Meet the Presenters

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The Problem: Over 5,200 Sites in U.S. Half Require Munitions Response

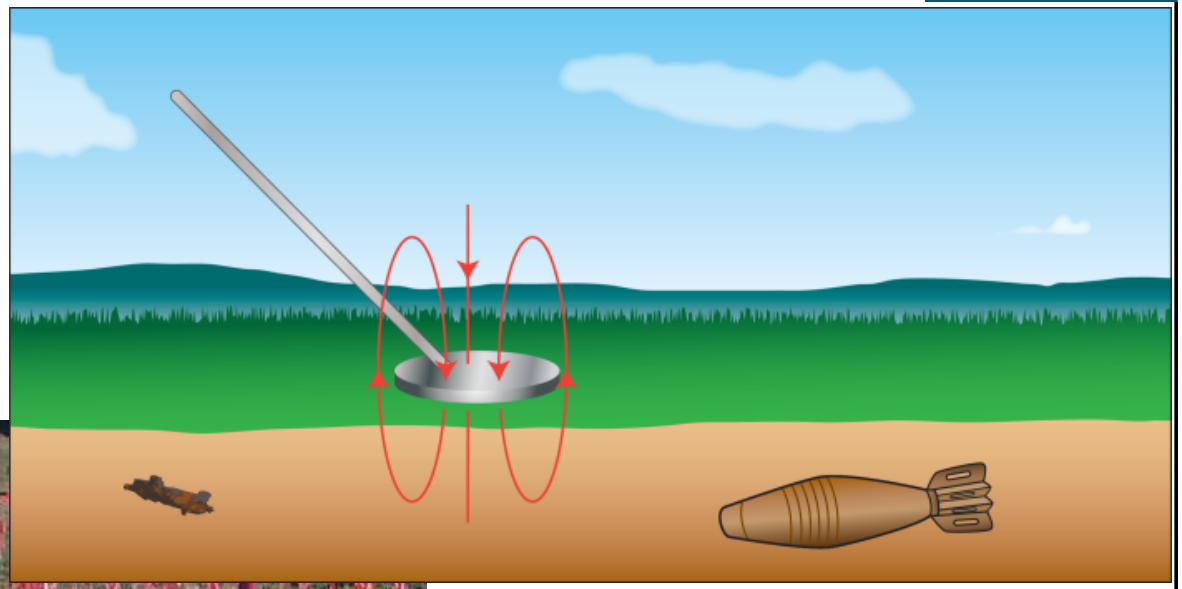
- **Why:** To prepare U.S. military for combat operations, DOD used military munitions for testing and training
- Resulted in unexploded ordnance (UXO) and discarded military munitions (DMM) present at many sites requiring excavation

