



# Amateur Radio for Emergency Managers



Santa Clara County ARES/RACES

Michael Fox, N6MEF, RACES Chief Radio Officer

Revised: 11-Mar-2019

# Amateur Radio in Santa Clara County

- Santa Clara County

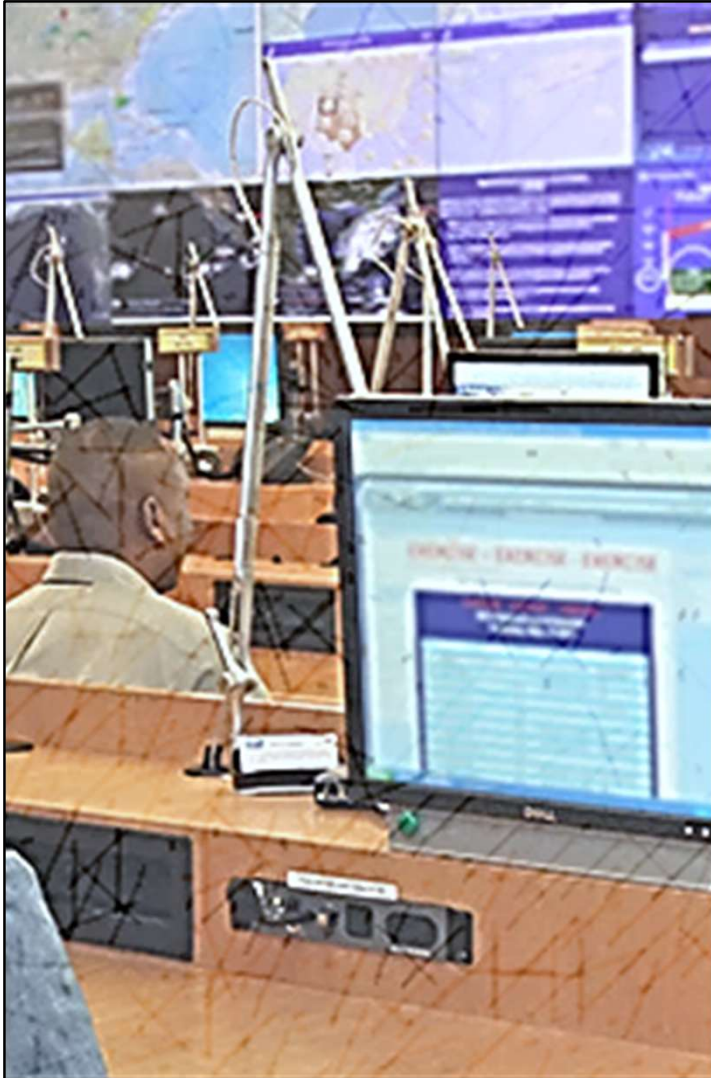
- ~1.8M people
- ~ 8,000 amateur radio licenses
- Many “eyes and ears”
- Most people know someone who is an amateur radio operator



- SCCo ARES/RACES

- A group within amateur radio focused on emergency comms systems, procedures, equipment
- About 350 weekly check-ins
- Weekly nets, monthly classes, quarterly drills, public service

# EOC Operations

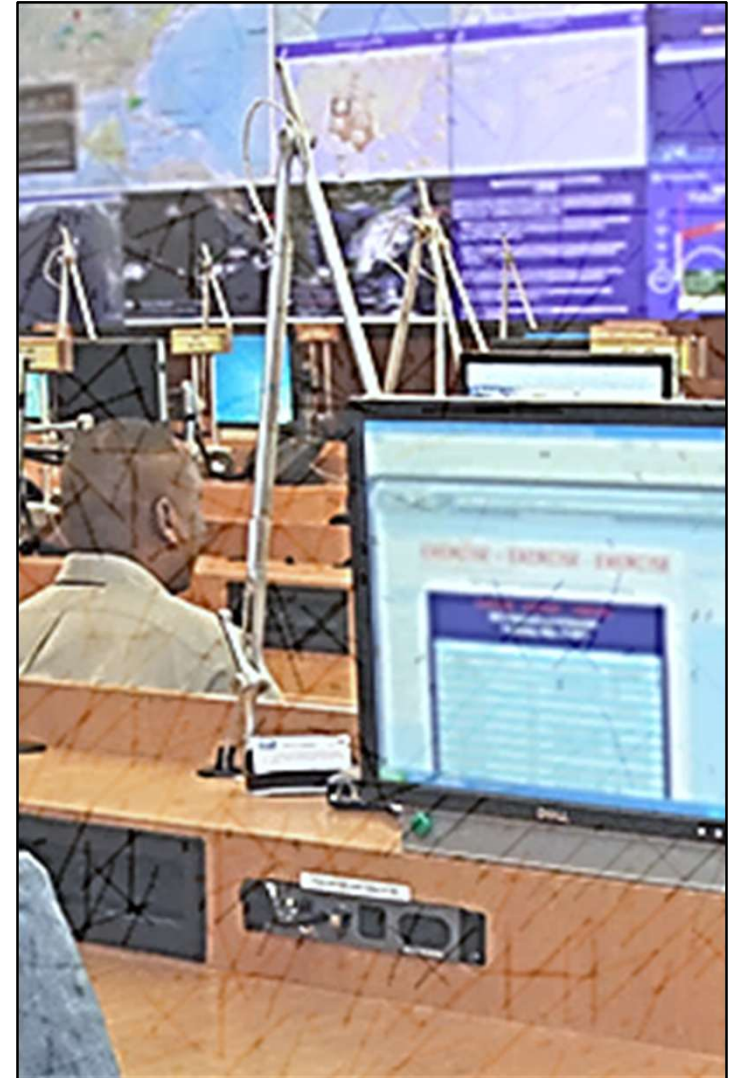


- #1 disaster response issue:
  - Poor communications
- A key role & responsibility of an Emergency Operations Center is:
  - Information Collection, Evaluation, Dissemination

