The Cost of Failure to Integrate
Infrastructure-Independent
Volunteer Commmunicators:

**Resulting Loss of Situational Awareness
Leads to Flawed Response**

Iowa Derecho August 2020

THIS IS WHY WE CARRY OUT EXERCISES LIKE WHIRLWIND BOOM

Comms Normally Connect

To succeed, comms may take advantage of distant, unaffected radio assets (human / equpment / computer)

STATE LEVEL AUTHORITY

Alternate federal channels / volunteers / agencies

Regional Comms / Comm Assistance

County ICS/EOC Level

IOWA: An example….

These responders struggled against handicaps that we might avoid next time.

Hindsight is always 20/20. Will we learn from this? Or will these issues be repeated, needlessly, over and over?

It depends largely on how volunteers attempt to integrate.

Released by Permission

- Permission to present many of the images of the slide presentation were explicitly given by the presenter, Daniel P Roesler, Softronics LTD, talk given 2/26/2021 to SHARES Interoperability Working Group.

- SOFTRONICS manufactures high power, high capability HF equipment.

Military Electronics

S171 Radios

GRC-171 Replacement

Sonobuoy Radio Simulators

6000 Watt UHF Transmitter

Control Head Power Supply

Iowa, August 10, 2020

Case Study:
Derecho Storm Disaster
Cedar Rapids, Iowa

August 10, 2020
The EMP that didn't happen

Daniel P. Roesler
Robert H. Sternowski

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30 minutes notice...

Scenario

- Cedar Rapids hit by straight-line windstorm with heavy rain, 30-45 minutes duration

- Westerly wind 110 mph, 140 mph gusts

- Unpredicted, no preparation time

- Storm system traveled 770 miles, Nebraska formation to dissipation in Wisconsin

- Cedar Rapids urban/suburban city of 100,000

What is a Derecho?

(der – RAY – show; Spanish for "straight")

• Storm phenomenon unique to the Midwest US

• Same setup as tornadoes: warm/cold front clash

• Not predictable like a slow-moving hurricane

• Derecho is straightline winds from bow echo on frontal system

   - Tornado would be rotational, different phenomenon

   - Tornado localized <1 mile wide; derecho 50 miles wide

• Equivalent to Cat 3/4 hurricane, not rotating

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Tore through several states!

Map from national weather service
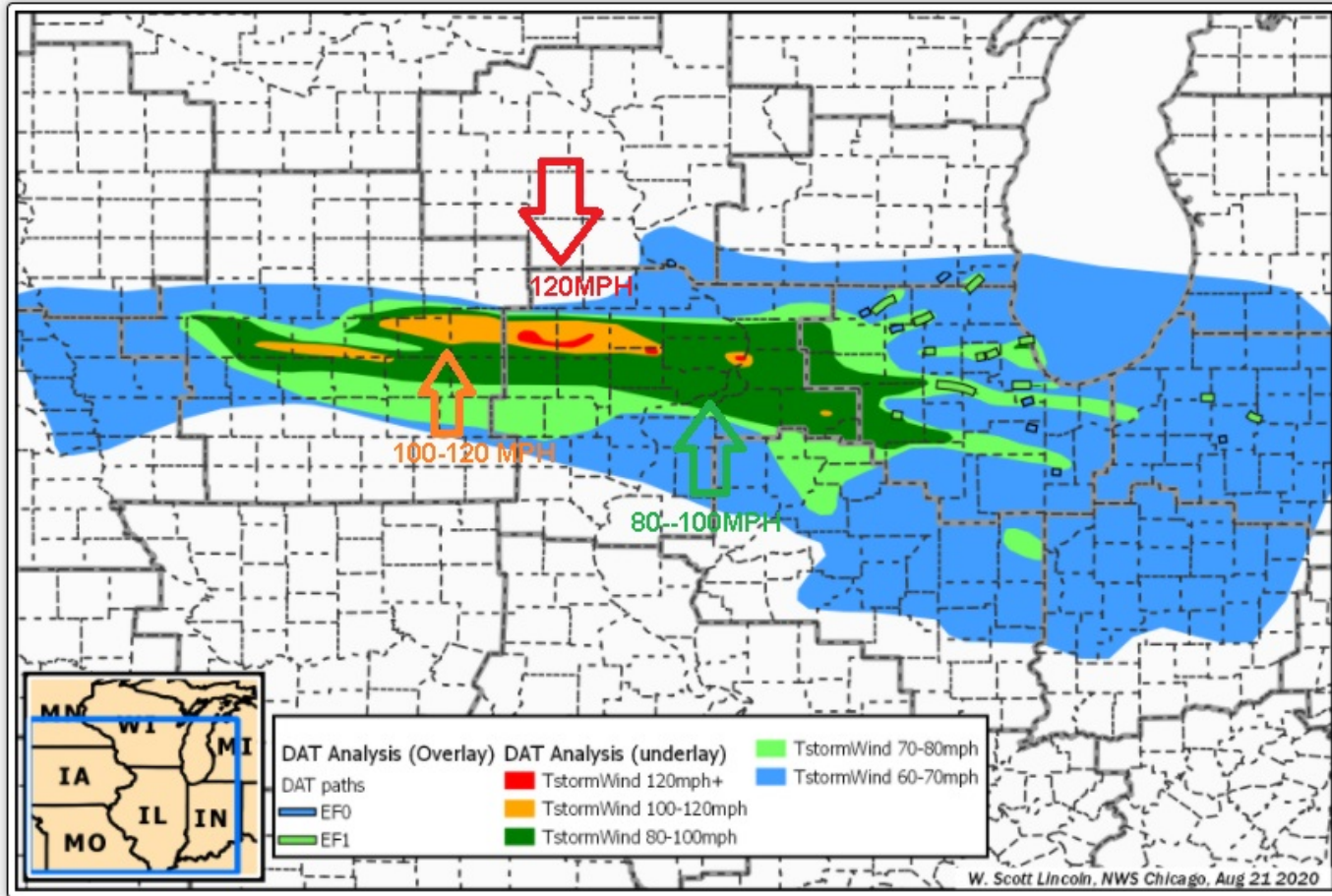
Timeline