Video courtesy of Lockheed Martin Corporation - copyright 2015

Example of munitions found at sites

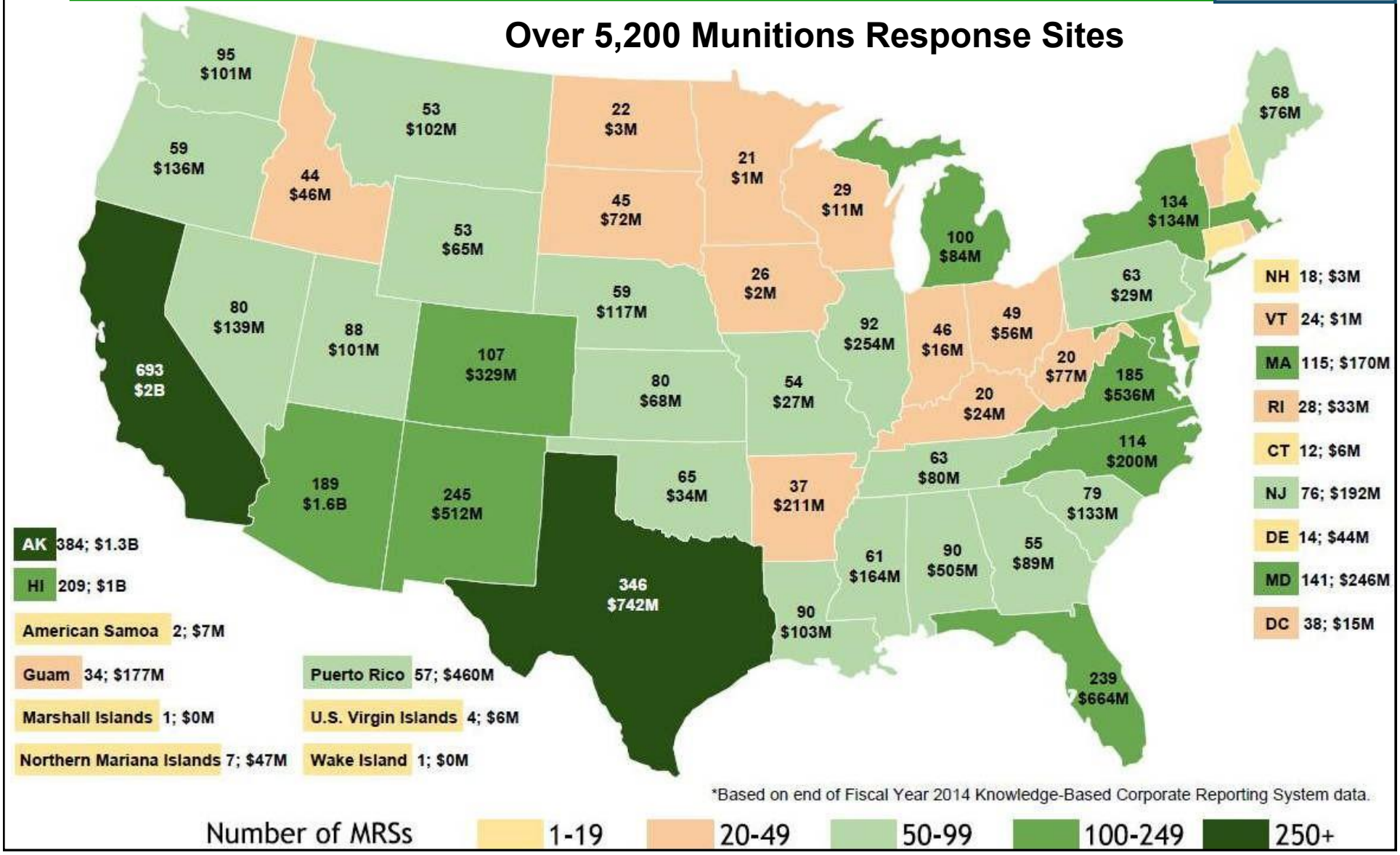
Current Approach: Geophysical Mapping with Single Axis Electromagnetic Sensors

Simply detects buried metallic objects (similar to searching for coins on beach)



Thousands of pieces of metal are detected, flagged, and then dug up.

Munitions Response Using Current Approach Cost to Complete $13.7 Billion by 2100



In Need of a Better Way – Geophysical Classification Using Multi-Axis Sensors

Traditional Approach Single Axis Electromagnetic Sensor	New Approach Multi-Axis Electromagnetic Sensor
Simply detects buried metallic objects (similar to searching for coins on beach)	Identifies type of object present based on depth, size, density, wall thickness, shape
Requires that most detections are excavated	Limits excavations to objects identified as possible munitions or when data inconclusive (up to 80% digging reduction)
Less acreage covered	More acreage covered
Baseline technology for cost comparison	Estimated as 45% cost reduction from traditional approach
Extended area closures and evacuations	Reduces area closures and evacuations

Geophysical Classification for Munitions Response (GCMR)

- Process of making principled decisions, using data collected by geophysical sensors, to ***differentiate between buried items that are potentially hazardous and those that can be safely left in the ground*** during munitions response actions

Dig This

Not This

GCMR – Accelerate Munitions Response Efforts

Focuses resources on investigation of metallic items identified as possible munitions or where the data are inconclusive

	Munition	Suspected Munition	Munition Fragment	Debris
Single Axis Sensor:	Dig	Dig	Dig	Dig
Multi-Axis Sensor: for Geophysical Classification	Dig	Dig	No Dig	No Dig

Technology Development through Department of Defense (DOD)

- Sensors and analysis originated in SERDP in decade of research and development
- Demonstrated in ESTCP Pilot Program at sites across the country