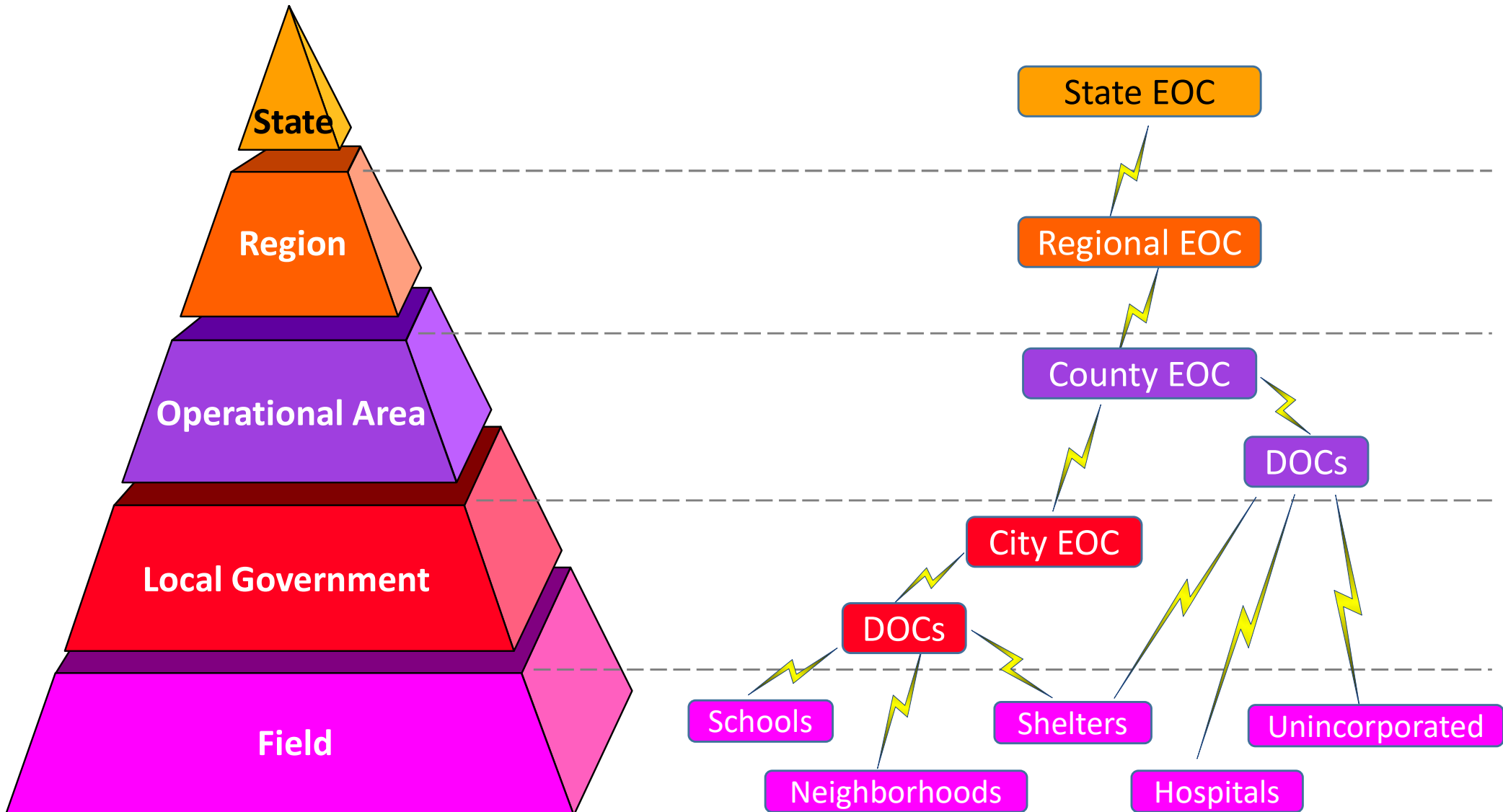
# Amateur Radio in EOC Operations

Amateur Radio can help:

- Communications
  - Create the capability where it don't normally exist
  - Provide backup capability where existing systems have failed
- Information collection and dissemination

