Coffee Break Training - Command and Control Series

Geographic Information, Ground Truth and Situational Awareness

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Learning Objective: *The student will gain an introductory awareness of the importance of geographic* ***ground truth*** *in the context of* ***situational awareness*** *for incident management.*

Getting from one place to another is a basic skill. In the process of finding our way around, we rely on mental maps that we recall from previous travel or from verbal directions. We use visual references, such as street intersections, and topographical features, such as hills and rivers. We also use paper maps, smartphones, and GPS devices that triangulate locations by referencing satellite signals. **Ground truth** is the result of connecting what we can see or visually reference with the **features** (points of interest) on a paper map or GPS-enabled smartphone mapping app.

From 2011, a NASA satellite natural-color image of a tornado track through Tuscaloosa, Alabama. The tan-toned, debris-filled path is several miles long, passing through the city's center. Running roughly parallel to the tornado track is a contrail from a plane in flight. NASA Image Archive: http://earthobservatory.nasa.gov/IOTD/view.php?id=50434.

Challenges to navigating come during responses outside of assigned areas, mutual-aid calls, and extreme weather events, such as floods and dense fog. A major disaster may cripple road and street infrastructure by wiping away signs and landmarks that we rely on in normal conditions, thereby affecting **situational awareness**. **Ground truth** and **situational awareness** go hand in hand.

Geographic Information System (GIS) and GPS are now widespread, and they support digital mapping and mobile mapping, as well as smartphone navigation. In that context, **ground truth** takes on a special meaning. If grid coordinates are returned or given via a location method such as GPS, then it must be assumed to be only an estimate of location. Only **ground truth** reveals the actual location on Earth.

We place a lot of faith on wireless Internet and navigational satellite signals and reliance on the batteries that power our smartphones, tablets, pads and GPS devices. What happens when we lose those aids? Presuming that you have a good map and can read it, you have a partial solution. A first responder should have basic map-reading skills to help ensure **situational awareness**.

In April 2011, Tuscaloosa, Alabama, firefighters faced a post-tornado scene of devastation 6 miles long and 1 mile wide. Locations they once knew as familiar now looked as if something from a disaster movie. Complicating matters, communications systems were temporarily inoperable and standard response routes were blocked. Civilians were injured, confused, lost, scared and looking for their loved ones, with nowhere to go and no way to get there, at least initially.

Officers could control their own crews, but controlling the mass of others was next to impossible. Help was coming but not quickly. There was no way to establish a perimeter for a while. There was no real command and control for a while. The people who live in the area were the best resource. They had something responders did not have: the knowledge of who lives where, if they were at home.

Lessons learned from this and similar events reveal that limited access to accurate maps (i.e., maps that have needed details) impedes response and recovery efforts. Lack of wireless signals, broken network and Internet connections, lack of ruggedized electronic equipment, and lack of digital maps of the disaster area slow recovery efforts. Also lacking were the digital GIS data layer sets, specifically layers of **critical infrastructure** systems needed for accurate mapping. This gap in geospatial capability for disaster response and recovery is widespread in almost all disasters. Fortunately, there is something you can do about it.

Future lessons in this series will cover basic navigation by map; map coordinate systems; geographic digital data; drones and unmanned aerial vehicles; crowdsource mapping, the basics of GIS, and the importance of **ground truth** to support **situational awareness** during response and recovery.