Operational Concept for the CBNAIR System

Vision: The Chemical, Biological and Nuclear Agent Identification and Response (CBNAIR[1]) System is a decision support system (DSS) designed to assist first responders in emergency situations that may involve chemical, biological and nuclear agents. The primary mission of CBNAIR is to provide near real-time detection and categorization of nuclear, chemical and biological (NBC) agents and to recommend appropriate immediate action to be taken in response to the presence of such agents.

Scope: CBNAIR shall include a mobile command center, high-speed secure data access to NBC identification databases, direct communication links to the National Institute of Health (NIH) and the Federal Emergency Management Agency (FEMA), portable secure communications equipment, and portable computers to accompany responders to the scene of emergencies. The CBNAIR system includes the necessary data and logic to allow for on-site, initial agent categorization and suggest risk mitigation strategies for that agent to be taken within the first 6 hours of agent release. The CBNAIR does not include data or decision support for agent containment, cleanup, or other actions that must be taken past the 6 hours point. Additionally, the CBNAIR does not include the information or testing equipment necessary to positively identify the actual agent.

Command Structure: CBNAIR is a Federally funded and mandated but locally controlled and operated DSS. Each local fire and rescue department is required to place at least one handheld unit on each emergency vehicle. The CBNAIR command center is co-located with the local 911 response system. Staff training and salary support for the CBNAIR function is provided by the Federal CBNAIR program.

Mission Requirements:

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    1) The system shall have an operational availability of TBD with a design goal of TBD.[2]
    2) The system shall be useable with two days of training by a user familiar with personal computing equipment.

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[1] Pronunciation: “see-bon-air”

[2] Analysis is required to determine feasible ranges of operational availability. An important part of the decision process of whether to move forward with design and implementation is to determine whether stakeholder requirements for operational availability are feasible given current technology. We leave these requirements unspecified pending interviews with stakeholders and initial engineering studies.

3) The portable aspect of the system shall weigh no more than 3 lbs with a design goal of 1/2 lb.
4) The system shall be capable of providing feedback from a query within 60 seconds with a design goal of 30 seconds.
5) The system shall be capable of classifying a chemical, biological, or hazardous material agent into one of the following categories:
   A) Chemical nerve agent
   B) Chemical blood agent
   C) Chemical choking agent
   D) Biological nerve agent
   E) Biological blood agent
   F) Biological choking agent
   G) Chemical hazardous material
   H) Explosive hazardous material
   I) Fire hazardous material
6) The system shall be capable of making a classification with an accuracy of TBD.[3]

Connectivity and information sharing between the first-responders and the supervisors shall be accomplished using existing COTS and GOTS telecommunication networks, including secure communication links when required. Wireless links shall be limited to data essential for mission accomplishment.

Operational Scenarios:

Use Case 1: Suspicious Symptoms at Emergency Scene. The first responder arrives at the scene of the emergency situation, and until this point, there has been no mention of NBC agent release. Upon arrival, one of the first responders notices symptoms that raise suspicions that an agent has been released. The first responder enters the evidence, such as victim symptoms and physical residue, into the handheld unit. The handheld unit responds to this input with an initial categorization of the agent type. This categorization is accompanied by a standardized COA to follow to mitigate the agent's effects. The initial categorization is relayed by wireless link to the command center and communicated to other emergency workers at the scene who may not be physically within earshot of the responder who originally noticed the symptoms.

Use Case 2: Chemical Release. The first responder is notified that a chemical release has taken place, and is dispatched to the scene. The command center electronically relays its best guess as to the agent type, and the system displays a checklist that the first responder should follow to confirm this initial assessment.

[3] See footnote 2 above.

Upon confirmation, the standardized COA is followed as in scenario one. If the initial assessment is not confirmed, then the first responder will restart the categorization process, as outlined in scenario one.

Use Case 3: Training Exercise. An emergency contingency plan has been drafted by FEMA to test the new CBNAIR system. The CBNAIR operational manager of FEMA has notified the Chiefs of various state and local emergency response teams that their cooperation is required to test the CBNAIR system. First responders are called to a mock spill of an "unknown" substance. First responders collect samples of the unknown substance to analyze with portable NBC analyzers. They also take digital images of the scene. It takes less than 3 minutes for the first responders to complete these tasks. The substance is not identifiable within the local CBNAIR database. CBNAIR recommends sealing off the area within a 500-yard radius and transmits results from the NBC analyzer and the digital images to FEMA, CDC and NIH via wireless communications link. Within 5 minutes a response from CDC shows the substance to be chlorine – of the type used for swimming pools, probably dropped from a cleaning truck. The information is relayed to the first responders via handheld radios to take appropriate action. A meeting is held after the exercise to gather input from all actors and fine tune the emergency contingency plan.