

MMRP Technology Update

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DoD's Environmental Technology Programs



Science and Technology

Demonstration/ Validation

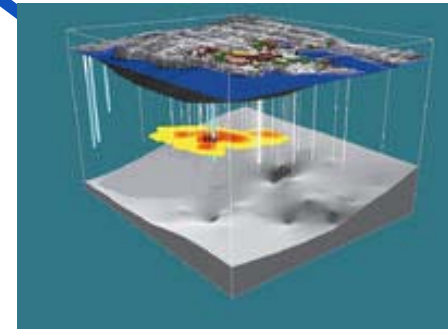
Program Area Management Structure

Weapons Systems & Platforms



Energy & Water

Environmental Restoration



Resource Conservation & Climate Change



Munitions Response

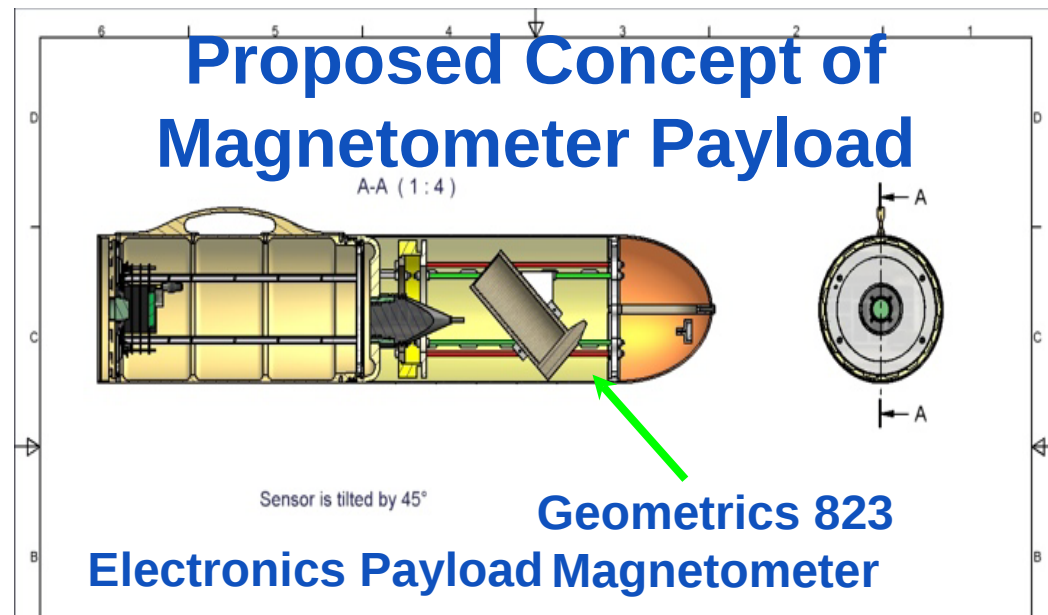
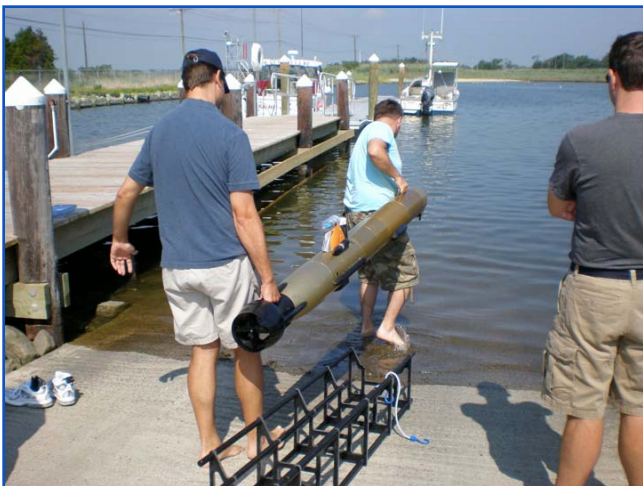
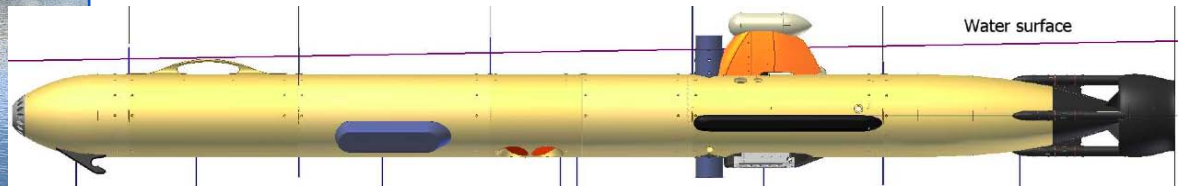
Today's Topics