- 8/10 1130-1200 CDT alert that storm is approaching

- 8/10 1230 CDT 8/10/20 storm hits

- 8/10 1300-1330 CDT all utilities disabled, state of emergency begins

  27 hours later.....
- 8/11 1600 CDT small pockets of power trickle back on line

  11 *DAYS* later
- 8/21 Last major block of power restored

- 9/25 Customers still without broadband internet

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Major disaster

Post-storm Communications

as of 1300 CDT 8/10

- Electrical power knocked out everywhere: trees on lines

  - Could only use battery devices

  - No means of recharging them

- No AM/FM/TV broadcast stations

  - No power; main AM station tower felled

- No NOAA weather radio (off air)

- Landline phones mostly knocked out due to overhead lines and jammed central office

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Situational Awareness?

- Information should flow immediately from cities to counties
- Counties declare ICS / emergency
- County information flows to State
- State declares disaster, invokes Stafford Act
- Resources flow to affected areas almost immediately
- NOT.

#1 No comms = no activation

Emergency Activations

- Emergency services/responder activation plan depended on commercial internet, landline, pager, cellular

- The storm disabled all commercial communications

- Could not activate responders because they could not be notified

#2 Missing long distance resources

Post-storm Communications cont.

as of 1300 CDT 8/10

- Cell service knocked out (variety of problems)

- Broadband TV/internet knocked out: trees on overhead lines

- Emergency police/fire repeaters remained operational

- Amateur radio repeaters operational on battery power

  - *HF radio never activated to "jump over" disabled local communications*

- No newspapers printed (no power) or able to be delivered

emphasis added

No Comms = "no need" for resources

Government Response

- 8/11, one day after storm
  - City deployed snowplows to push trees off major streets and emergency routes
  - Residents pitch in and clear own streets
    - Fallen 2-3 ft diameter trees beyond DIY abilities
  - Heavy equipment was badly needed but slow coming
  - Primarily due to "fog of war"/lack of visibility:
    - State level could not see what happened
    - Declined aid from other counties, NGOs
      - Not sure it was needed
    - Did not request National Guard with heavy equipment
    - Residents needing emergency aid went without for days
  - The poorer residents, most needing help, were the last to be reached and serviced

