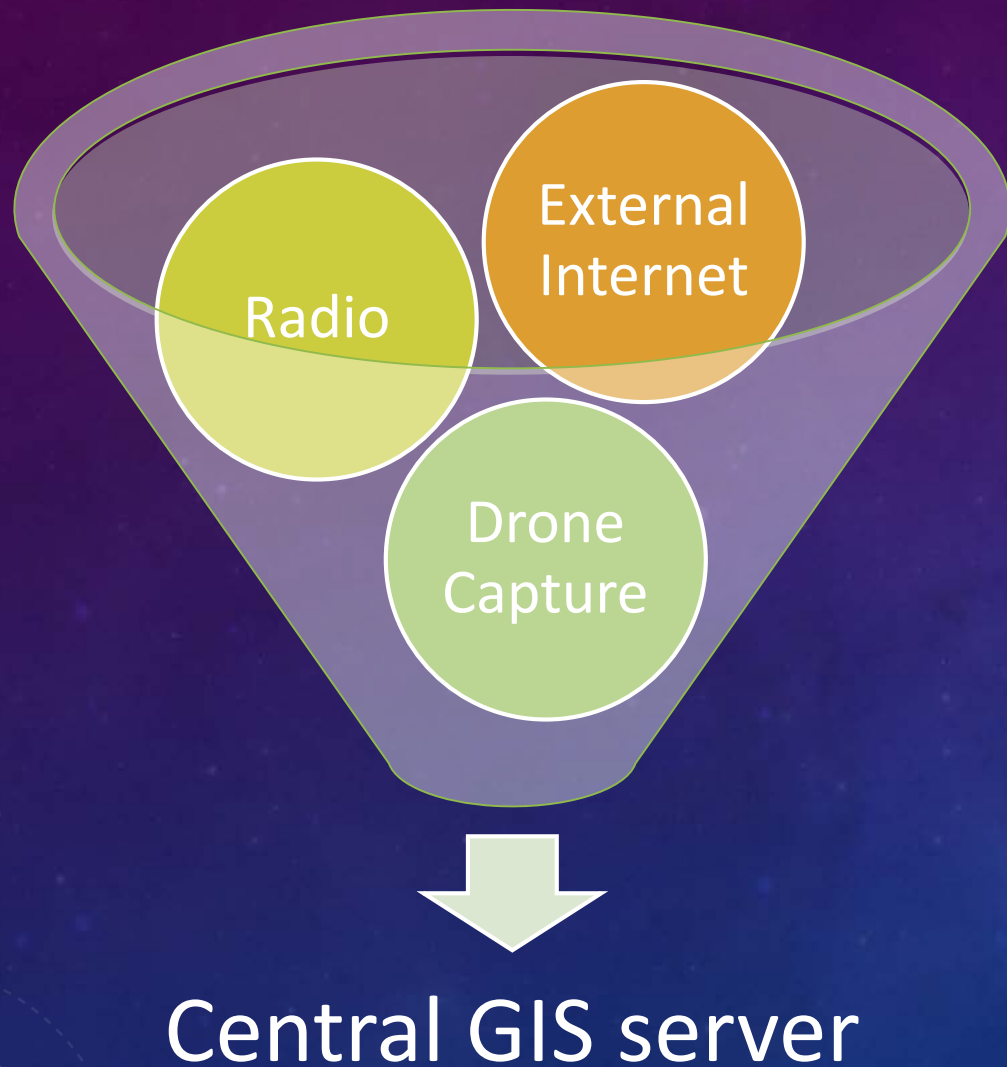


GIS Day 2017

# PRAGMATIC DATA COLLECTION

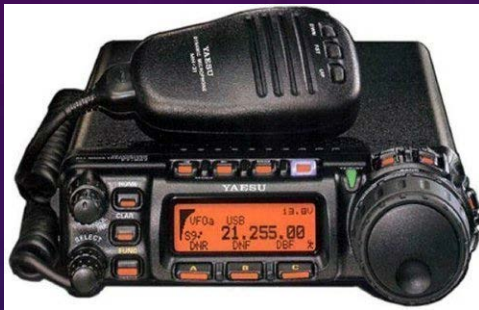
**POST-HURRICANE AND DISASTER RECOVERY IN THE CARIBBEAN**

# The Objective



- HF Radio Link Data
  - Digital 2-way communication
- External Data inputs (missing Family, crowdsourced data etc.)
- Drone Capture
  - Relay ADB-S, GPS/GIS data, Image Capture, Damage assessment

# DIGITAL AND ANALOG COMMUNICATIONS



Yaesu 857D

- All Mode HF/VHF/UHF
- Built in DSP
- Can run 5w – 100w Output
- Rugged very small unit
- Portable/Mobile



Yaesu 991a

- All Mode HF/VHF/UHF
- Built in DSP
- Can run 5w – 100w Output
- Automatic Antenna Tuner (ATU)
- Base Station



- Snapshot Picture Taking Capability
- Built in GPS with Tracking
- Wide Band Receiver
- Navigation
- AX.25 Data TNC Modem
- Simultaneous Voice/Data Communication Mode