SERDP DOD • EPA • DOE

ESTCP

Key Terminology

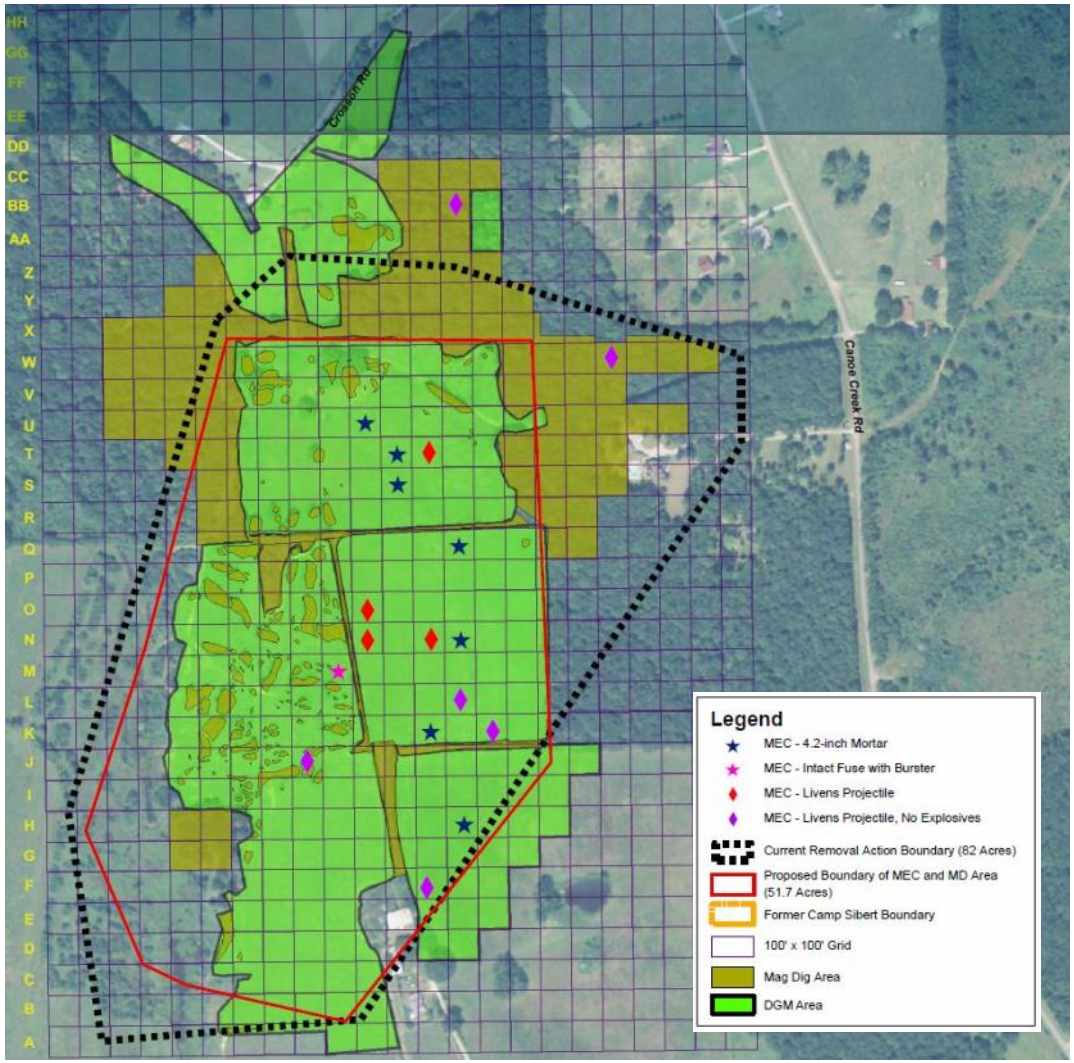
- Single-Axis Sensor: “Traditional” metal detector
- Multi-Axis Sensor: “New-Tech” used for classification
- Anomaly: Metallic item that causes a geophysical response
- Clutter: Non-hazardous metal “FRAGments”
- Targets of Interest (TOI): Maybe hazardous anomaly
- Classify: Determine whether “Frag” or “TOI”
- Validate: Prove your “classification” was “correct”
- QC & QA Seeds: Used to “validate” cleanup

Example: Traditional "Single-Axis Sensors" at Camp Sibert in 2014

- **Single Axis Sensors**
- 5,295 excavations
- Symbols: 16 recovered UXO

Traditional approach:

- All items identified were excavated
- Over 99% of items excavated were non-hazardous items