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System Damage: Everything

Post-storm Comm Summary

Service	Status	Driver	Medium	Comments
Cellular	Out/overload	Power, wind damage	Voice/internet	Thin surviving network towers overloaded
Landline	Out/overload	Tree damage	Voice/internet	Above ground infrastructure
Broadband	Out	Tree damage, power	Broadcast/voice/int ernet	Above ground infrastructure
Broadcast	Out	Power	Broadcast	No power: listener or broadcaster
Emergency landmobile	Working	Reinforced emergency system/power	Voice/data	Only mode working
Weather radio	Out	Power, remote feed	Voice	Lines down to NOAA
Amateur radio	Working	Battery power, many members	Voice	Never activated by agencies
SHARES	Not used	Apparently unknown to emergency agencies	Voice/data/internet	Not part of plans
Newspaper	Out	Power, blocked delivery	Print	Could not drive about; only walk
Word of mouth	Limited	Felled trees blocked movement	Voice	Could not drive about; only walk

Broadcast systems?

Aftermath
Primary AM Station WMT 600 kHz

Extensive individual station damage...but still connecting!!

SHARES Station Status
NCS579, NNC7IA, Marion Iowa

- Off air August 10 – 21: Marion IA power outage
- Antenna pole shook but did not break
- B&W dipoles
  - Stainless steel wires twisted but survived
  - Type N coax center conductors pulled out
    - Did not realize low power output until after North Net check in since reception was still nominal
  - WinLink system also operating on low or no power
    - Did not realize message decrease in traffic
    - ADIF Analyzer wasn't being used at the time
- Now installed tri-fuel and dual-fuel generators
  - City natural gas was available in storm aftermath
  - **Gasoline unavailable (no electricity for the pumps)**
  - Liquid Propane tanks were heavily used (cooking & some generators)
- Adding UPS and auto-start for generators
  - Radios & Computers

Elongated hole from wind movement of 45-foot pole

Water Pipe Antenna?

Station Lessons Learned

- Keep battery power charged up for radios (i.e., ALE best practices 100 Amp marine battery)

- Ham radios need NTIA mod for home use when entity station is out of order…
  - E.G. Yaesu 897D

- Keep available outside backup antenna in safe storage
  - Not many trees left to use for support.
  - Have versatile antenna supports stored also

- Surviving antenna in basement using water pipes enabled JS8 and WSPR reception (needed tuner for transmit)
  - JS8 allowed reception of JS8 ALLCALL Messages

Citizens soldier on their own

Public Response

- Slightly panicked
    - Could not drive for food/aid due to felled trees
    - Could not buy anything– no power to stores/pumps
    - No banking or ATMs or cash registers
    - No power for light/air conditioning/cooking
    - Remaining chilled food spoiled after days of no power
    - Could not call for help
    - Could not drive for help
    - City could not go out to check on damage and help
    - *Very few storm injuries – zero fatalities*

Infrastructure Obliteration

Damage Assessment

- Unprecedented damage

- Electrical power infrastructure destroyed
  - 1200 miles of wire, 500+ high voltage structures, 3600 wood poles broken, 6 communications towers damaged

- 70% of city's trees felled or badly damaged
  - Lack of prior windstorms: many vulnerable "weak" trees
  - Predominant overhead cabling destroyed by falling trees

- Many buildings and structures destroyed or damaged by sustained high winds

- Overwhelming amount of debris blocking access to everything

Molasses-Speed Recovery

Recovery

- 8/17 (1 week after)
  - Much of power, internet, broadband, telephones restored
    - 2000 power crew members (700 debris removal)
      - Power Crews from all across US and Canada
    - 200 National Guard with heavy equipment
  - **Cellphones came online with power restoral**
  - Resources overwhelmed by amount of debris to be removed
  - Worst pockets of need still being discovered
- 8/24 (2 weeks after)
  - Still known pockets of severe damage and people suffering in those pockets
  - Only isolated power outages remain
  - Still major broadband outages
  - Still overwhelmed by debris; help coming in
  - More pockets of need still being discovered

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Glacial AAR/IP

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EMERGENCY MANAGEMENT

PUBLIC SAFETY & HOMELAND SECURITY

6 Months After Iowa Derecho, Planners Yet to Assess Lessons

Six months after an unprecedented disaster, county, city and non-government organizations in Linn County have yet to decide how they'll ensure emergency communications get to the public should another such storm strike.