- Munitions Underwater
- Classification Applied to Munitions Response

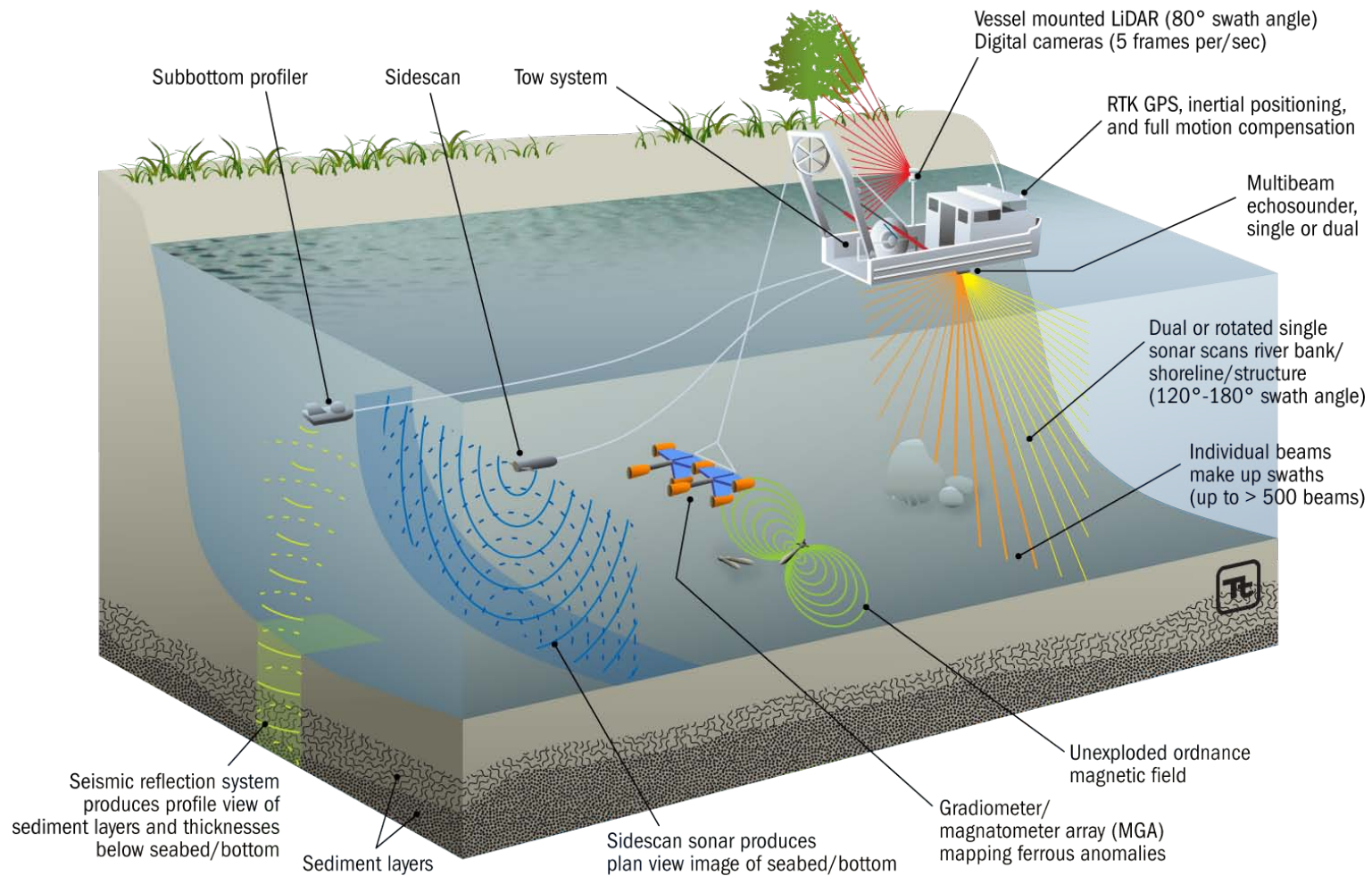
Three Areas of Focus Underwater

- Wide Area Assessment
 - ◆ locate areas of concentrated munitions
 - ◆ requires high coverage rates and reasonable probability of detection
- Detailed surveys
 - ◆ locate individual munitions for removal or monitoring
 - ◆ requires high probability of detection and good geolocation
- Enabling technologies
 - ◆ geolocation technologies
 - ◆ mobility models
 - ◆ remediation technologies

