The Next Generation of MRIGlobal Expeditionary Laboratories - ATHENA

Christopher Hollars Ph.D., Robert Hegarty, Jesse Coble, Nathan Flood, Mark Reynolds

Importance of Expeditionary Laboratory Analysis

Access to rapid, reliable, and accurate laboratory analysis of local conditions is critically importance to decision makers in every type of environment. From commanders evaluating CBRNE threats in theater to doctors triaging patients in remote villages, prompt situational knowledge is mission critical. In many scenarios, the existing laboratory which could provide such analysis is located too far away to provide results in an acceptable response time. Building a closer traditional laboratory is often impractical due to high cost, construction duration, or mission duration.

One solution is to deploy a mobile laboratory system with trained professionals who can rapidly setup and process the samples locally.

Ebola Treatment Center, Moyamba, Sierra Leone, 2015.

MRIGlobal Expeditionary Laboratory History

Ebola Detection, Guinea

DOD CBRNE Laboratory, "Site 1"

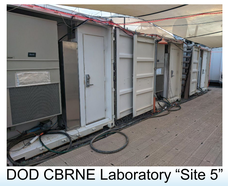
MRIGlobal has been designing, building, deploying, staffing, and maintaining mobile laboratory systems for clients at locations globally since 2003. The main building block of our mobile laboratory system is a 20' ISO shipping container converted to provide a basic workspace suitable for laboratory use. The base container is then customized by our experienced field engineering team to meet the needs of any scientific discipline and their wide range of instruments. Power generation, water supply, communications, billeting, logistics supply chain, and all other support services necessary to support a mobile laboratory system are also provided as part of a complete system.

While the current shipping container-based platform provides a good starting point for a mobile laboratory, it has limitations. As our field capability grows to multiple instrument platforms and analytical techniques, power consumption and lab space requirements have increased beyond what our legacy system can easily provide. This next generation design provides a turnkey solution to our current limitations and future proofs our base system for many projects to come.

Ebola Diagnostic Center, Moyamba, Sierra Leone

DOD CBRNE Laboratory "Site 42"

DOD CBRNE Laboratory "Site 3"



DOD CBRNE Laboratory "Site 5"

Athena: Next Generation Expeditionary Laboratory Solution

In order to better support two of MRIGlobal's largest priority markets, Countering Weapons of Mass Destruction and Infectious Disease/Biological Threat Detection, the engineering team completed a ground-up redesign of the mobile lab system concept. Codenamed Athena, after the Greek goddess of wisdom, strength, and strategic warfare, this new container provides a greatly enhanced expeditionary laboratory workspace capable of rapid worldwide deployment. The redesigned platform is custom built from the ground up to eliminate the limitations involved with modifying a shipping container into a lab. This allows for an enhanced structural design and better insulation to provide a more ergonomic workspace better protected from harsh environmental conditions.

Exterior of an ATHENA Laboratory in the expanded configuration.

3D photo of the interior of an ATHENA Laboratory outfitted for high throughput COVID-19 sample analysis provided to the JPEO-CBRND (Joint Program Executive Office for Chemical, Biological, Radiological and Nuclear Defense) in spring of 2020.

The expanding design increases the amount of laboratory space so analysts can comfortably, efficiently, and safely work without increasing the shipping footprint or deployment cost. The power system is designed to accept both US and international electrical power standards, allowing for easy deployment worldwide. The integrated and scalable battery backup system provides clean and reliable power regardless of the input power quality while providing an additional layer of instrument protection.

Key Design Features

- 18' Expandable Section
  - More useable laboratory space for the same shipping footprint and cost
  - 82% more floor space and 40% more laboratory bench space than current model
  - Middle bench is accessible from both sides
  - Maintains ISO Shipping container specifications when retracted
- Upgraded Power Considerations
  - Accepts United States 208/120V, 60 Hz or European 400/230V, 50 Hz
  - Integrated UPS provides more flexible placement of instruments, easily expandable, compatible with standard grid power worldwide
- Physical Access
  - One single door, one double door, all with door closers and locks
  - Doors controlled by flush mounted programmable numeric cipher lock
- Ergonomic Interior
  - Dimmable LED lighting above each of the work benches
  - Quieter work environment
  - Load bearing walls support tables, eliminating table legs
  - Sealed and flat floor, with hidden cargo tie-downs throughout the container
  - Overhead cable tray for communication and gas line organization
- Integrated Alarm System
  - Expandable to connect to other labs in the system
  - Alarms on containment failure, fire detection, and panic switch
- Improved Environmental Controls
  - HVAC easily sized to match ambient conditions
  - Better internal airflow and insulation, reduced temperature gradients within the lab workspace

Installation progression

Capital Investment for Sector Growth and Rapid Response

From design through construction, Project Athena has been funded by MRIGlobal IR&D. This capital investment will benefit our core markets in two impactful ways. First, it positions MRIGlobal to respond rapidly to CBRNE or health crises worldwide by keeping a turnkey lab system in standby, ready to deploy in a short timeframe. Without this investment, the construction time of 6 months typically inhibits this option due to the urgency the situation demands.

Contact Information

Christopher Hollars, Ph.D., PMP
T: (816) 326-5444
E: chollars@mriglobal.org

MRIGlobal
425 Dr. Martin Luther King Jr. Blvd
Kansas City, MO 64110