GCMR-2, Appendix A

Example: Geophysical Classification Demonstration at Camp Sibert in 2013

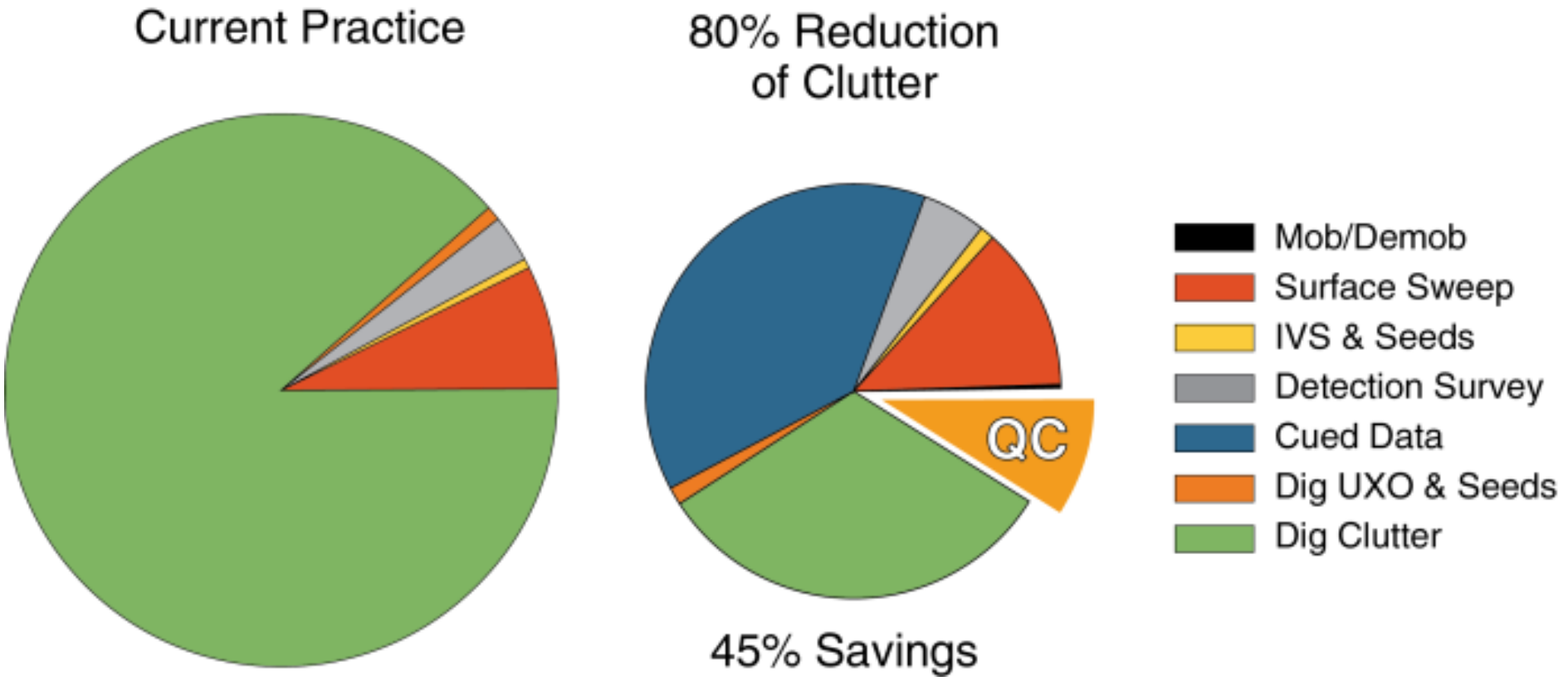
- **"Multi-Axis" Sensors used**
- 6,055 **anomalies** identified
- 970 excavated
  - All of "**QA seeds**" and three 4.2 in. mortars were correctly classified
  - 4% "**TOI**" plus 3% "**QC**" plus 2% discernable targets
  - 7% additional "**Clutter**" targets were excavated that were "**Classified**" non-hazardous to "**Validate**"
- 84% of the targets were non-hazardous items left in the ground