Wide Area Assessment Geophysical Sensor on Statistical Transects

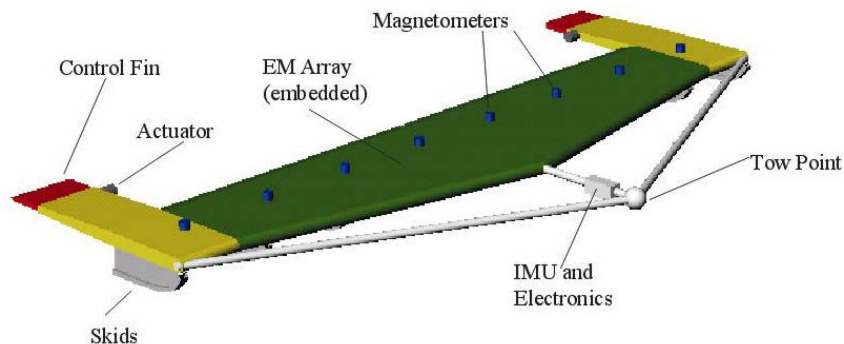


TetraTech Hybrid System



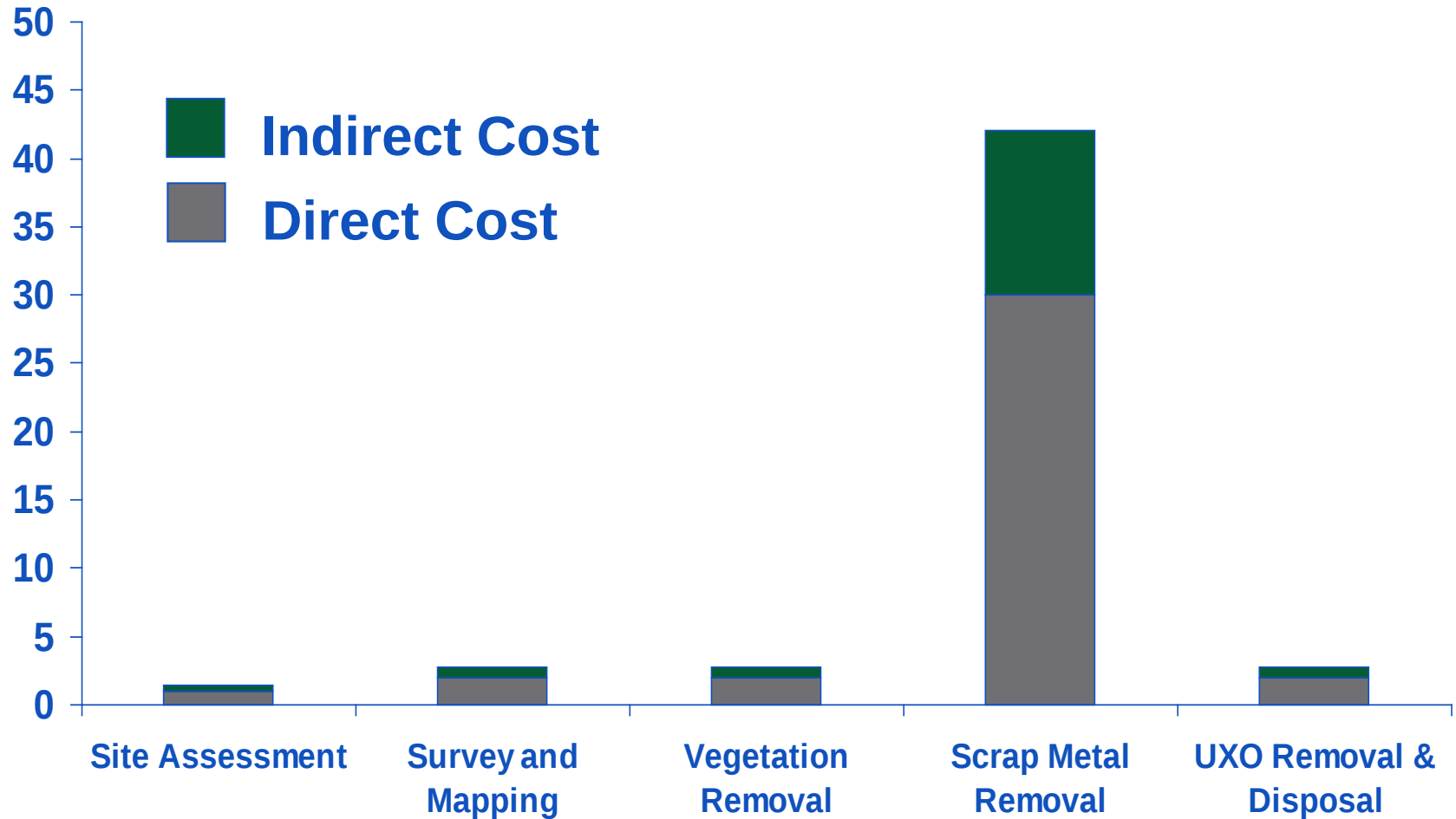
Marine Towed Array

- Demonstrated and Validated System
 - ◆ Duck Naval Bombing Range, NC
 - ◆ Former Naval Ammunition Depot, Puget Sound
 - ◆ Lake Erie
 - ◆ Puerto Rico
 - ◆ Blossom Point
- 8 Total Field Magnetometers



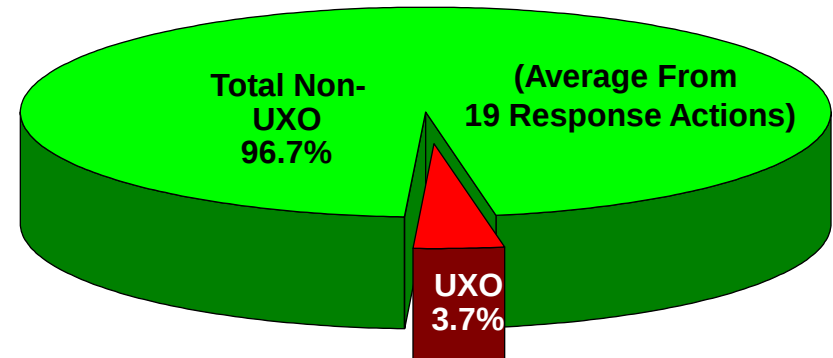
Classification Applied to Munitions Response

Defense Science Board UXO Clean-up Cost Break Out



Why Discriminate?

- Excavation of suspected UXO drives cost and time
- Less than 4% of excavations are UXO
 - ◆ Usually <1%
 - ◆ Ex. Camp Butner
 - 7 items out of > 100,000 digs
- Most items are harmless scrap
- Technology can now discriminate UXO from scrap
 - ◆ Result of a decade of R&D
 - ◆ Proof of concept demonstrated at three real live sites (FUDS)



Evolution to Live Site Demonstrations

- More meaningful results when we validate capabilities of currently available and emerging technologies on real sites
- Supports dialog with regulators and program managers
- Keep standardized test sites as intermediate step between system shakedown tests and live site demonstrations

New EM Technology

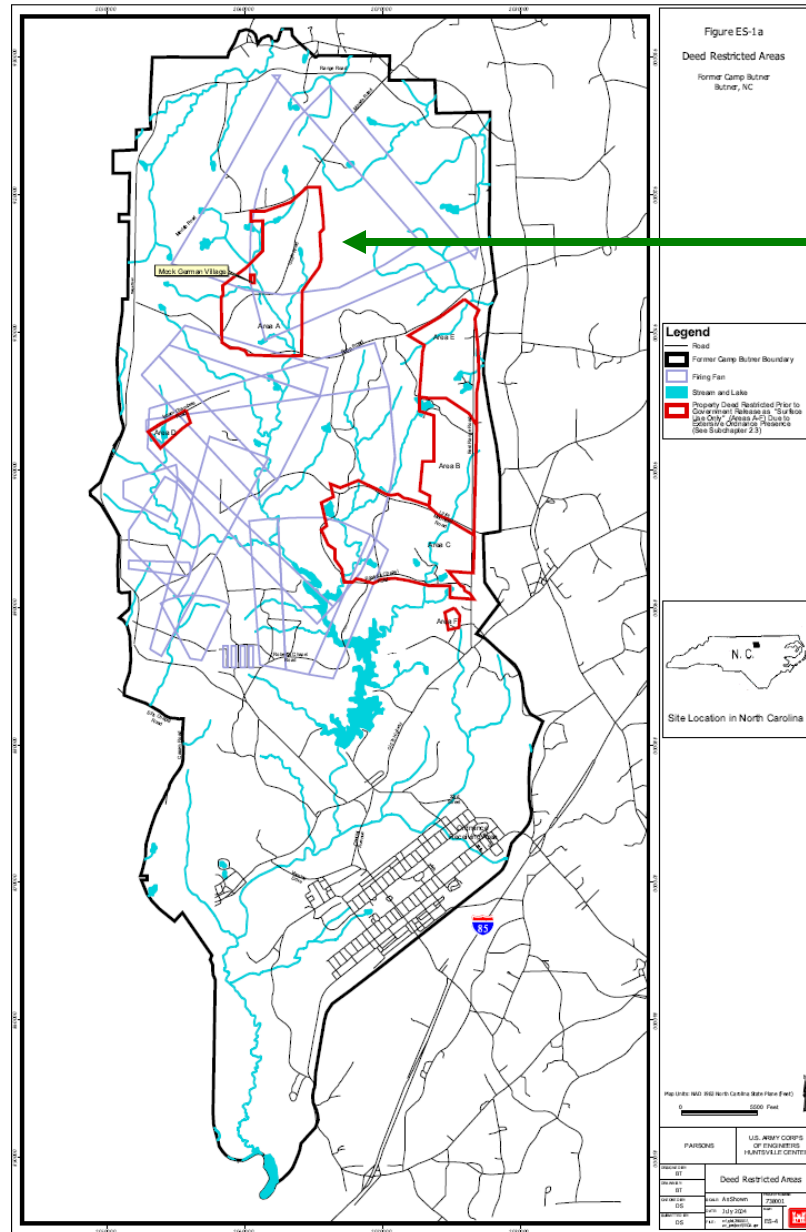
- New **UXO-specific** EM technologies have been developed and tested under SERDP & ESTCP
- All digital electronics, measuring complete eddy current decay cycle
- Collect more complete data on the target.