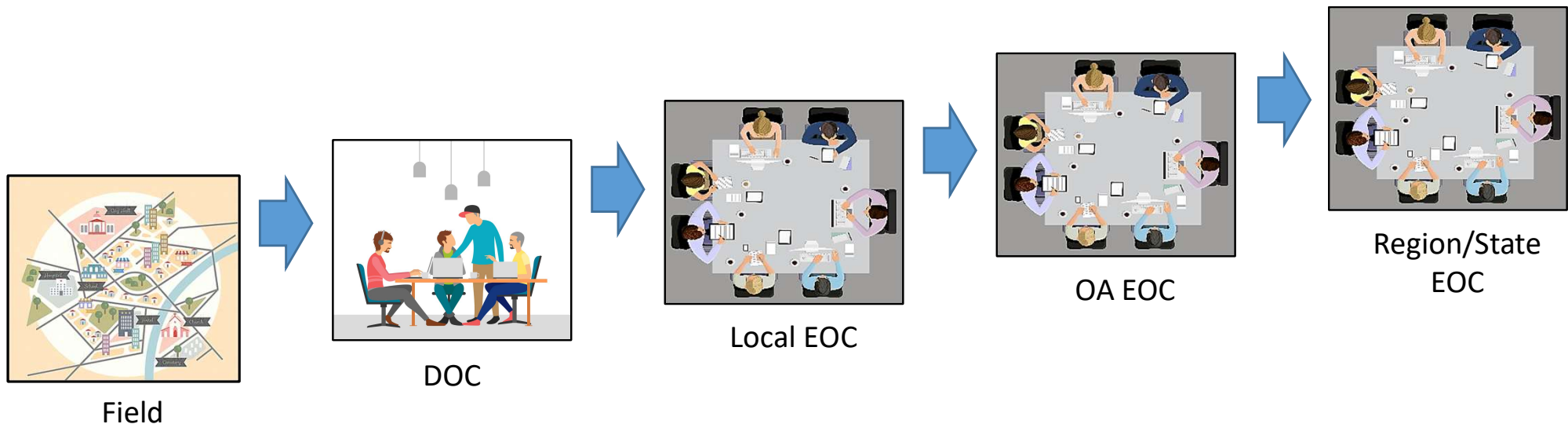


# The Standardized Emergency Management System (SEMS)

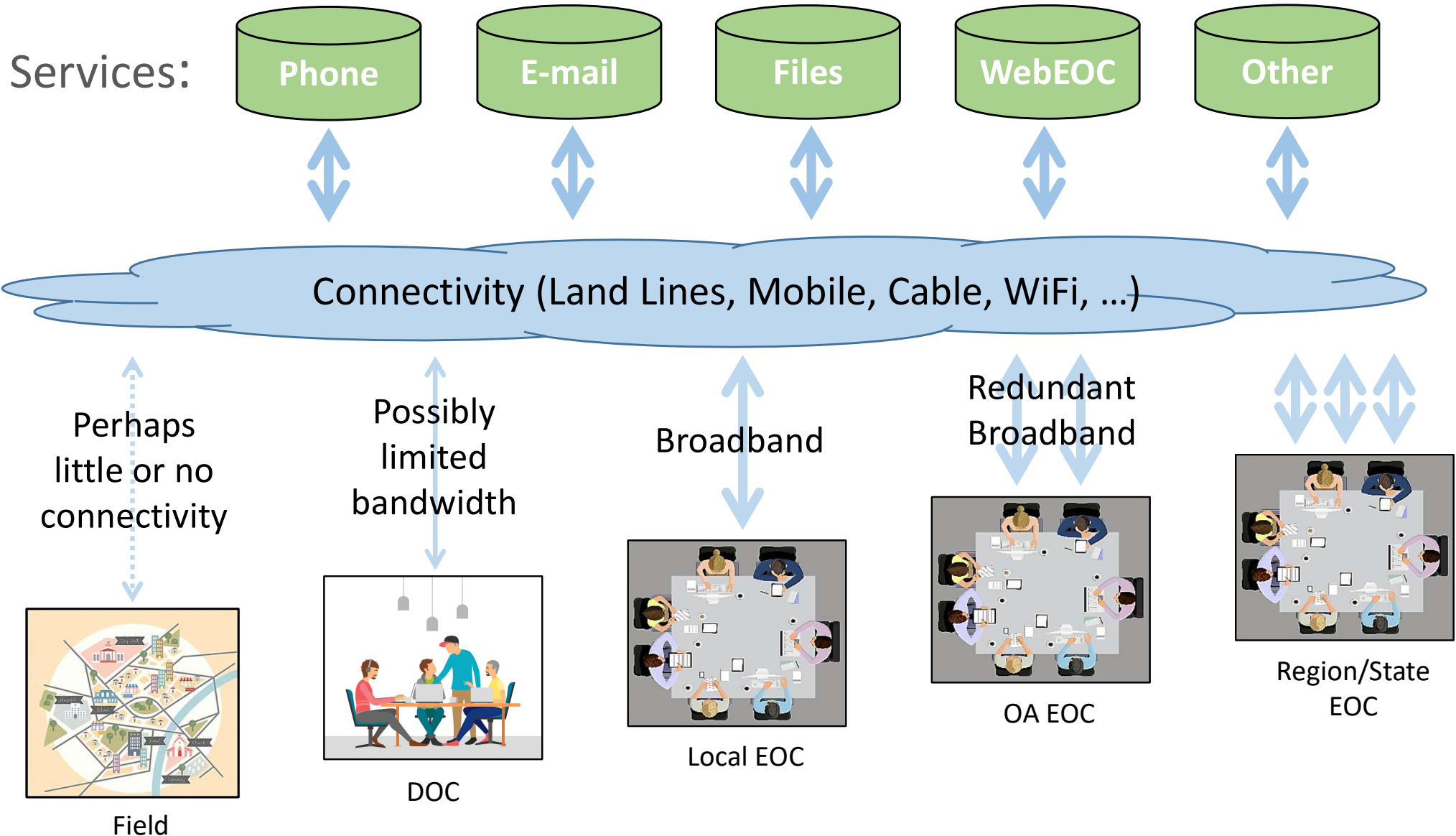


# How We Think of Communications

- Follows the SEMS / NIMS model
- Assumptions
  - Connectivity will be there when needed
  - Communications systems and services (voice, data, video, ...) will be there when needed

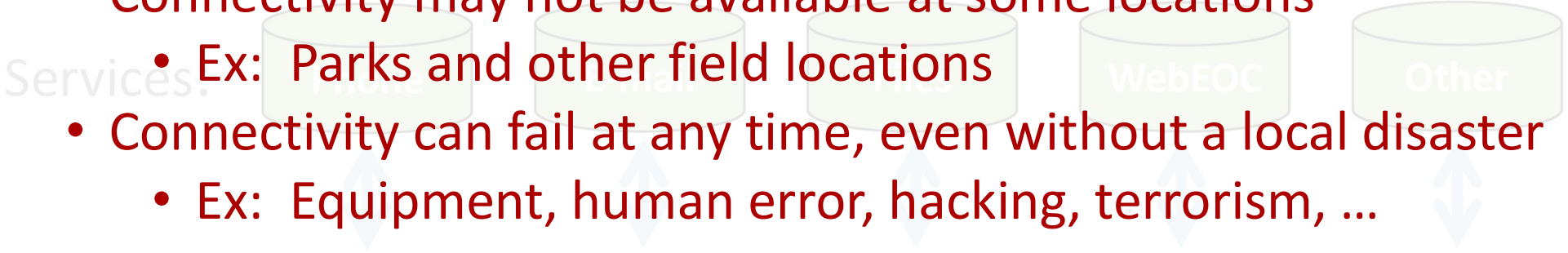


# Reality Is More Complicated



# Possible Connectivity Problems

- Connectivity may not be available at some locations
  - Ex: Parks and other field locations
- Connectivity can fail at any time, even without a local disaster
  - Ex: Equipment, human error, hacking, terrorism, ...



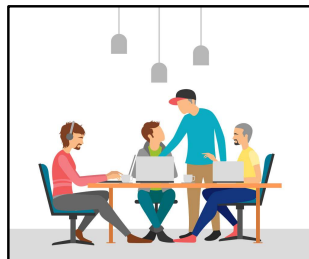
Connectivity (Land Lines, Mobile, Cable, WiFi, ...)