Figure A-9. MetalMapper in use at Camp Sibert Site 18

GCMR-2, Appendix A

Technology Benefits – 45% Cost Savings

Cost Savings using Multi-Axis Sensors – at least 45%



GCMR-2, Figure 2-17

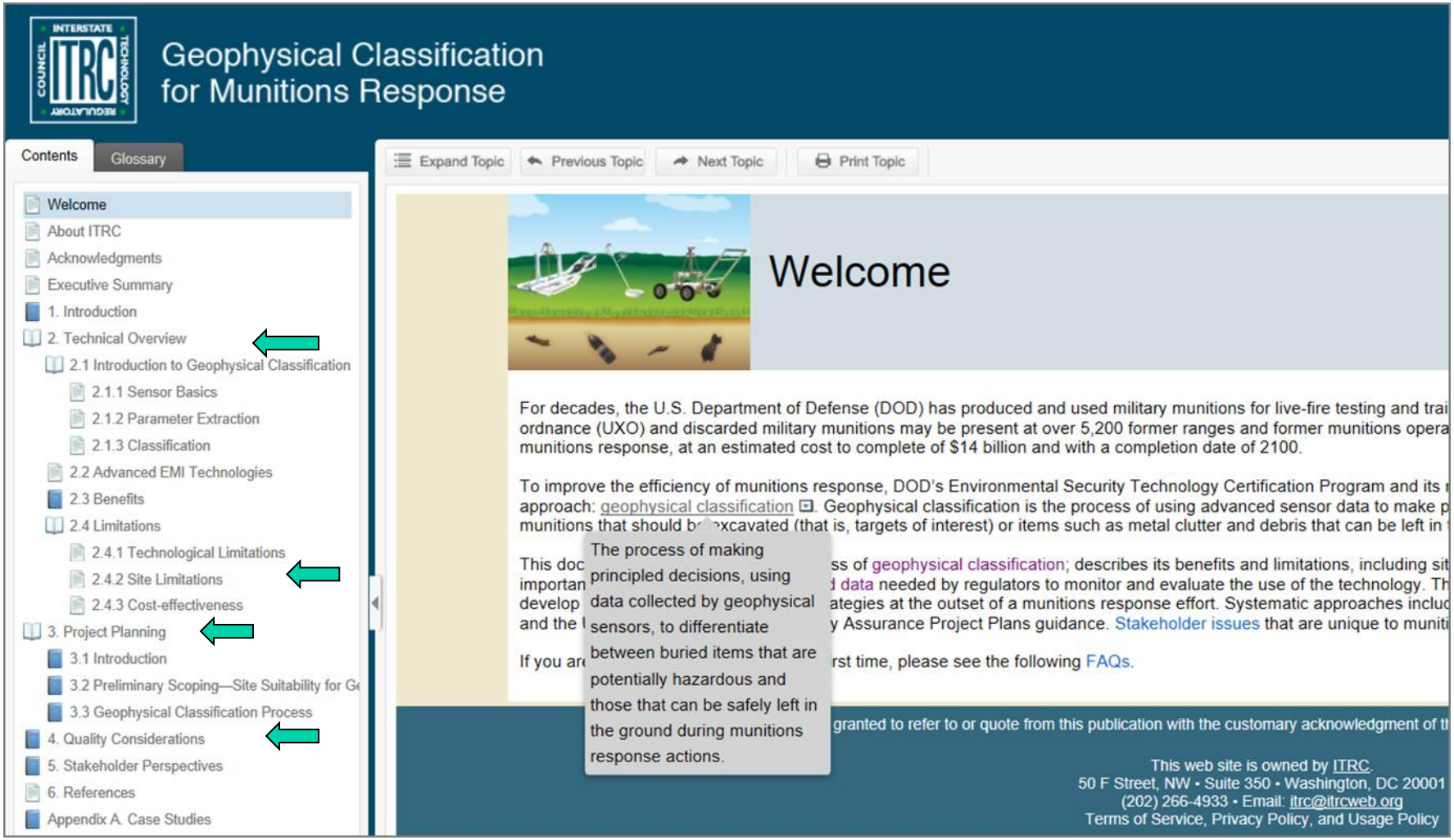
You May Have Questions About Geophysical Classification

- How does the technology work?
- When to use and when not to use geophysical classification?
- What is the state regulators' role to ensure quality and confidently support decisions?
- Provide a case study where geophysical classification is used

Answers in ITRC's Geophysical Classification for Munitions Response (GCMR-2, 2015) and this associated training class

Geophysical Classification for Munitions Response (GCMR-2) August 2015

ITRC Technical & Regulatory Guidance Web-Based



ITRC Geophysical Classification for Munitions Response Team

- Team evaluated technology & QA/QC/Accreditation
- Concluded geophysical classification is ready for use on production projects with appropriate controls
- No regulatory barriers – CERCLA Process
- ITRC and DOD products include Fact Sheets and Guidance Documents – Template UFP QAPP
  - Fact Sheets
    - Introductory
    - Technical
    - Regulatory
  - Guidance Document

GCMR-1, GCMR-2

After Today's Webinar You Should be able to find information to…..

- Understand the technology to evaluate for use on your site
- Learn some Geophysical Classification and Munitions Response (GCMR) terminology
- Start to transition your mindset to decisions that leave non-hazardous items in the ground
- Find case studies similar to your site
- Find tools to transfer knowledge within your organization and to stakeholders