Demonstrations to Date

- Completed
 - ◆ Former Camp Sibert, AL – simple site, single munitions type
 - ◆ Former Camp San Luis Obispo, CA – more difficult, mix of munitions
 - ◆ Former Camp Butner, NC – small munitions (37 mm)
- Ongoing
 - ◆ Mare Island Naval Shipyard, CA – industrial site
 - ◆ Pole Mountain, WY – case study in implementation
 - ◆ Former Camp Beale, CA – trees, restricted access
 - ◆ Site TBD
- Planned – additional demonstrations in FY12

Camp Butner



Area A- Artillery Impact Area

Survey Sensor Systems

- Survey Sensors
 - ◆ EM61 Cart
 - ◆ MetalMapper



MetalMapper



EM61 Cart

Cued Sensor Systems

- Cued Sensors
 - ◆ MetalMapper
 - ◆ Naval Research Lab Cued EMI array (TEMTADS)



MetalMapper



TEMTADS

Cued Area with Grid R21 Detail

~4.5 acres

2300 targets

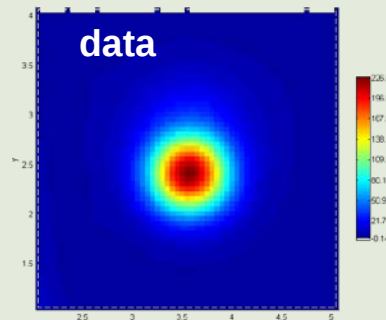
Standard Processing Stream

- The standard processing stream for detection and classification of munitions using geophysical data

1. Data Collection

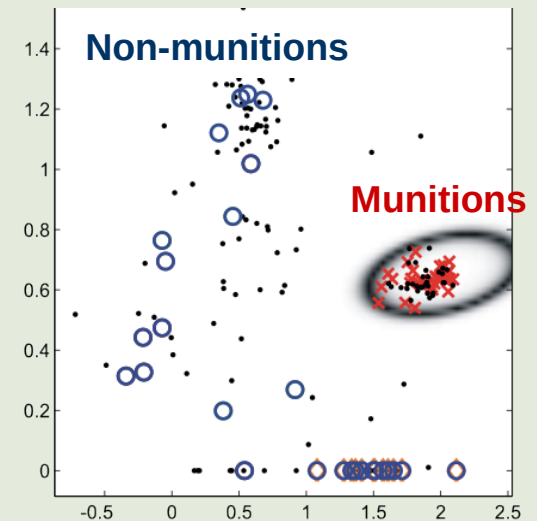


2. Parameter Estimation (Target Attributes)



Parameters

3. Classification



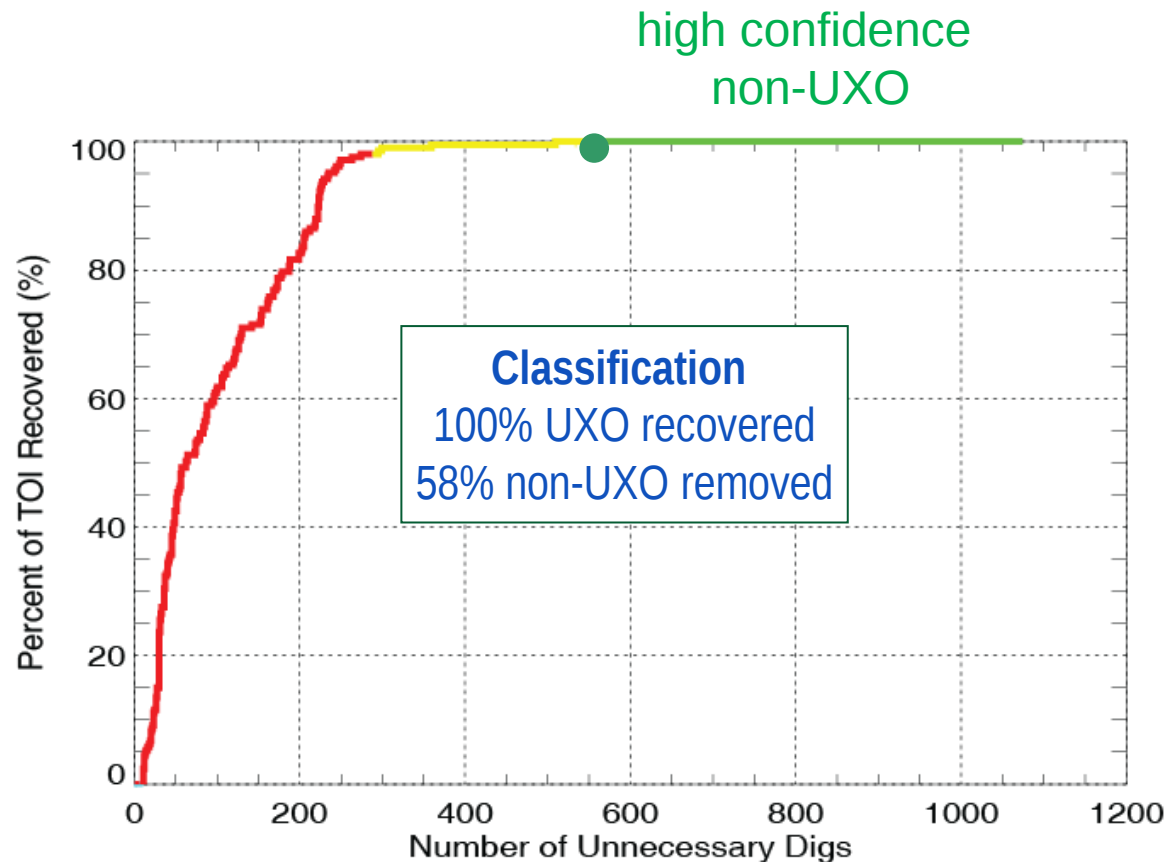
Dig List Example

Rank	Comment
N/A	Can't extract reliable parameters
1	
2	High confidence munition
3	
...	
...	Can't make a decision
...	
...	
...	
...	High confidence non-munition
...	
...	
...	
...	
N	

