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The Role of Integrated Scenario Experimentation in Improving Humanitarian Response Outcome

Appling, Scott; McCook, Leigh; Briscoe, Erica; Scott, Gerald; Allen, Tristan; Fruehauf, Todd

Georgia Tech Research Institute

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Scott Appling ✧, Leigh McCook ✧, Erica Briscoe ✧, Gerald Scott ✯, Tristan Allen ✯, Todd Fruehauf ✯

✧Socio-Technical Systems Division, Information and Communications Laboratory, Georgia Tech Research Institute, Georgia Institute of Technology, Atlanta, GA

Department of Information Science, Graduate School of Operational and Information Sciences, Naval Postgraduate School, Monterey, CA

{scott.appling,leigh.mccook,erica.briscoe}@gtri.gatech.edu; {grscott,tmallen,tjfrueha}@nps.edu

ABSTRACT

GTRI in support of the Naval Postgraduate School's Joint Interagency Field Experimentation JIFX event carries out quarterly Integrated Scenario Experimentation. Integrated scenario experimentation brings technologists together to collaborate on shared humanitarian response scenario to gain working knowledge outside of the laboratory. Scaffolding scenarios are offered to experimenters in a series of pre-planning calls that happen before the week of JIFX. Through discussion with experimenters, the scenarios are expanded to allow for in situ experimentation that is beneficial to individuals experimenters outside of their traditionally isolated and laboratory settings. The qualitative knowledge and empirical data gathered through integrated scenario experimentation is invaluable to evolving experimenters' technology.

Example Scenario

The capital city has been on high alert for several days based on intelligence that a terrorist group is planning to target military and government facilities. On a typical afternoon in the commercial center of the capital city, officials learn that a local man has stolen a car and taken police on a chase to a nearby neighborhood.

The man parks the vehicle in the neighborhood and enters a mosque with two large black duffle bags. The man, armed with two assault rifles has now taken several hostages in the mosque. The man is also speaking with the media using his mobile phone. Many posts from social media have varying information about the standoff based on bystander reports and second-hand information. Some reports indicate that the man has a radiological dirty bomb in the mosque while others indicate that they have spotted in the windows what experts would identify as a biological weapon.

The terrorist response incident command order surveillance of the mosque using unmanned aerial systems with video and photo capabilities. At the same time, an ad-hoc communication network operating non-public radio frequencies is deployed to provide secure communications between field personnel and incident command.

The man eventually launches a small-range biological weapon and infects some of the hostages, one of whom escapes and is diagnosed/treated by the response personnel. At which point, the man is shot twice by police snipers. The standoff ends with the man in critical condition and the rest of the hostages are freed.