Perhaps little or no connectivity



Field

Possibly limited bandwidth



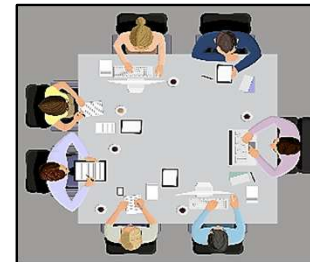
DOC

Broadband



Local EOC

Redundant Broadband



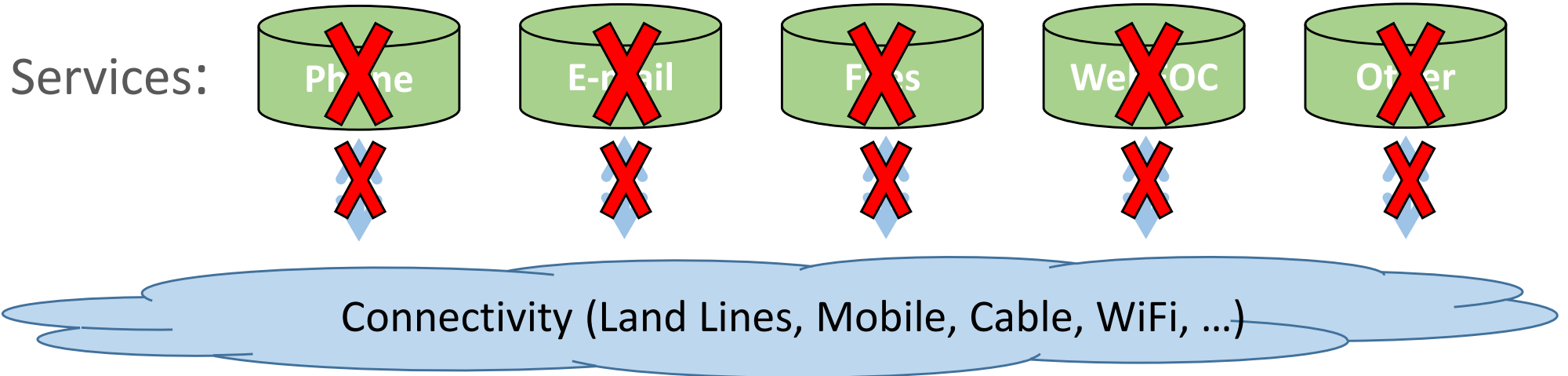
OA EOC

Redundant Broadband

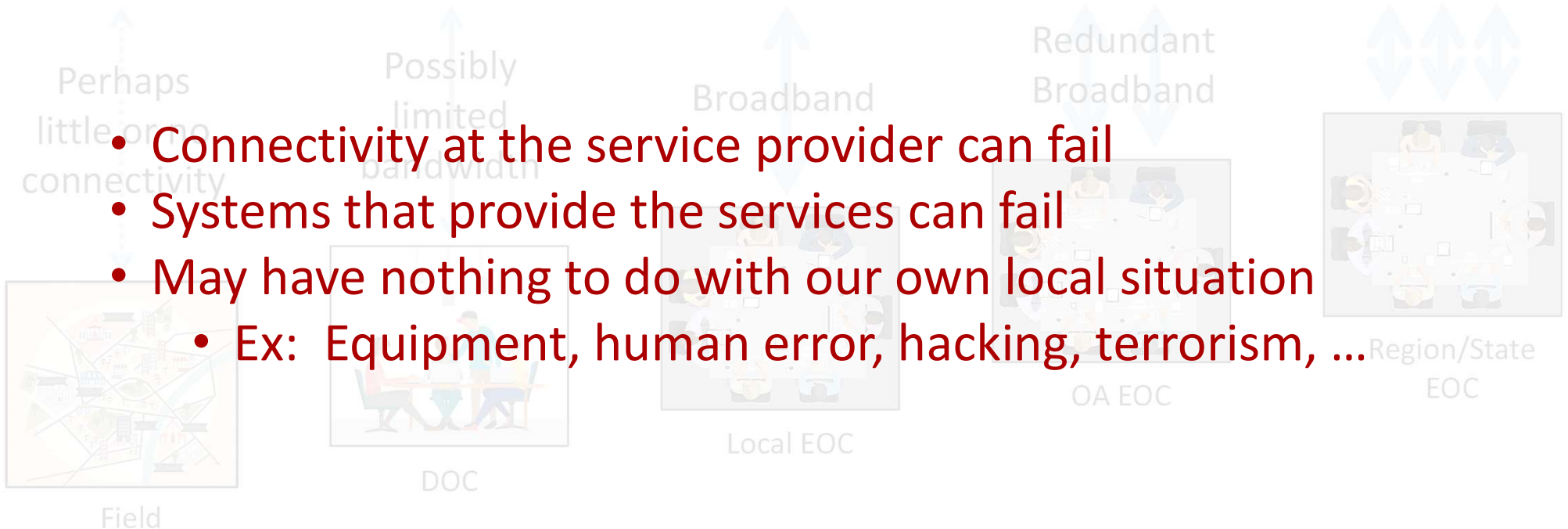


Region/State EOC

# Possible Service Problems

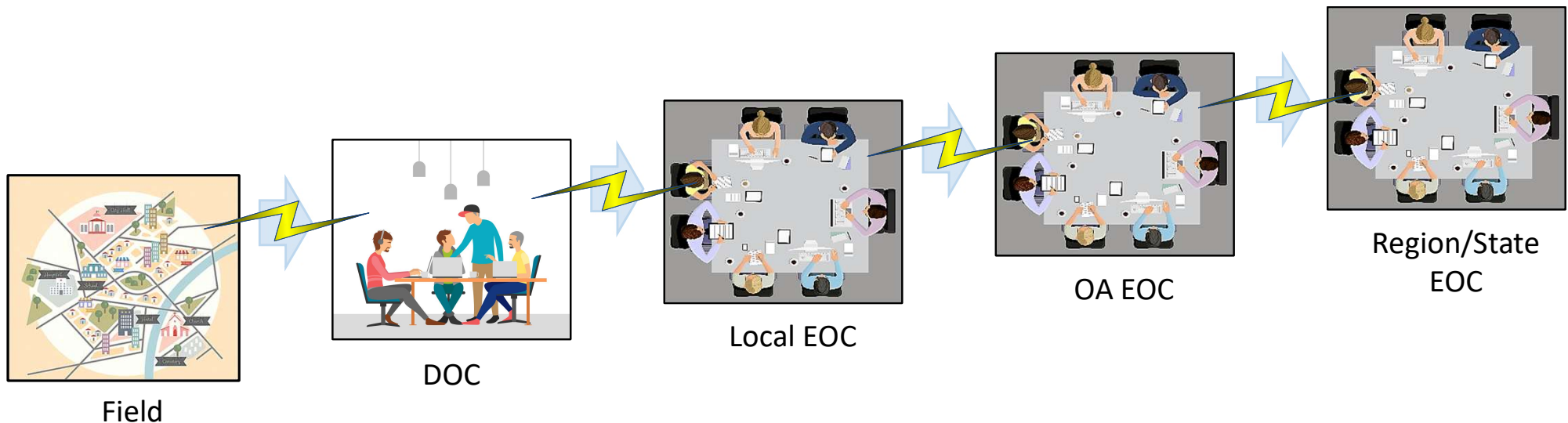


- Connectivity at the service provider can fail
- Systems that provide the services can fail
- May have nothing to do with our own local situation
- Ex: Equipment, human error, hacking, terrorism, ...



# Amateur Radio Can Help

- When communications at a field site doesn't normally exist ...
- Or, when existing systems are degraded or disabled ...
- Amateur radio doesn't replace these systems
- But it can help fill in some of the gaps



# Amateur Radio Provides Voice AND Data Communications

When most people think of “amateur radio”, they think of voice communications ...



Today, we use a mixture of voice and data communications ...



In Santa Clara County, we leverage data communications for increased speed, accuracy and alignment with served agency needs

# “When All Else Fails”

- 2016 Loma Fire
  - Commercial power failed
  - Generator at radio site failed
  - Roads closed; no access to bring backup generator
  - Internet service provider networks failed
  - Most private communications systems failed
- Santa Clara County ARES/RACES network continued to run
  - Provided temp, humidity, smoke sensor info to other site tenants
  - Used to send/receive Internet email while ISP networks were down



# 2017 Wine Country Fires

## **Mendocino:**

- Fire destroyed AT&T cable between Ukiah and Willits
- Loss of E-911, cellular, landline, cable and most broadband services
- Cash only; no ATM machines, credit card readers, ...
- Sheriff Allman: relying on amateur radio for hospital communications

## **In Napa and Sonoma:**

- Electrical service cut off during initial wind storm
- Widespread loss of cell service and other communications
- Loss of communications at hospitals, shelters, ...

## **Amateur Radio Response:**

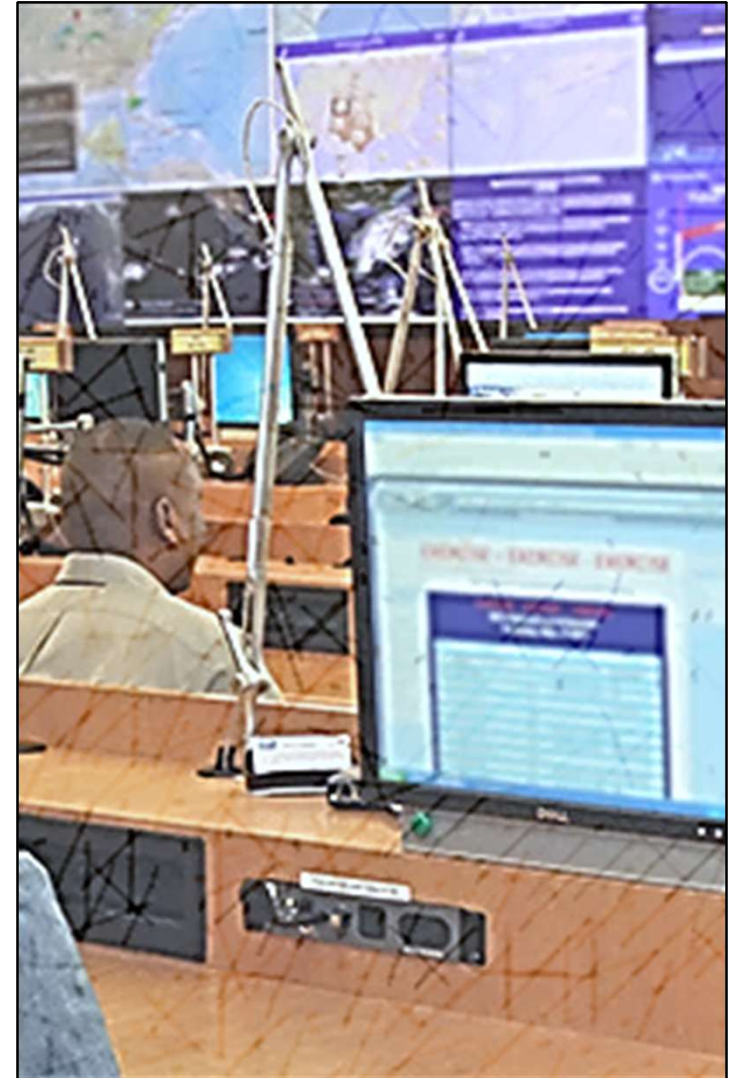
- Local radio amateurs deployed to EOCs, medical centers, nursing homes, Red Cross shelters, high schools, ...
- Coordinated delivery of food, bedding, shelter supplies, donations