BY ERIN JORDAN, THE GAZETTE, CEDAR RAPIDS, IOWA / FEBRUARY 11, 2021
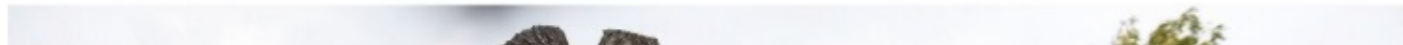
Not sure where they fouled up

Six months after that unprecedented Iowa disaster, county, city and non-government organizations in Linn County have yet to decide how they will ensure emergency communications get to the public should another such storm again strike in and around the state's second-largest city.

"Part of our review will be, 'What communications systems didn't we tap into?'" said Steve O'Konek, Linn County Emergency Management Agency coordinator. "I don't have all the answers."

The agency plans to gather information from its partners — such as cities and nonprofit groups — to put together an after-action review document in the next three to four months, O'Konek said. The review will focus on logistics, operations, communications and mass care of people displaced or needing services.

Are you part of the system?

If you aren't in the system before the disaster...

you AREN'T going to be serving afterwards with that agency.

TRY TO EXERCISE in ways that will ensure your systems are KNOWN to the authorities…..local EOC, NGO Agencies, State EM Dept/Div!

WhirlwindBoom 2021

- Designed to practice structured communications between every level
  - From shelter all the way to State EOC
  - Data that goes easily into professional databases
- Intended to bring as many different teams TOGETHER to give them experience interacting….
  - BEFORE the next disaster
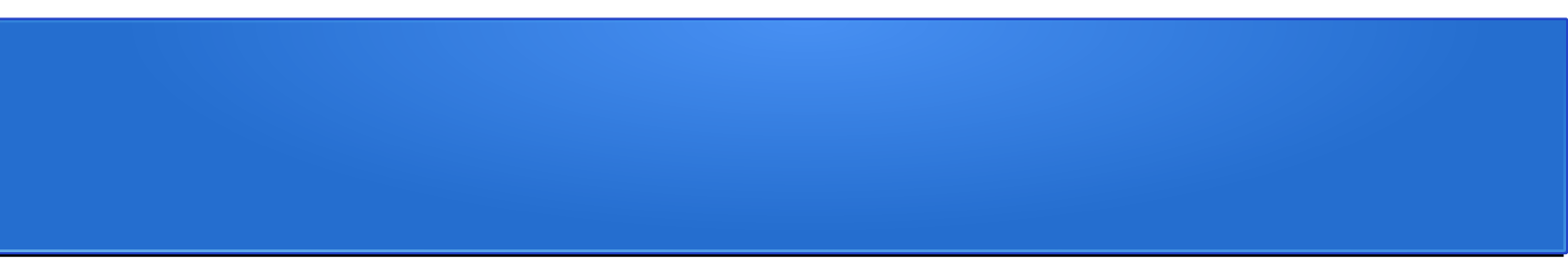- A chance for your team to become more "a part of the system."

Links

IAP: https://qsl.net/nf4rc/FBDR/2021/2021WhirlwindBoomICS201.pdf

ExPlan:

https://qsl.net/nf4rc/FBDR/2021/2021WhirlwindBoomExercisePlan(Particpant).pdf

Register your group or individual effort:

https://docs.google.com/forms/d/e/1FAIpQLSfeOZg8ehrWL_Brg45aKAq3ImlVgIvgrgY98bwup2ycwMF3BQ/viewform?vc=0&c=0&w=1&flr=0&gxids=7628

- Pre-Registered groups will receive planned "injects" to be more a part of the Exercise.

Three types of walk-on volunteers

- (1) Originating Stations
  - Create Agency Situation Reports to RDEM@WINLINK.ORG
  - Create Survivor Messages outbound to Email Relay Stations
- (2) Out-of-State Ordinary Email Relays: Out of State stations who can accept Agency Situation Reports, or Survivor Messages and relay them by either mail or telephone. (We are not accepting inbound W traffic)
  - NOTE: regular email systems to RDEM@WINLINK.ORG must have //WL2K as first characters in SUBJECT of email
- (3) In-State WINLINK Relays: In-State Stations with HF WINLINK capabilities who can send/receive traffic from voice-only stations to Winlink RDEM@WINLINK.ORG, or handle Survivor Messages.