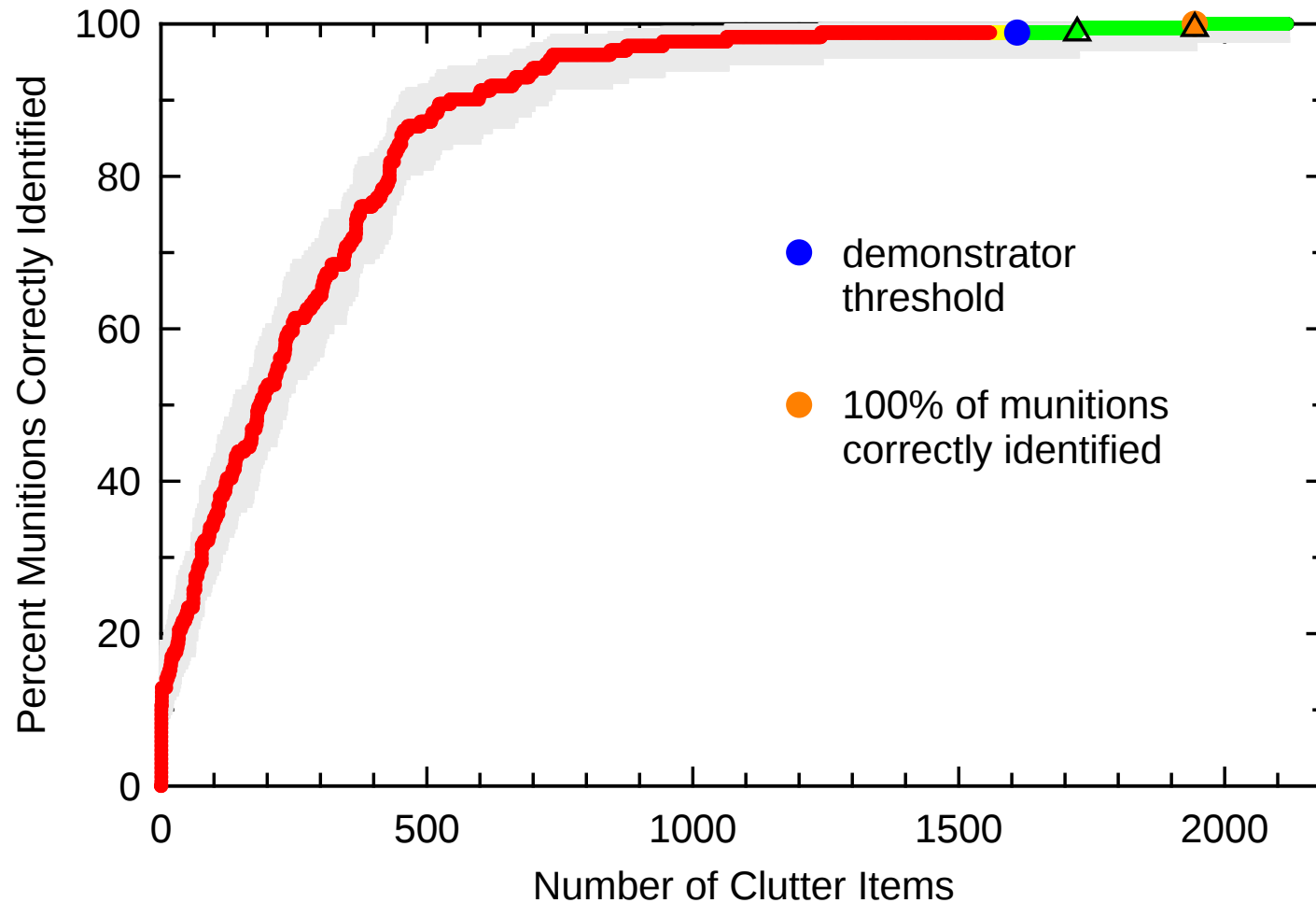
Threshold

Performance Evaluation

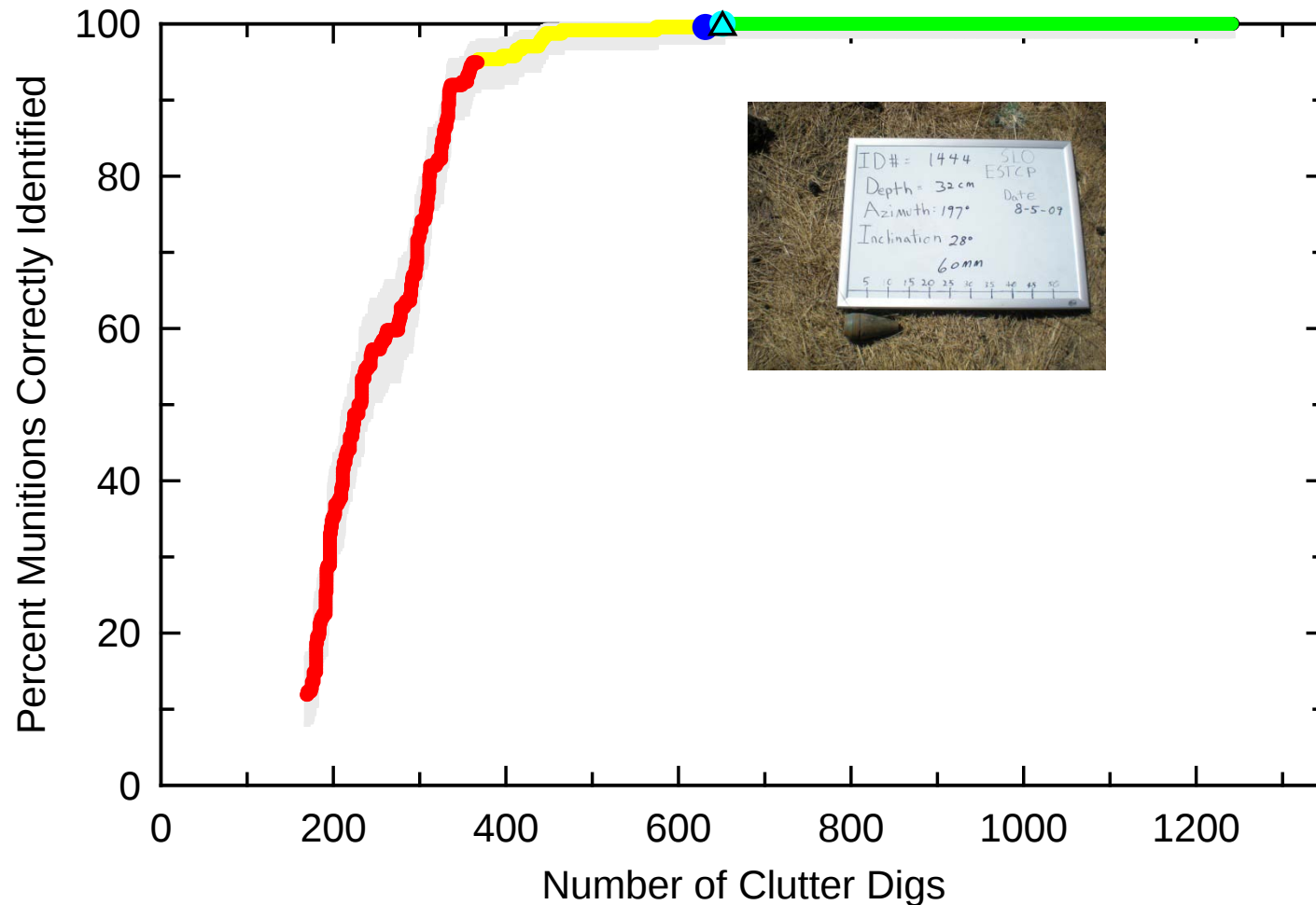
Receiver Operating Characteristic (ROC) Curve



