Technical Approaches to Anti-Personnel Landmine Alternatives

Mines, Demolitions, and Non-Lethal Conference

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Summary

- APLA consists of three dynamic, aggressive programs
- Leverages advanced sensors, communications, and robotic technologies to address safety and situational awareness challenges
- Features remote command and control and equivalent or increased lethality
- Designed for integration within both the Interim and Objective Forces, compatible with FBCB2
- Foundation for the Mine Warfare Modernization Plan

DepSecDef Directs Implementation

21 Oct 97 - Two Track Approach

Track 1 - Near-term solution for persistent munitions: Army Lead

Track 2 - Investigation of long-term advanced technologies for maneuver denial : DARPA Lead

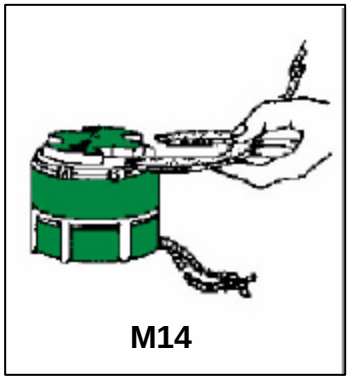
23 Mar 99 - Third Track added

Track 3 – Search aggressively for alternatives to our mixed mine systems (militarily advantageous, cost effective, safe): OSD Lead

US Landmines

Non-Self Destructing (NSD) "dumb" or long-lived mines

M14 / M16 APL
- Man-triggered
- Korea only



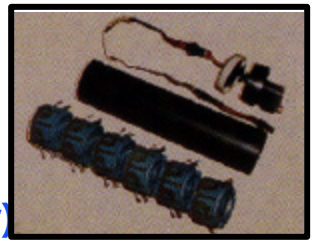
M14

Self Destructing (SD) "Mixed" Munitions

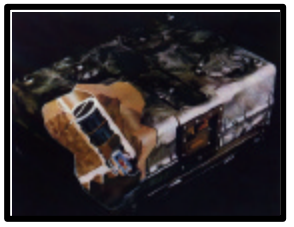
USN GATOR
(45 AT, 15 AP)

USAF GATOR
(72 AT, 22 AP)

VOLCANO
5 ATL / 1 APL
or
6 ATL (small qty)