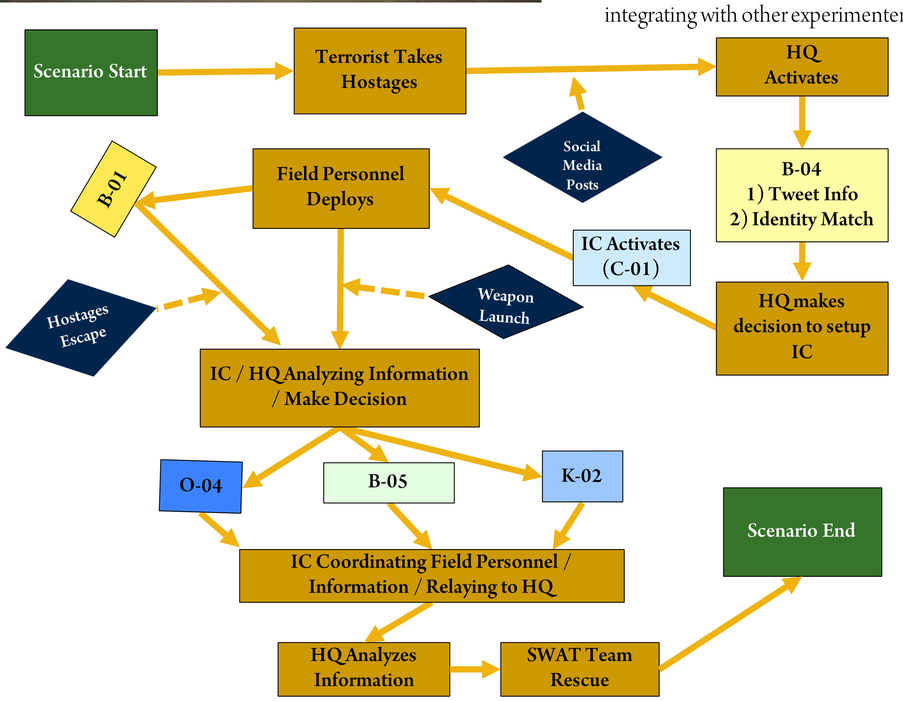
Experimentation Sequence

- Experimenters, JIFX staff, and volunteers took their locations at either the CATF or at McMillan Airfield, within the Technical Operations Center.
- After about 45 minutes, an announcement was made across the radios that the scenario was starting.
- Army Special Operations groups, serving as terrorists, drove around the CATF towards an office building and captured two additional hostages.
- One of these additional hostages was outfitted with a tracking sensor (B-01).
- Next, HQ received intelligence derived from social media (B-04) about the terrorists and hostages that had been identified and taken to a local religious building (i.e. church, mosque) (near the office building).
- HQ requests that an incident command be established near the site of the church to conduct field operations including situational awareness and potential hostage rescue.
- Next, incident command executes a mission to retrieve a vital water purification asset (E-01) using tracking technology (B-01) embedded within the asset.
- Afterwards, in consultation with HQ, IC executes a hostage rescue mission and deploys field personnel to the location of the religious building where the terrorists are holding hostages.
- At this point, one of the hostages is able to open a window and their tracking sensor (B-01) is exposed and they are identified.
- Next, one of the terrorists sets off what appears to be either radiological or biological weapon.
- Then, two of the hostages escape. Field personnel locate the escaped hostages and conduct field experiments on them to ascertain their health status and risk of infection (K-02; O-04).
- These results are communicated back to IC (C-01) and then to HQ (B-08). At this point, IC sends in a SWAT team to capture the terrorists and rescue the remaining hostages.
- The scenario concludes.

CATF Area: A mock village with several buildings to use during integrated scenario testing. **Here**, a picture of the Hotel; **To the right**: (a) underground tunnel network passage; (b) Church building

Experimenter Research Questions

- Which technologies were simulated and what conditions/resources would need to be present in order to fully simulate in the future?
- What, if any, were unexpected conditions or knowledge gained?
- What were the gaps in running the scenario that were less observable from the initial planning phase?
- To what degree did the scenario reflect or not reflect the real-world that it sought to simulate?
- What technologies/data, if present, would additionally enable you to better test your technology during the scenario?
- To what extent do you think you were successful in integrating with other experimenter's technologies?



Experiment ID	Experiment Name	Brief Description	Scenario Collaboration and Experimentation
B-01	RF Combat Identification Patch (RF Patch)	Efficient RF transceiver matched with an internal GPS system to provide tracking of people and objects.	Providing sensor information to track personnel and, later on, a hostage.
B-04	SAS Intelligence Framework	General situational awareness analytics platform that takes in data and performs aggregate operations.	Perform analyses of scenario-specific social media data.
B-05	Carrier Agnostic Over-The-Top Group Communications Wearables	Carrier Agnostic, Wearable, Communication Devices	Allow field personnel during the scenario to communicate
C-01	Modeling and Measurement for Rapidly-Deployed Multi-Transmitter Networks	Near-automatic deployment and self optimization of multi-transmitter network; autonomous sensing with aerial and ground vehicles	Using mobile platform and autonomous vehicle cameras as an incident command platform.
K-02	Rapid Virus Testing in "Field" or Deployed Conditions	A portable kit that can be used by field personnel to conduct rapid virus testing for exposure to biological weapons.	Provide health intelligence about persons of interest during scenario.
O-04	Field Assessment of Brain Health	A portal field assessment platform to determine whether or not individuals may have experience different forms of trauma related to injuries.	

Experimenter Impact

Here are sample statements provided by various experimenters about their experience with Integrated Scenario testing:

- ***"We're developing an injury-assessment tool for use by non-experts, and it whatever field environments the uniformed end-users might need. The integrated scenario will help us assess how our device functions under conditions that we hadn't planned on in the design phase (e.g., outdoor use)."***
- ***"Mostly Successful - Few Interoperability Issues / New Data Gained to Improve Technology"***
- ***"We measured success by our ability to setup and run the system in a simulated field-type environment. Ultimately, we were not able to collect the data we intended to, but even our failure in this area helped to invalidate a working hypothesis we developed going into JIFX. All in all, it was a very worthwhile event."***