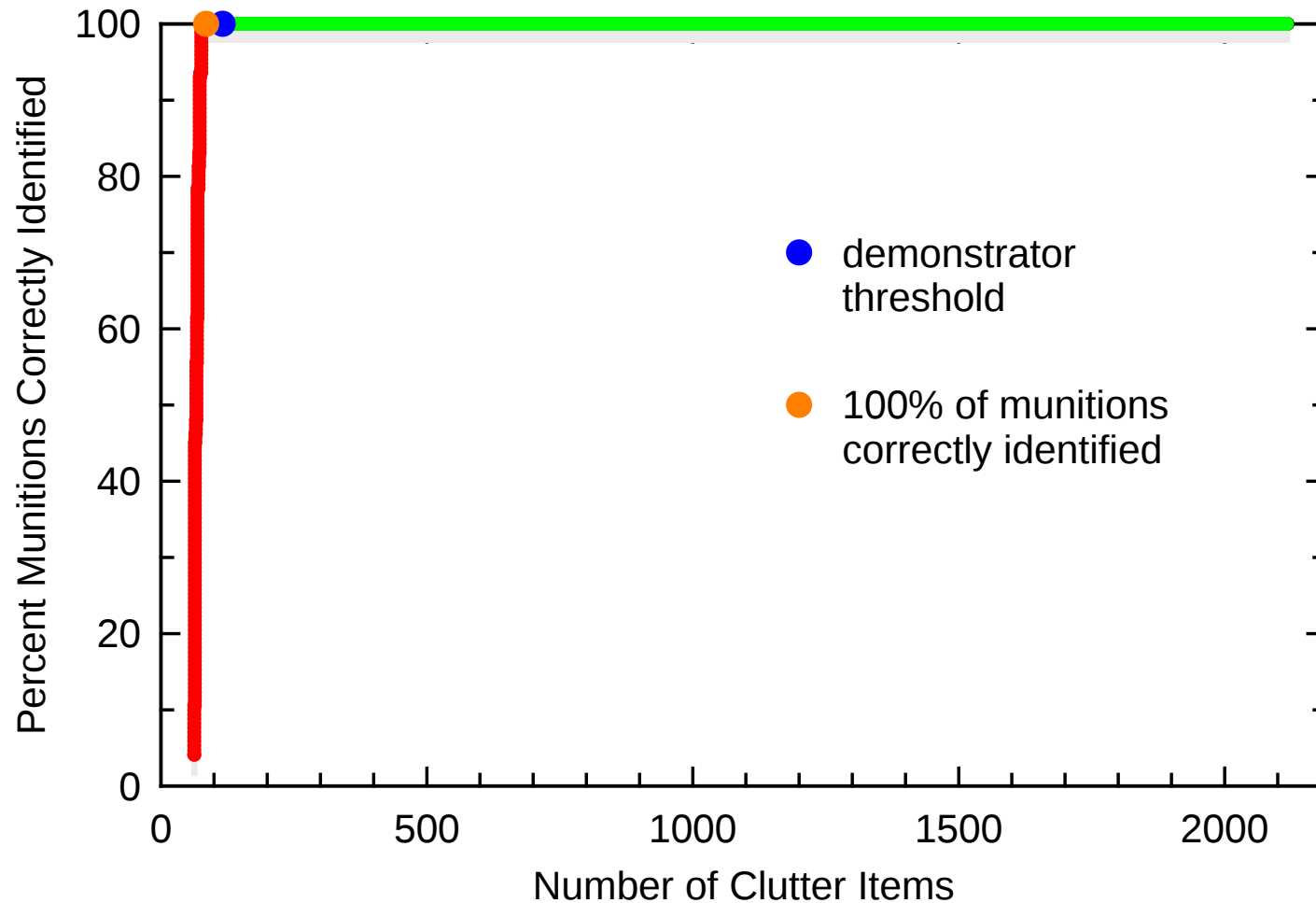
Camp Bunter: EM61-MK2 Cart



San Luis Obispo: EM61-MK2 Cart



TEMTADS Cued Data

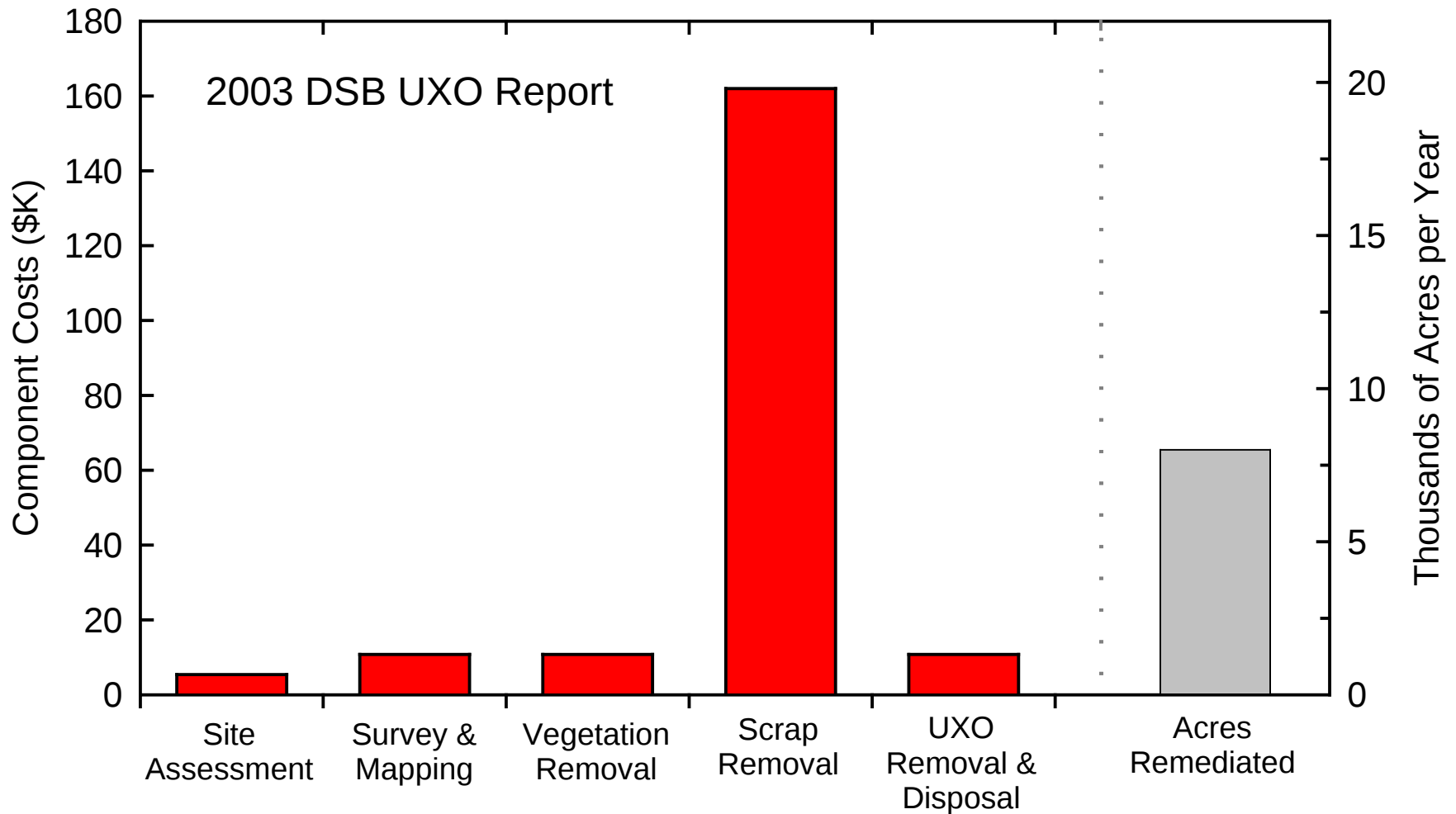


Implementation Approaches

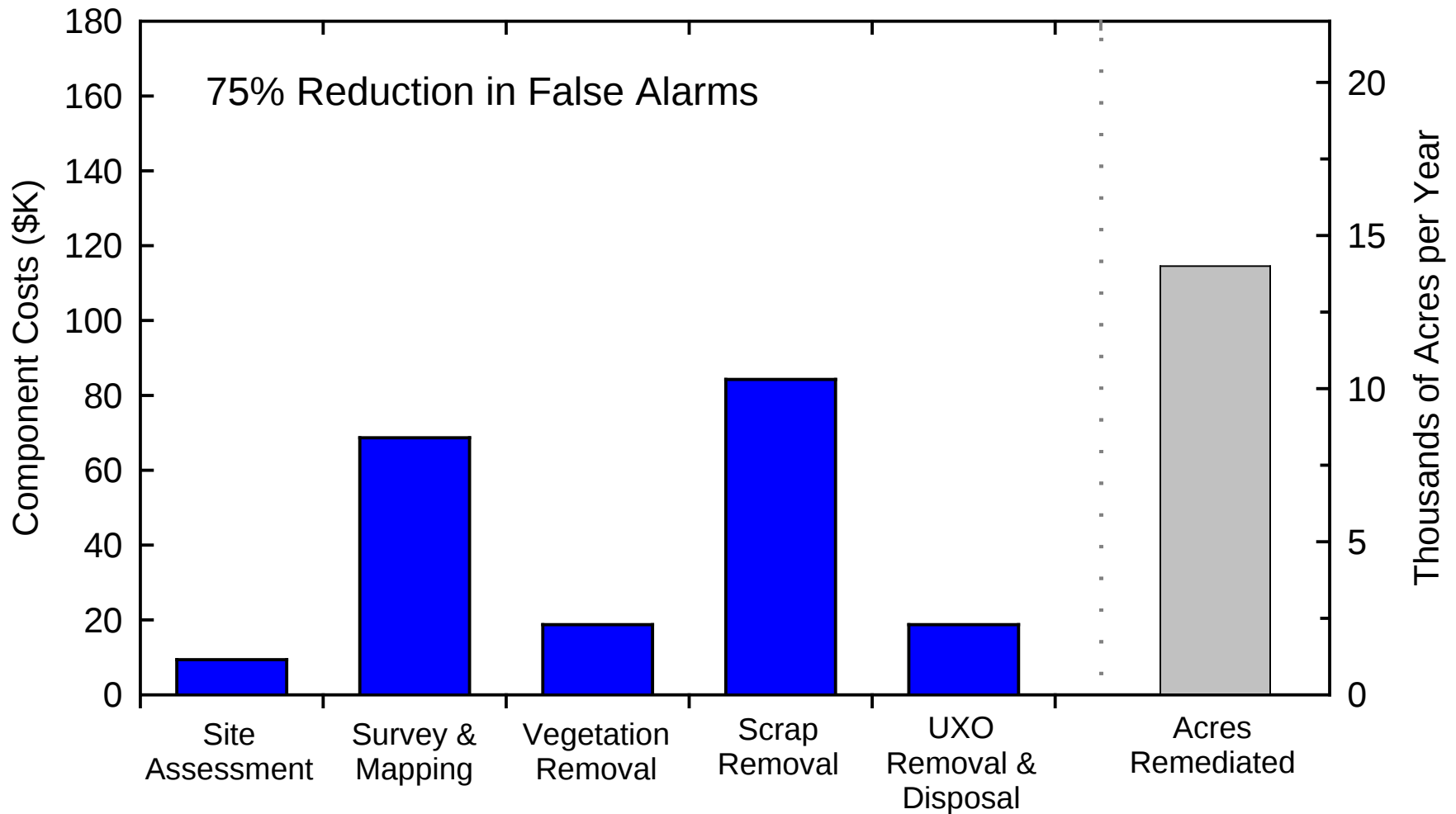
- Hazard-based dig decision
 - ◆ High confidence non-hazardous anomalies remain in the ground
 - ◆ Remaining anomalies are dug
- Hazard-based dig protocol
 - ◆ High confidence non-hazardous anomalies dug with one UXO tech supervising a team of lower-cost diggers
 - ◆ Remaining anomalies are dug with usual procedures (UXO personnel and safety equipment)