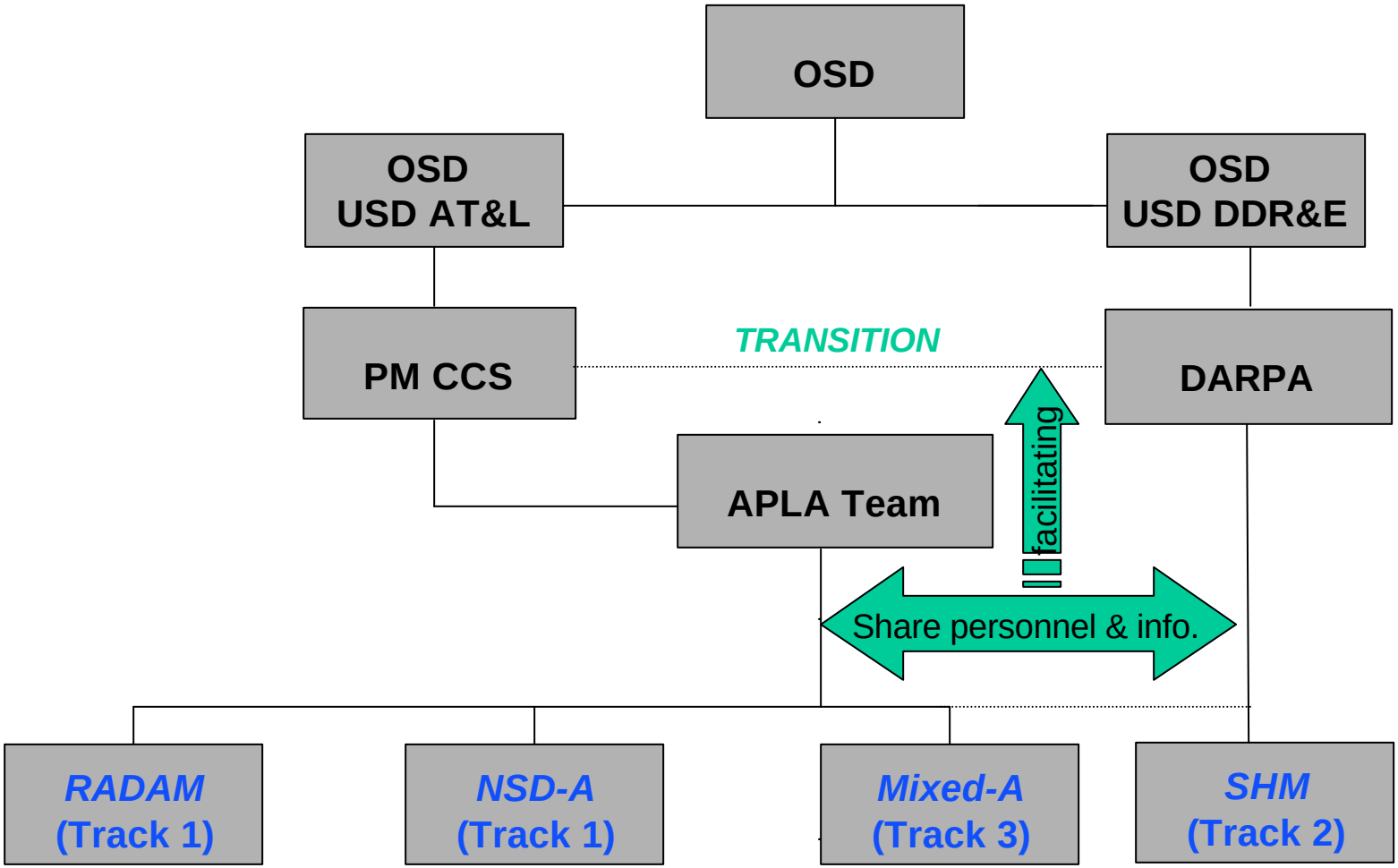
Modular Pack Mine System (MOPMS)
(17 ATL / 4 APL)



- Dumb mines: long-lived
- Static fields / DMZs

- Short-lived (SD at 4 hr, 48 hr or 15 days)
- Flexible and responsive: Placed on ground surface only where, when and for how long the commander requires

APLA Organization



Anti-Personnel Landmine Alternatives (APLA) Track 1 Non-Self Destructing Alternative (NSD-A)

Description:

- US Army led effort to find an alternative for current non-self destructing "dumb" landmines. New system will have "man-in-the-loop" (MITL) capability and may include non-lethal effects.

Capability (User Payoff):

- Command Destruct/Neutralize
- Reset Self Destruct/Neutralize
- Re-deployable (prior to firing/SD commands)
- Command Fire (MITL)
- Prevents fratricide
- Demonstrates non-lethal interface for potential area denial applications

Status:

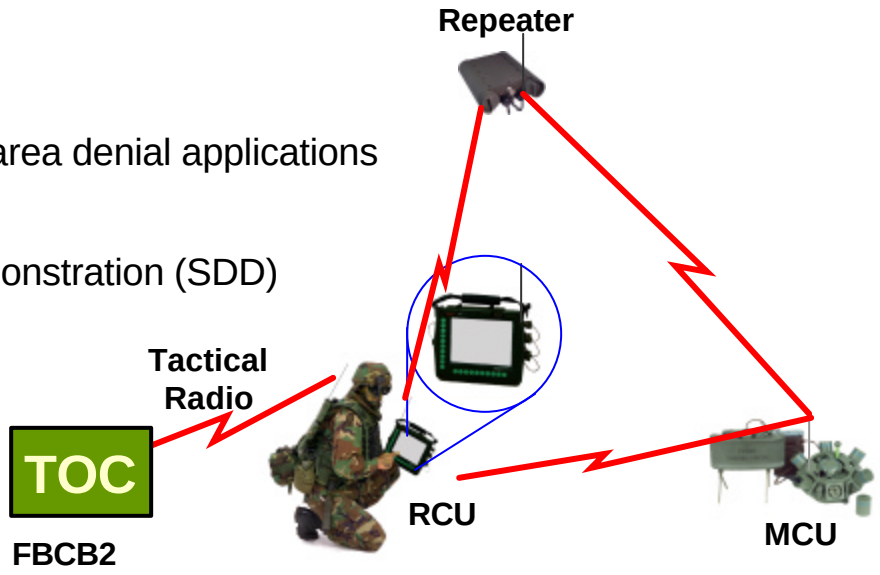
- Awaiting Start of System Development and Demonstration (SDD) Pending Policy Review.