# Amateur Radio in EOC Operations

Amateur Radio can help:

- Communications
  - Create the capability where it don't normally exist
  - Provide backup capability where existing systems have failed

- Information collection and dissemination

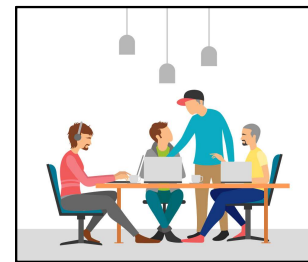


# Information Collection

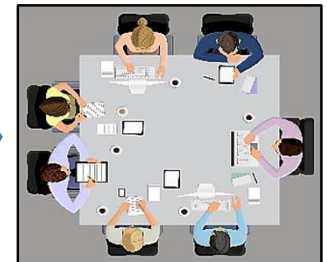
Information needs to be collected from places that lack communications



Field



DOC



EOC

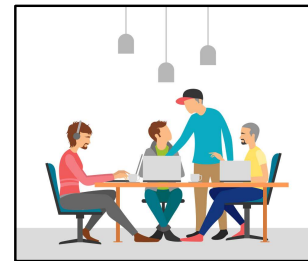


## Amateur Radio

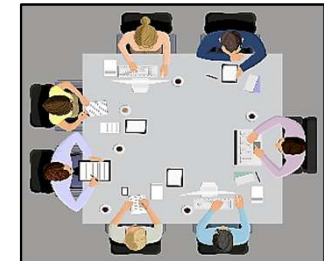
- Can provide communications at schools, shelters, hospitals, neighborhoods and for groups such as CERT, Red Cross, CADRE, and others.
- Report on situation, collect status, make requests

# Example: Earthquake Damage Reports

# Earthquake Damage Reports



DOC



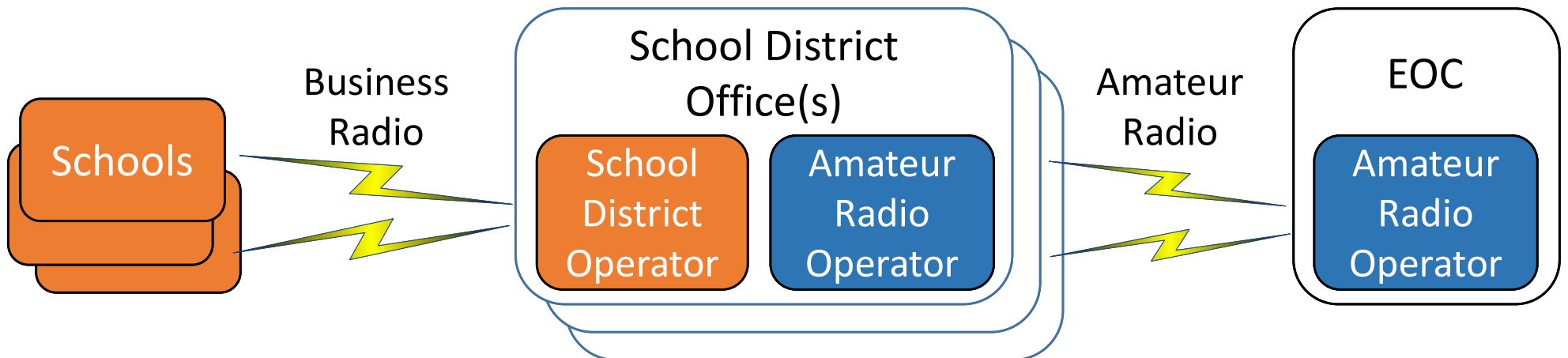
EOC

- Santa Clara County amateur radio operators are trained how to send in damage reports using the **Modified Mercalli Scale**
- Quickly establishes a county-wide picture of where and how much damage has occurred

Example:  
Schools / Local EOC

# Example: Schools / Local EOC

- Schools report to school district; school districts report to city EOC
  - Status (damage, injuries, ...), resource requests, H&W
- Amateur Radio:
  - School districts to city EOC (primary or backup)
  - Schools to school districts (backup)



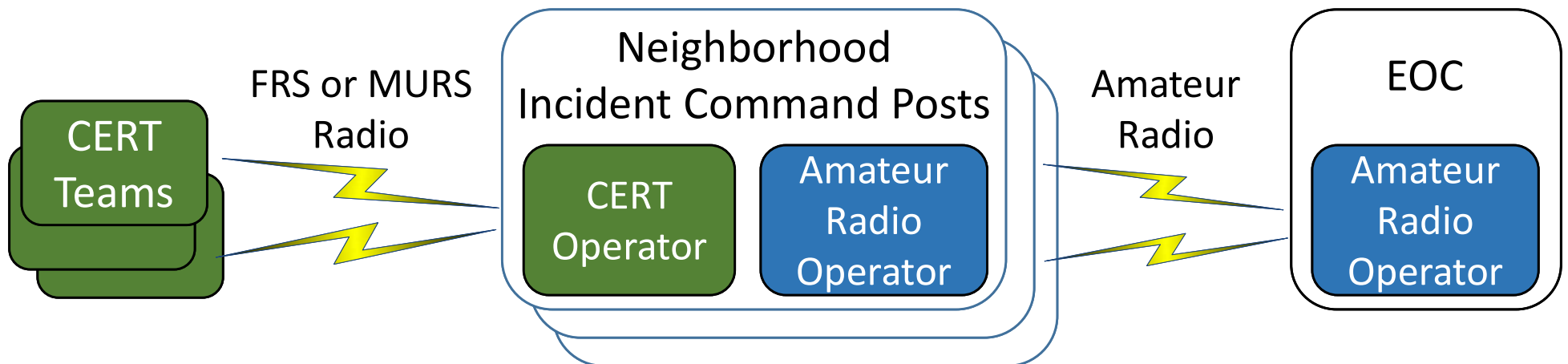
Example:

Neighborhoods / Local EOC

Mountain View CERT and ARES/RACES (Amateur Radio)

# Example: Neighborhoods / Local EOC

- Community Emergency Response Teams report to neighborhood command posts; CP reports to city EOC
  - Damage assessment
- Amateur Radio: neighborhood CP to EOC