*Approach would be site dependent and determined
by the site team*

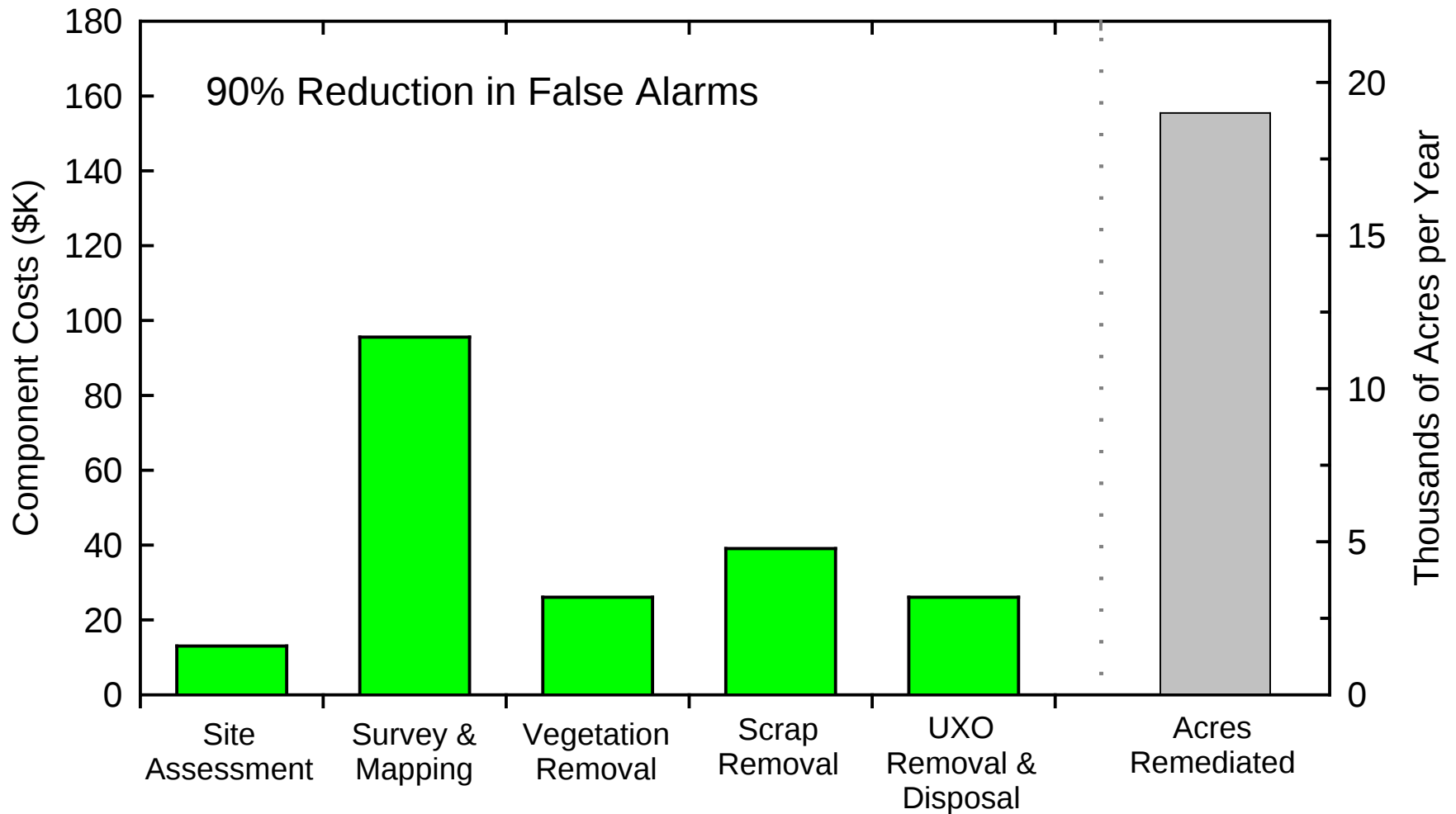
Breakdown of Nominal \$200M FUDS MMRP



Breakdown of Nominal \$200M FUDS MMRP



Breakdown of Nominal \$200M FUDS MMRP





Web site
www.serdp-estcp.org

Symposium
November 29 – December 1, 2011
Washington, D.C.