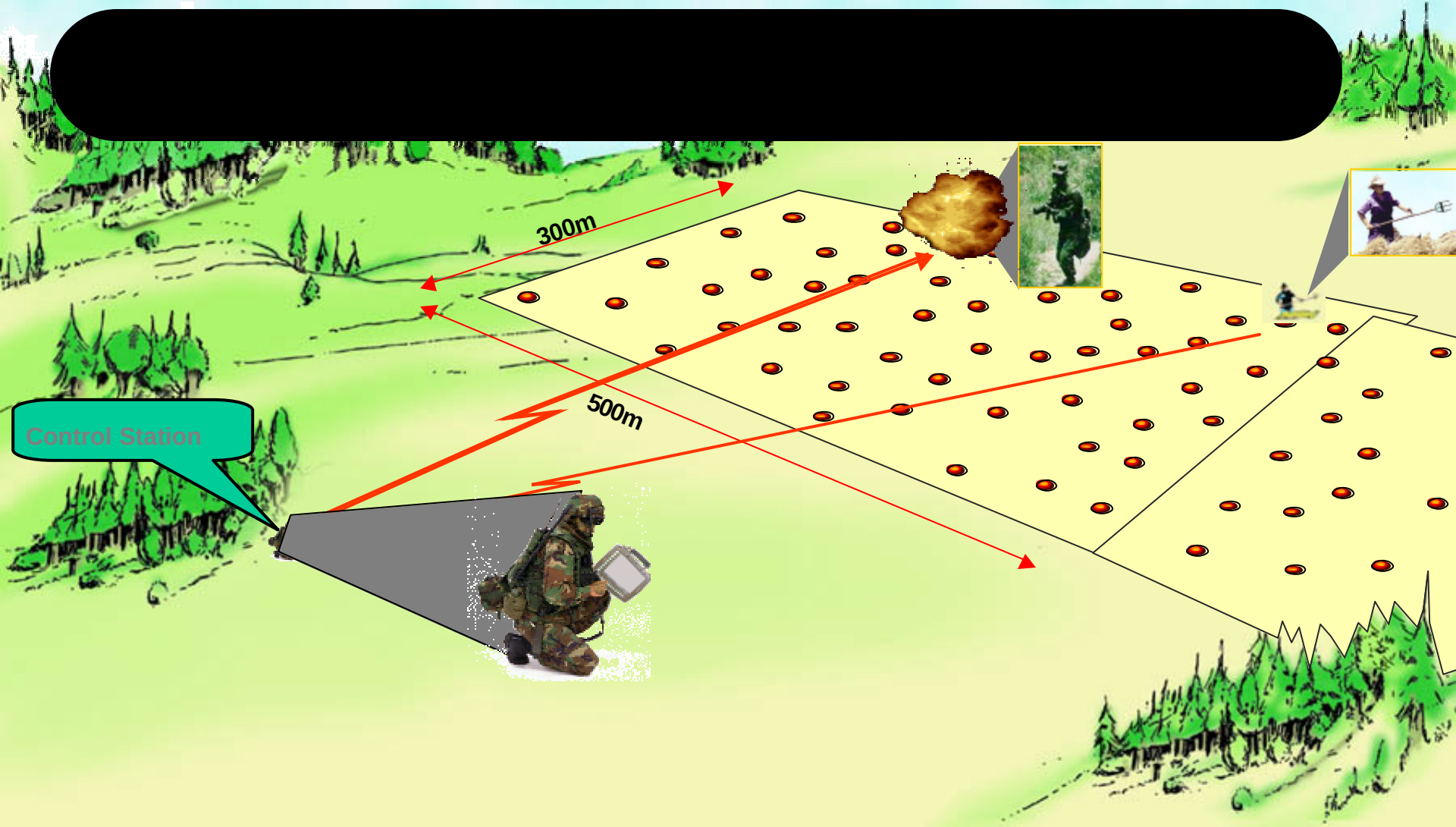
Program Lead:

- PM CCS

Major Contractors:

- Alliant Techsystems, Textron Systems





- NSD-A requires man-in-the-loop for lethal final mechanism
- An intruder trips a sensor
- The sensor/munitions command and control units send “trip” messages to control station
- Control station operator determines response based on available intelligence

Anti-Personnel Landmine Alternatives (APLA) Track 2 Self-Healing Minefield

Description:

- Concept being developed by DARPA to provide a robust obstacle complicating both mounted and dismounted breaching without the use of anti-personnel landmines

Enabling Technologies

- Communications/Networking
- Healing Algorithms
- Mobility

Goals

- Develop and demonstrate the enabling technologies for an intelligent, mobile anti-tank mine system with the intent to transition them to the Army

Status:

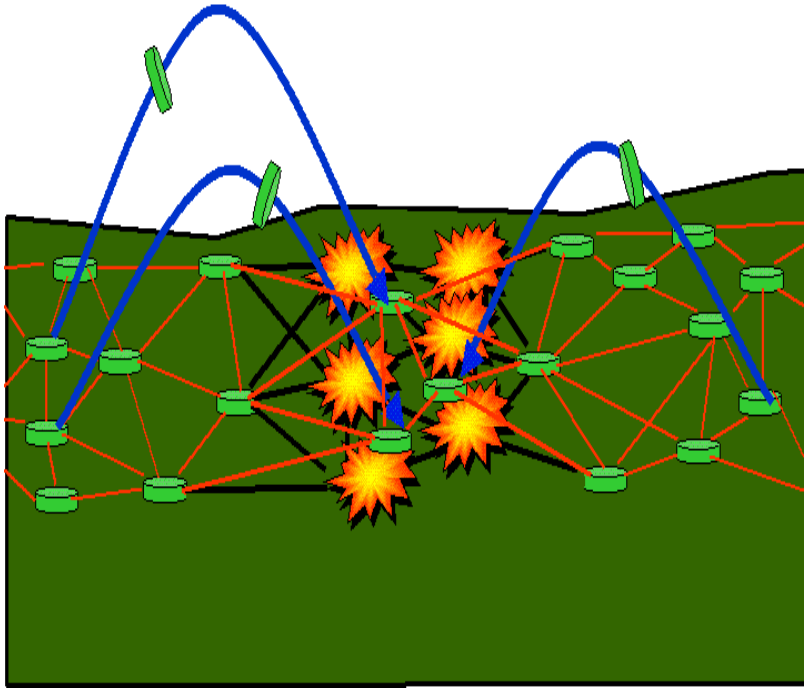
- Tech Base
- Successful development test of Track 2 technologies

Program Lead:

- DARPA

Major Contractors:

- Sandia National Laboratory, Foster Miller, SAIC



Self-Healing Minefield Test Facility
Fort Leonard Wood, MO

Main Test Field: 100m x 50m

Electrical outlets and data ports on each pole

Anti-Personnel Landmine Alternatives (APLA) Track 3 Mixed Landmine Systems Alternatives (MLSA) RATTLER

Tasking:

Identify and Evaluate Alternative Concepts
(Materiel and Non-materiel) :

- To the APL Submunition Within Mixed Systems (Autonomous)
- To Mixed Systems (Autonomous)
- To the NSD-A APL (MITL)

Find Alternatives That Are:

- Militarily Advantageous, Cost Effective, Safe

Consider Lethal and Non-lethal Alternatives

Address Humanitarian Concerns While Meeting Warfighter Requirements

Physical Characteristics:

- Deployed Through Existing Delivery Methods
- Leverages Advanced Hornet and M87 Munitions
- Protects against Mounted and Dismounted Threats
- Autonomous Lethal AT, MITL Control of AP
- AT/AP's Communicate with Gateway
- Multiple Sensor Suites
- Provides Situational Awareness to the Command Center

Status:

- Awaiting Start of Component Advanced Development (CAD) Pending Policy Review

Program Lead:

- PM CCS

Major Contractors:

- BAE SYSTEMS IDS, TEXTRON SYSTEMS

LACET ORGANIZATION

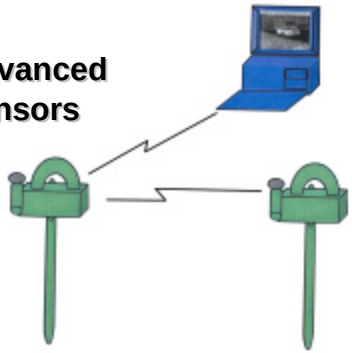
Landmine Alternatives Concept Exploration Team

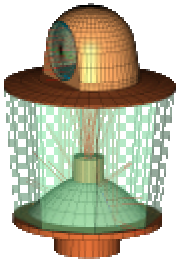
Organizational Hierarchy	Responsibilities / Products
USD AT&L – LA IPT	**Review and Approve Recommendations**
OUSD - Working IPT	**Validate Recommendations**
OUSD - LACET	**Develop Recommendations**
Warfighter / User Group J8/Engineer School	**Frame Operational Environment** **Produce Baseline Operational Assessment**
Materiel Concepts Group PM CCS	**Create & Evaluate Materiel Concepts** **Produce Cost & Constraint Information**
Technical Assessment Group LANL	**Assess Materiel Concept Performance** **Assess Robustness of Materiel Concepts**
Battlefield Utility Group LLNL	**Assess Materiel & Non-Materiel Battlefield Utility** **Conduct Modeling & Simulation**
Modeling & Simulation Working Group USAMSAA	**Ensure Model Integration** **Certify Model Input / Sensitivity Analysis**

10 COMPONENT TECHNOLOGIES

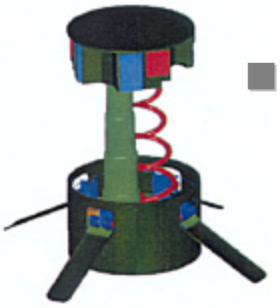
- 6 Sensor
- 3 Delivery
- 1 Communication

■ Mixed Minefield Advanced Target Detection Sensors



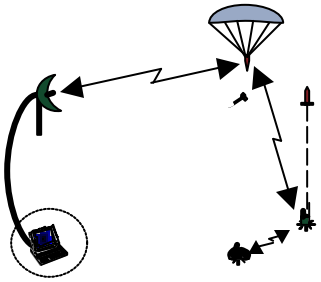


■ IR Personnel Detector

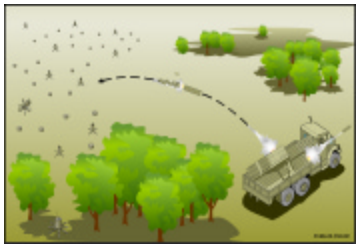


■ PIR Sensor for Taser Munition

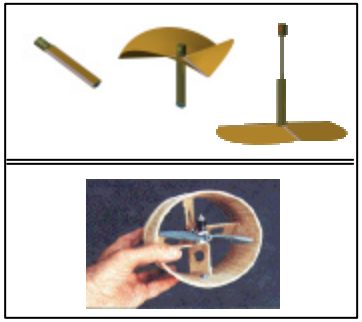
◆ Radio Relay Rocket



■ Magnetic Microsensors



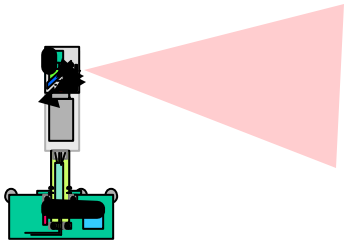
● Volcano Microprocessor Processing System



● Remote Sensor Delivery & Erection Mechanisms

■ Miniature Acoustic Array

● Remote Mobile Targeting System



■ Optical/Acoustical Sensor Module

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