
		Commercial Power
		Wind or Solar Power
		UPS
		Battery Back Up
		Generator and/or Fuel
		Grounding system
		Tower
		Tower antenna
		Tower lights
	Feedline	

Voice and Data Resources	If used, were there any issues of the following resources?	
	Commercial Wireless:	
		Voice
		Data
		Cellular on Wheels (COW)
		Cellular on Light Truck (COLT)
		Aerial Communications ⁹
	Mobile Data:	
		Commercial – Air Card
		FirstNet - Fixed Site and/or Deployable
		Agency Owned
	PSTN/VOIP	
		DSL, T1, T3, etc.
		Voice
		Landlines
		Fax
		Voice Over Internet (VOIP)
	Satellite	
	Voice	
	Data	
	Push to Talk (PTT)	
Emergency Telecommunications Services		
	Wireless Priority Services (WPS)	
	Government Emergency Telecommunications Services (GETS)	
	Telecommunications Services Priority (TSP)	
Notification System	Where any of the following notification systems used?	
		Emergency Alert System - EAS
		Integrated Public Alert Warning System - IPAWS
		National Oceanic and Atmospheric Administration - NOAA
		WEA – Wireless Emergency Alerts
		Any Local, Regional or Statewide Systems
		Pager
		Smart Phone App
		Text Messages
		Prompt Notification System (Sirens)
		Reverse 9-1-1
Additional Concerns	Where any of the following an issue and was follow up needed/completed?	
	Was there any lack of radio coverage; i.e., "dead spots" observed during the event.	
	If yes, what was the underlying cause?	
		Coverage issue

⁹ Cellular on Wings (Flying COWS), Tethered Balloons, etc.

	System maintenance issue
	Channel assignment
	Were there any "blocked" or excessively busy resources such as radio or telephone channels that were overloaded with traffic, thus preventing or delaying messages from being received?
	Were there any unexplained communication failures that occurred during the event?