# PRE-EVENT: COMMUNICATION DEVICE READINESS

- Stock of 12v cells preferably, of varying Amps (6Ah – 40Ah). LiFePO 4 Batteries (better chemistry, less of a fire risk, high charge discharge capacity, light weight/very portable)



- Secure HF communication devices (Base at redundant locations)
  - Fire & Police Stations, Hospitals
- Standardize devices: this improves training and support, convenience of interchangeable programming/batteries/accessories
- Test of all communication devices (done at intervals throughout the year)
- Have deployable antennas available (towers will fail > Cat 1 winds)
  - Dipole and/or Vertical antennas deployable by a single individual



# POST EVENT: EVALUATION & DEPLOYMENT

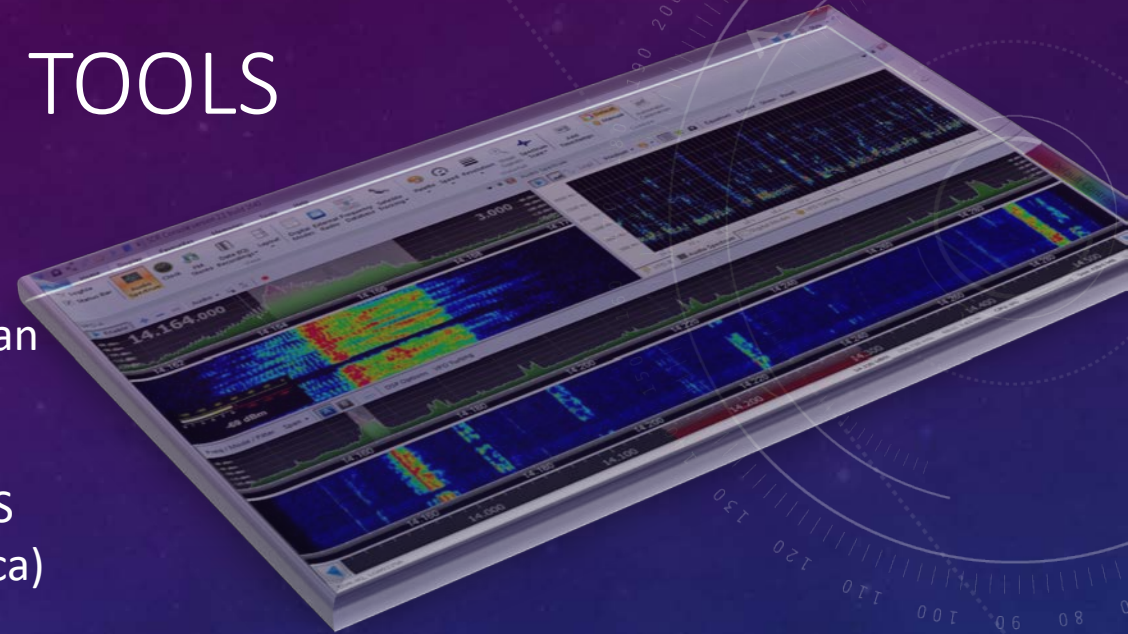
- What is the status of the power grid?
  - Reliable power allows > transmit capabilities
- What communication networks are reliability available?
  - Cell towers, land lines are always prone to outage in adverse events.
  - Satellite phones have limited use in cloudy weather conditions and are prone to network congestion in the Caribbean, also very expensive
- Install and Deploy long-range HF Radio communications (SSB Voice)
  - SSB 20M and 40m communication to the closest receiving station (conserve battery)
- Deploy Digital communications (PSK-31, JT65, RTTY)
  - Excellent low power means of Data Out
- Establish Activate local VHF/UHF handheld network
  - Standardized 8am/6pm bets to communicate with other islands
  - Dominica was unique: it was able to hit the St. Lucia VHF repeater with handheld radios at 5w. This is not typical for islands to reliably reach repeaters in other countries.

# SOFTWARE DEFINED RADIO (SDR) TOOLS

SDR devices cost as little as \$19 (the pragmatic part!)

Joined with a Raspberry Pi device and a simple antenna, anyone can deploy a wide-band multi-mode receiver. (cost ~\$90.00)

A digital receiver with the appropriate script can auto populate GIS servers in real-time – as proven in 2017 (Hurricane Maria, Dominica)



- Decode Realtime Satellite Weather Images
  - Everyday multiple NOAA weather satellites pass above us. Each NOAA weather satellite broadcasts an Automatic Picture Transmission (APT) signal, which contains a live weather image of your area.  
Source: <https://www.rtl-sdr.com/rtl-sdr-tutorial-receiving-noaa-weather-satellite-images/>
- Listen to/ and record ALL emergency audio for play back and evaluation.
  - Sample: <https://soundcloud.com/sigmytube>
  - Recordings are VITAL to data collection