# CERT Collects Neighborhood Data



CERT - DAMAGE ASSESSMENT FORM																							
DATE: 5/15/11		EVENT: CityWide Exercise										PERSON RECORDING / ID#:				PAGE #: 1 of 1							
Incident #	Reported	Priority		BURNING	OUT	GAS LEAK	H2O LEAK	ELECTRIC	CHEMICAL	LIGHT	MODERATE	HEAVY	IMMEDIATE **	DELAYED	TRAPPED	DEAD	ACCESS	NO ACCESS	OTHER	ASSIGNED	COMPLETED		
#	TIME	By	LOCATION	FIRE	HAZARD	BUILDING Damage	PEOPLE	ROAD														COMMENTS	
1	1301	2	1	825 Pawl	1	0	0	0	0	0	0	1	6	18	0	2							
2	1303	6	1	25W Dana			0	1	0	0	0	1	0	8	20	60	3	0	1				Apart. Wing collapsed
3	1304	9	2	125 Church			0	1	0	0	0	1					0	1					Tree across Church
4	1305	4	1	135 Mercy	1	0	1	0	0	0	0	1	4	9	0	2	1	0					Power line down
5	1307	8	1	152 Bush	1	0				0	0	1	2	3	10	0	1						Thick smoke
6	1309	6	1	272 Bush	1	0	1	0	0	0	0	1	1	4	9	1	0	1					
7	1310	4	1	372 Bryant			0	1	0	0	0	1	0	2	6	11	2	1	0				Chimney fell
8	1311	3	1	631 Oak	1	0	1	0	0	0	0	1	0	1	2	5	1	1	0				
9	1313	9	1	238 Villa						0	0	3	0	2	2	0							3 Townhouses down
10	1315		1	118 Eldora	1	0	1	0	0	0	1	0	2	3	6	0	1	0					
	1320			Totals	6	0	5	3	1	0	0	4	8	26	67	103	11	5	3				20%

Radio Priority 1 - Life Threatening or growing, and Priority 2 - Property/Fire incidents immediately as you find them. \*\* Immediate Medical = life threatening; others are delayed/minor. Use "?" for Unknown. Put an "X" in the OTHER column for descriptions that don't fit elsewhere.



# Summary Data Ready to Transmit

ARES/RACES MESSAGE FORM - Mozilla Firefox

file:///C:/RVM/CERT - MTV/Drill 10-22-11/CERT-DA-Install/CERT-DA-MTVUniversal-message.html

(This form works with Outpost/OpDirect for Automatic ASCII text save)  
For Instructions using this form [Click Here.](#)

**1a.) Date: (MM/DD/YY)**  
05/15/11

**1b.) Time: (24 hr time)**  
1320  
0001 to 2400  
2:00 PM = (2+12)=1400 Hrs.

**4.) Situation Severity (Select One)**  
 EMERGENCY (e.g., Life Threat)  
 URGENT (e.g., Property Threat)  
 OTHER (All Others)

**5.) Msg. Handling Order (Select One)**  
 IMMEDIATE (As Soon as Possible)  
 PRIORITY (Less Than One Hour)  
 ROUTINE (More Than One Hour)

**6.) Message Requests You to:**  
**TAKE ACTION (Check one)**  
 Yes  No  
**REPLY (Check one)**  
 Yes, by [ ]  No  
 **FOR YOUR INFO.** (No action required)

**7.) ICS Position: (required)**  
 Display Dropdown List  
 Planning

**8.) ICS Position: (required)**  
 Display Dropdown List  
 Planning

**9a.) Location: (required)**  
 Mountain View EOC

**9b.) Location: (required)**  
 Display CERT List  
 Old Mtn. View CERT

**10.) SUBJECT:** Damage Summary for Old Mtn. View CERT

**11.) REFERENCE (e.g., Number of earlier msg.):** [ ]

Fill in the blanks with your current Damage Assessment column **TOTALS.**

Fire & Hazard					Building			People				Roads		Neighborhood
Fires	Gas Leak	Water Leak	Electrical	Chemical	Light	Mod	Heavy	Immediate	Delayed	Trapped	Morgue	Access	No access	% surveyed
6	5	3	1	0	0	4	8	26	67	103	11	5	3	20

**12.) Message (what, when, where needed; how long; contact name and phone number) KEEP MSG BRIEF**  
 Optional: Enter top 1-3 incidents with locations and situation details.  
 Apartment building 25 W. Dana I=8, D=20, T=60, one wing collapsed

Display/Hide DA Input

**13.) Action Taken: (For use by Originator / Recipient) -> USE SEPARATE MESSAGE FORM IF SENDING REPLY!**

# Summary Displayed in Mountain View EOC

DA Summary																
File Settings Help																
	Fires Burning	Gas Leaks	Water Leaks	Electrical	Chemical	Light	Building Moderate	Heavy	Immediate	People Delayed	Trapped	Morgue	Roads Access	No Access	Neighborhood % Surveyed	Report Time
TOTALS:	8	7	6	2	0	11	7	10	27	68	105	11	5	3	2 %	1320
Ada Park	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Appletree Area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
The Crossings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cuesta Park	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dutch Haven	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monta Loma	-	2	3	1	-	7	1	-	-	1	-	-	-	-	10 %	1319
Mountain View Gardens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Whisman	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Old Mtn. View	6	5	3	1	0	0	4	8	26	67	103	11	5	3	20 %	1320
Rex Manor	2	-	-	-	-	4	2	2	1	-	2	-	-	-	-	1312
Saint Francis Acres	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shady Ridge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sylvan Park	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wagon Wheel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

C:\...packetCommLog\_101111\_Recvd.csv 01-Jun-2011 01:01

Monitor is On

New Information: Click to reset



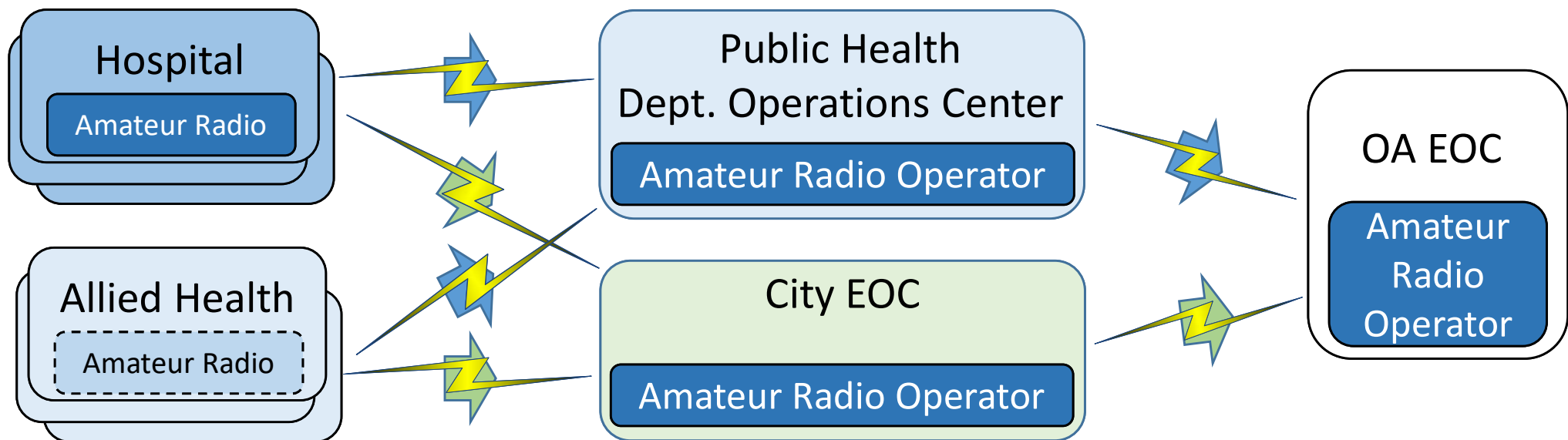
Example:

Hospitals, Allied Health

Various health-specific forms or other messages

# Example: Hospitals, Allied Health

- Medical info is reported to PHDOC; municipal issues are reported to the city EOC; OA EOC supports both
  - Bed status, facility status, resource requests, municipal issues
- Amateur Radio:
  - Hospital to (PHDOC or City EOC) to OA EOC
  - Support for Allied Health facilities is new



Example:

City EOC / County EOC

Resource Request or other messages

# Example: City EOC / County EOC



City EOC

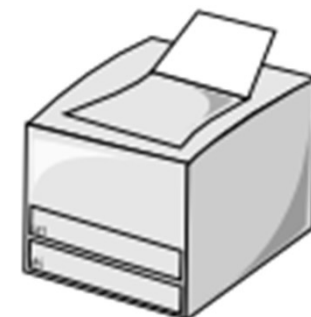
## Scenario:

- City EOC needs to send a Resource Request form to the County EOC
- Connectivity to Veoci if not available at one or both ends



OA EOC

Deliver



Print Form

Fill Out Paper Form

City EOC radio operator sends form

County EOC radio operator receives form

Give to amateur radio operator

Transmit via radio from anywhere in the county

Resource Request		Radio Operator Only		Origin Mag #	Destination Mag #	Unit ID#(ICS)	DOC
<b>This Section to be Completed by Jurisdiction Personnel</b>							
Date:	Time (24hr):	Heading:	Chemical (ICAP):	Priority (1-3):	Resource (1-3):		
ICS Position:	F	ICS Position:	R	Location:	Location:		
Name:	O	Name:	M	Contact Info:	Contact Info:		
<b>Resource Order</b>							
Title:							
Justification:							
Date:	Time:	Quantity Requested:					
Item 1:	Item Name:	Description:	Quantity Requested:				
	Includes Items for Demobilization? <input type="radio"/> Yes <input type="radio"/> No		Quantity Requested:				
Item 2:	Item Name:	Description:	Quantity Requested:				
	Includes Items for Demobilization? <input type="radio"/> Yes <input type="radio"/> No		Quantity Requested:				
Item 3:	Item Name:	Description:	Quantity Requested:				
	Includes Items for Demobilization? <input type="radio"/> Yes <input type="radio"/> No		Quantity Requested:				
Item 4:	Item Name:	Description:	Quantity Requested:				
	Includes Items for Demobilization? <input type="radio"/> Yes <input type="radio"/> No		Quantity Requested:				
Item 5:	Item Name:	Description:	Quantity Requested:				
	Includes Items for Demobilization? <input type="radio"/> Yes <input type="radio"/> No		Quantity Requested:				
Item 6:	Item Name:	Description:	Quantity Requested:				
	Includes Items for Demobilization? <input type="radio"/> Yes <input type="radio"/> No		Quantity Requested:				

Resource Request		Radio Operator Only		Origin Mag #	Destination Mag #	Unit ID#(ICS)	DOC
<b>This Section to be Completed by Jurisdiction Personnel</b>							
Date:	Time (24hr):	Heading:	Chemical (ICAP):	Priority (1-3):	Resource (1-3):		
ICS Position:	F	ICS Position:	R	Location:	Location:		
Name:	O	Name:	M	Contact Info:	Contact Info:		
<b>Resource Order</b>							
Title:							
Justification:							
Date:	Time:	Quantity Requested:					
Item 1:	Item Name:	Description:	Quantity Requested:				
	Includes Items for Demobilization? <input type="radio"/> Yes <input type="radio"/> No		Quantity Requested:				
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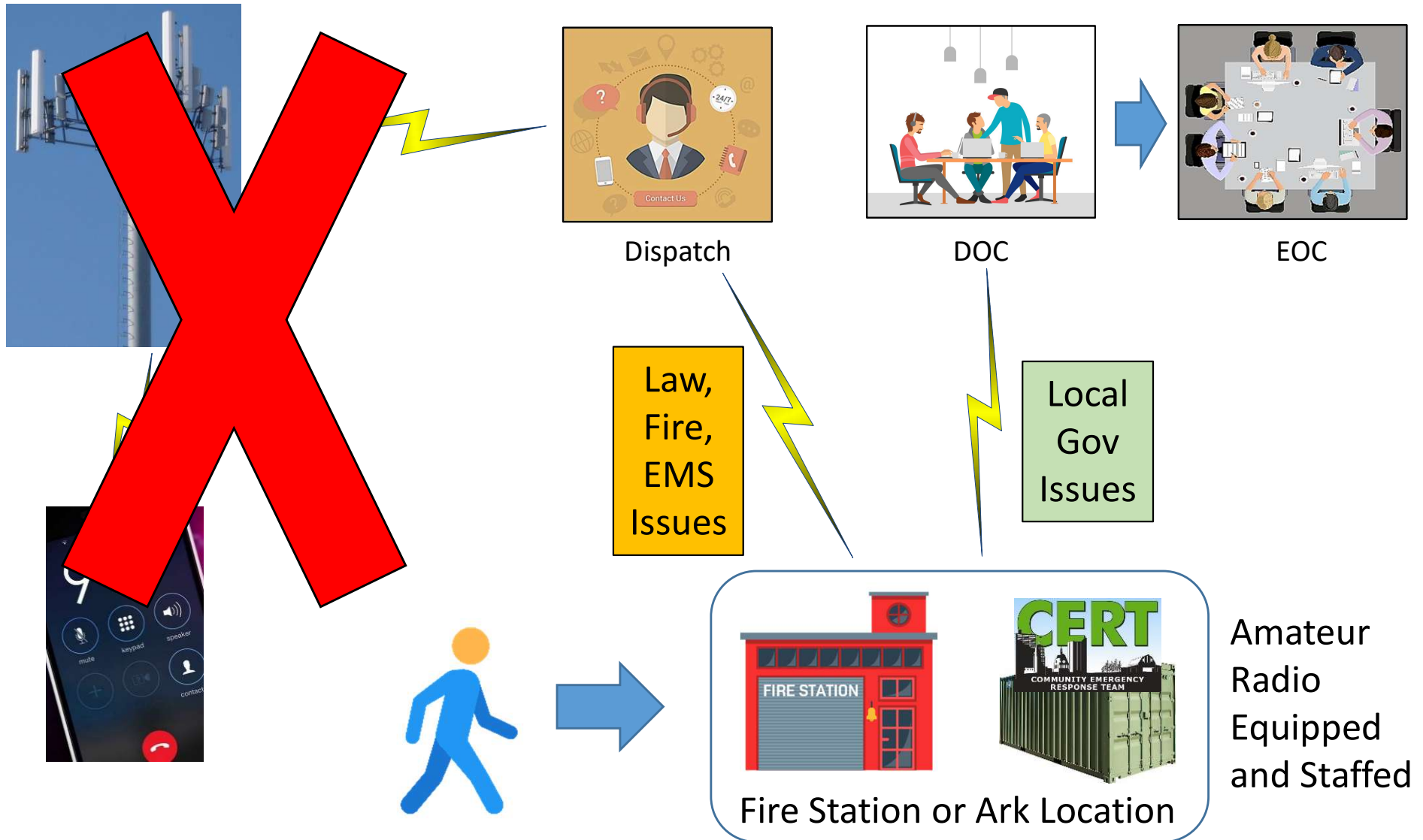
Resource Request		Radio Operator Only		Origin Mag #	Destination Mag #	Unit ID#(ICS)	DOC
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Date:	Time (24hr):	Heading:	Chemical (ICAP):	Priority (1-3):	Resource (1-3):		
ICS Position:	F	ICS Position:	R	Location:	Location:		
Name:	O	Name:	M	Contact Info:	Contact Info:		
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Title:							
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Item 6:	Item Name:	Description:	Quantity Requested:				
	Includes Items for Demobilization? <input type="radio"/> Yes <input type="radio"/> No		Quantity Requested:				

