CASTLE

CBRNE Assessment Science & Technology Laboratory at ECBC

What is it?

CASTLE supports the assessment and development of proximal, (tens of centimeters to tens of meters) detectors in a state-of-the-art, adaptable surety laboratory where emerging detection systems can not only be evaluated, but challenged against live chemical agents, Biosafety level 2 biological threats, and energetics in various scenarios. This capability addresses current efforts for the development of enhanced surface detection systems that need to be assessed before moving closer into the hands of users.

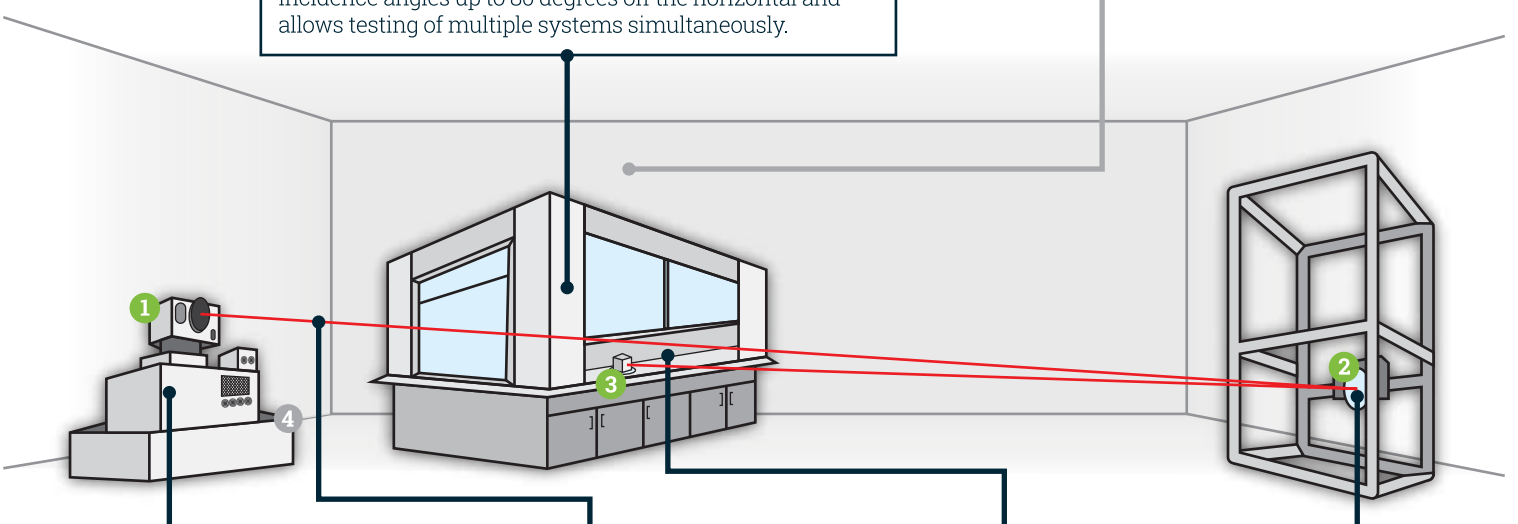
How does the lab work?

1. The system being challenged is mounted to a reconfigurable test apparatus.
2. The system is focused or aimed into the hood and onto the sample.
3. Researchers analyze how well the system in question can analyze the contaminated sample within the hood. Results are sent to a computerized system.
4. System can be moved around room to analyze success of detection from various angles or through obstacles, including a future system that can analyze from overhead.

The Major Components

The four-sided hood is a central component of CASTLE. It is where test materials can be safely kept under engineering controls and the four sides allows for a wide range of equipment footprints to be assessed. This unique configuration allows for the system to operate at various incidence angles up to 80 degrees off the horizontal and allows testing of multiple systems simultaneously.

Researchers are developing a means to have an aerial view of the glove box.



Detectors can be mounted on the fully reconfigurable instrument rack allowing operation from various heights and at various angles.

The detector system can either look directly into the hood at live agent samples at up to **10m directly**, or a mirror can be used to bounce the signal across the room for up to **24m standoff distance.** Surface up to a one meter square can be interrogated.

Within the hood there are multiple options for how to setup and conduct the experiment. These options include placing contaminated samples in a fixed position, or moving samples to mimic on-the-move detection.

Angled panels are placed throughout the laboratory to allow the laser distance to be multiplied.

CASTLE Creation Timeline

April 2014
CASTLE is awarded ECBC's first Grand Challenge Competition winner.

May 2014
Renovations begin to transition two existing laboratories into one large space that could accommodate the four-sided hood and allow for distance testing up to 10 meters.

November 2014
ECBC receives the four-sided hood, and takes necessary steps to meet safety protocol.

June 2015
The first project takes place in CASTLE.

Upcoming Projects

Next Generation Chemical Detector (NGCD)

This is a Joint Program Manager for Nuclear Biological and Chemical Contamination Avoidance program to develop and field a handheld sensor for surveying surfaces to locate areas of contamination.

Wide Area Mapping and Identification Program (WAMID)

This project integrates two orthogonal technologies and leverages the strengths of each to rapidly map surface contamination and then zero in and identify the specific contaminants.

Standoff Covert Eyesafe Explosives Detection System (SCEEDS)

This is a Defense Threat Reduction Agency funded effort to improve the sensitivity of a standoff bulk explosives detection system.

Raman Agent Monitoring System (RAMS)

This is an international project with the Republic of Korea to develop a UV system to detect chemical agents at proximal ranges. Efforts in CASTLE include: examine the photochemical effects of DEEP UV sources and their implications on detection systems, quantify the utility of single pixel versus multi-pixel systems, and collect the library signatures of toxic industrial chemicals.