## Ten Starting Points

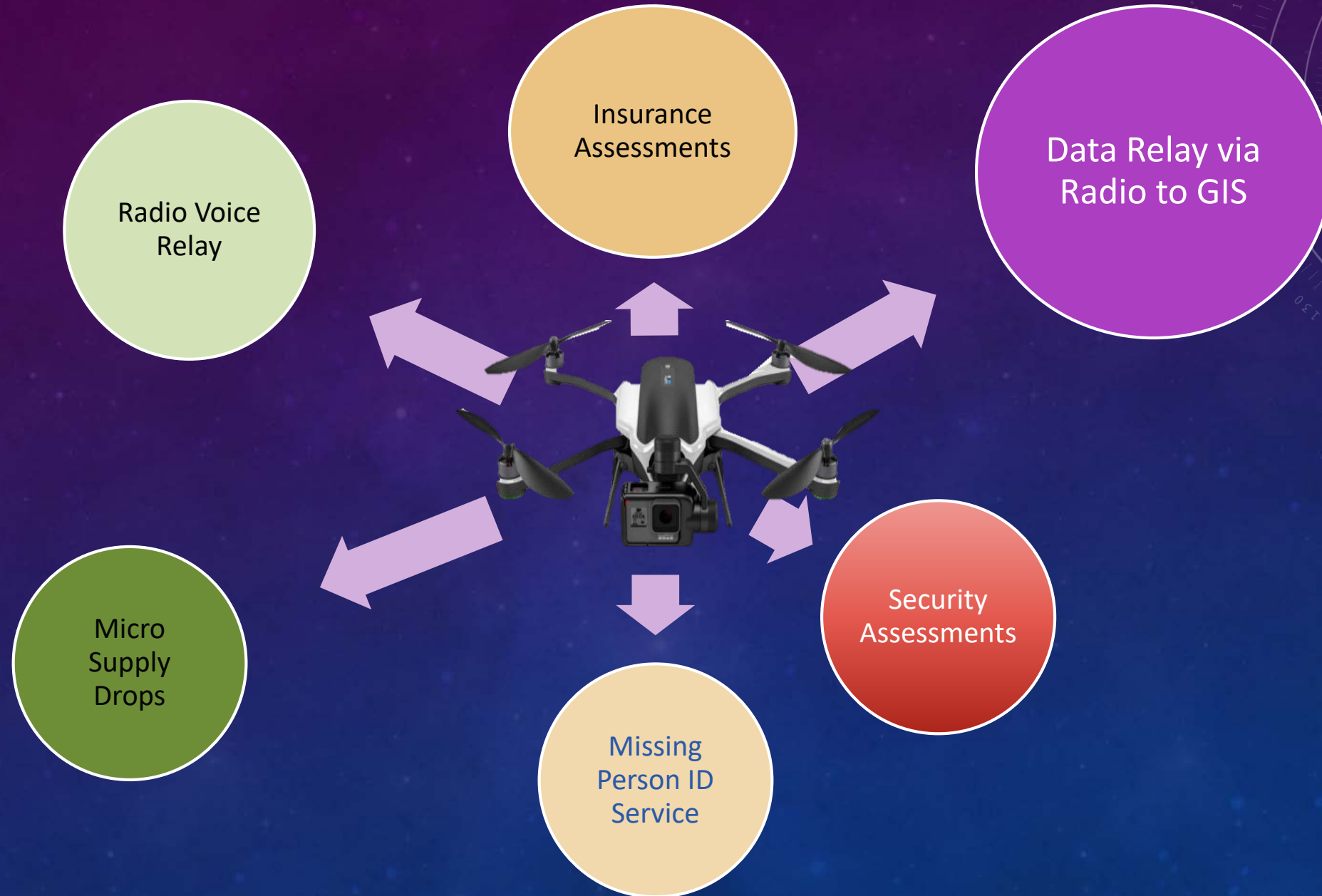
### Communications Post Disaster in the Caribbean diaspora

1. Antenna Towers of any kind (cell, radio etc.) are failure points in Cat 2+ Winds.
2. Satellite Phones work but are costly, unreliable in weather conditions (heavy cloud cover) and are prone to network congestion in the Caribbean.
3. Very few Regional Emergency personnel can deploy Radio Communications.
4. High Frequency (HF) SSB & Data is proven as a reliable first response method.
5. Need for Amateur HF in at least 4 locations per island (e.g. 2 Police stations & 2 Fire Stations), all without towers, and equipped with collapsible vertical or wire (dipole or end-fed) antennas.
6. HF Antennas should be simple and deployable by a single individual.
7. HF rigs should (ideally) be capable of transmitting on multi-band HF/VHF/UHF like Yaesu 857D
8. All units should be accompanied by instructions and have a self-contained power source, using an always charged Lithium Iron Batterie(s) (LiFePO4 not Lithium Ion). Also: foldable solar charging capacity
9. Reliable fixed or open frequency VHF/UHF two-way radios are under \$60.00 – this is an opportunity to put 10s of handheld radios in each CARICOM nation – at low deployment cost. Batteries should be 2x per Radio. 10 Radios Deployed = 10 Batteries on Charge.
10. When all else fails, HAM radio has proven to be reliable. Why wait for another disaster?

Authour FCC Call: K4ECD

Date: 2017-09-23

# DRONES EVERYWHERE!





THANK YOU FROM  
ECD SOLUTIONS