# Example: Alternate 911

Under development for:

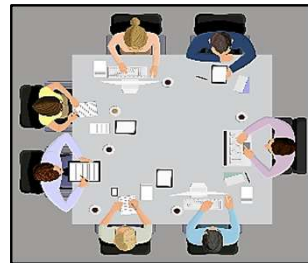
Cupertino, Los Altos Hills, Saratoga, Milpitas

# Alternate 911

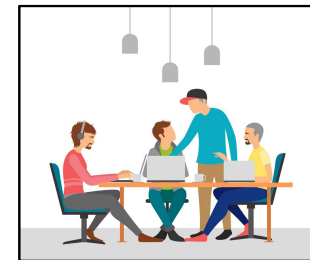


# Information Dissemination

After analysis, synthesis, information can be distributed to field resources and the public



EOC



DOC



Field



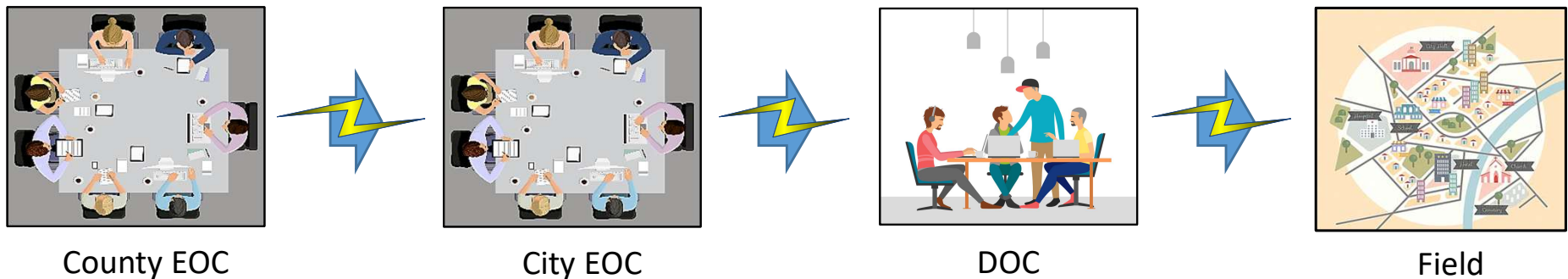
## Amateur Radio

- Can be used to distribute information to schools, shelters, hospitals and groups such as CERT, Red Cross, CADRE, and others.
- Press releases and public service announcements can be distributed to the general public

Example:  
Disseminating info to  
field responders

# Information Dissemination: Field

- Situational awareness, common operating picture, resource status, prioritization, analysis, support, ...
- Amateur radio: each SEMS level

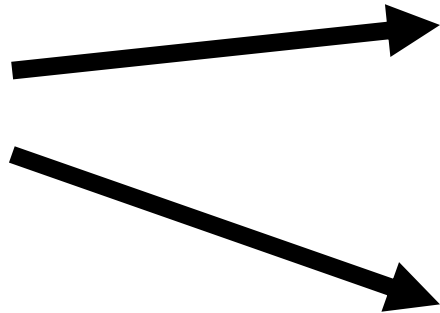


Amateur radio operators are trained in message passing techniques (voice and data) which help deliver the message correctly and quickly

# Example: Distributing Information to the Public

# Distributing Public Info

**PIO**



Broadcast  
Media



Social  
Media



What about those who don't have access or where communications systems are damaged?

Amateur  
Radio

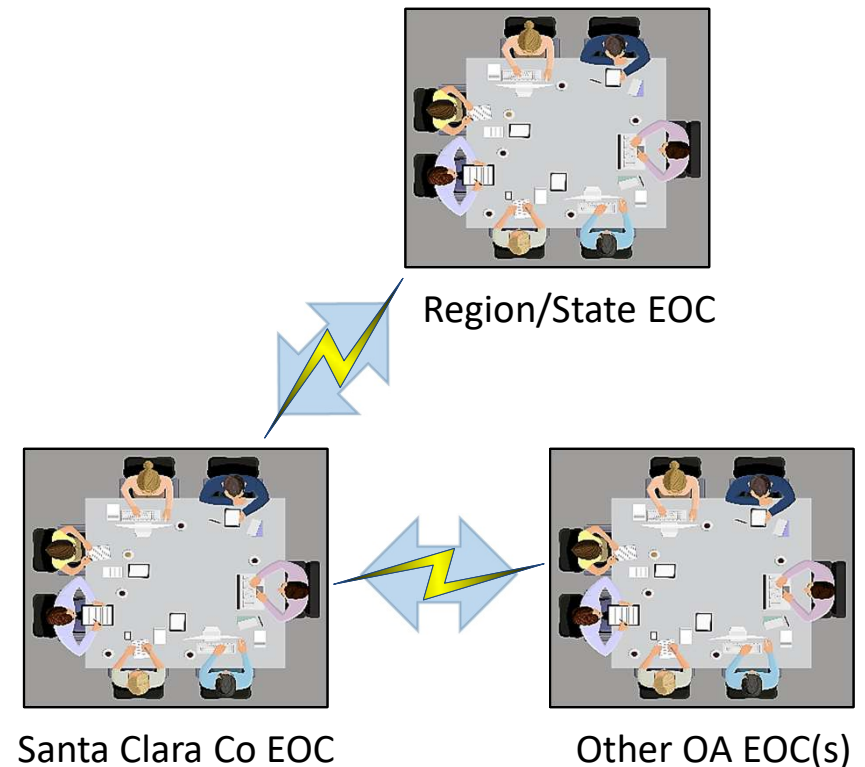


- Schools
- Shelters
- Neighborhoods
- ... wherever needed

Example:  
Beyond the Op Area

# Example: Beyond the Op Area

- Communications outside of our operational area is also important
  - Who
    - Other Operational Areas
    - Region and State
    - Elsewhere
  - Why
    - Situational awareness
    - Common operating picture
    - Resource sharing
    - Coordination
    - ...
- Amateur radio can compliment existing communications paths or act as backup during failures



# EOC Readiness: Amateur Radio



Two related but separate questions:

- Is your EOC ready for Amateur Radio?
- Is Amateur Radio ready at your EOC?

# Readiness Assessment



- Each city/OA has a Chief Radio Officer
  - Manages amateur radio emergency comms efforts
  - Best single point of contact for EOC staff
- Equipment & facilities
  - Do sufficient radios, antennas, computers, etc. exist for simultaneous operations on standard nets?
  - Do you have sufficient space allocated? Accessible to/from EOC?
  - We have standardized recommendations for city EOCs, hospitals, ...
- Personnel
  - Do you have a sufficient number of amateur radio operators and are they sufficiently trained?
  - Are you helping to recruit, encouraging participation, training?
  - We have a comprehensive training and credentialing program
- Procedures
  - Do you have EOC procedures for utilizing amateur radio?
  - Do your training, documentation, exercises include amateur radio?

# Summary



- Amateur radio can help at the EOC with
  - Information collection and dissemination
  - Communications
    - Where it doesn't normally exist
    - Backup where existing systems are degraded or failed
- Amateur radio in Santa Clara County
  - Standards for people, procedures, equipment
  - Robust and active training and exercise schedule
    - Weekly nets, monthly classes, quarterly drills
    - Public service events (races, parades, ...)
  - Each jurisdiction should assess readiness, encourage participation
- For more information:
  - <https://www.scc-ares-races.org>