“ROBOTICS AND UNMANNED VEHICLES: THE FUTURE”

THESIS:

Robotics Technologies May Cause DoD to Cross A New Live Fire Test and Evaluation (LFT&E) Horizon

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WHY UNMANNED GROUND VEHICLES?

(Senate version of FY01 Defense Authorization Bill)

Sec.217

- **GOAL – It shall be a goal of the Armed Forces to achieve the fielding of unmanned, remotely controlled technology such that—**

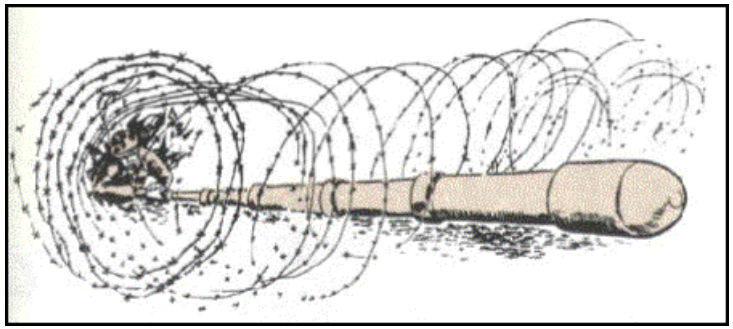
  (1) by 2010, one third of the operational deep strike aircraft of the Armed Forces are unmanned, and

  (2) by 2015, one third of the operational ground combat vehicles of the armed forces are unmanned.

- **REPORT ON ADVANCED CAPABILITY GROUND COMABT VEHICLES – Not later than January 31, 2001, the Secretary of Defense shall submit to the congressional defense committees a report on each of the programs undertaken of the Secretaries of the Army, Navy and Air Force jointly with the Director of DARPA to demonstrate advanced capability of ground combat vehicles.**

DULL, DIRTY, OR DANGEROUS MISSIONS

World War II, mine clearing operations



Engineers use a bangalore to breach a wire obstacle

Korea, three soldiers use a rope to clear a booby trap

D7G with MCAP kit

Unmanned Ground Vehicles
"Historical Perspective"

Unmanned systems do not fit the traditional mold of LFT&E!

- o Survivability of platform
- o Lethality of weapon system

Goliath

The German Army Wehrmacht deployed the first unmanned vehicles on the battlefield in World War II:

Borgwald IV

Goliath – a small <u>expendable</u> remote control vehicle, driven by wire.

Borgward IV – a <u>survivable</u> remote control vehicle, driven by radio.

Lessons learned from the battlefield directed changes to these systems.

UGVs in Bosnia and Kosovo
1996 – 2001

Bosnia, May 1996-present

Robotic Turretless M60, Panther was used to proof for Anti-tank/vehicle mines.

Kosovo, Sep 1999-present

Miniflail repeatedly was used to proof for Anti-personnel mines and booby traps.

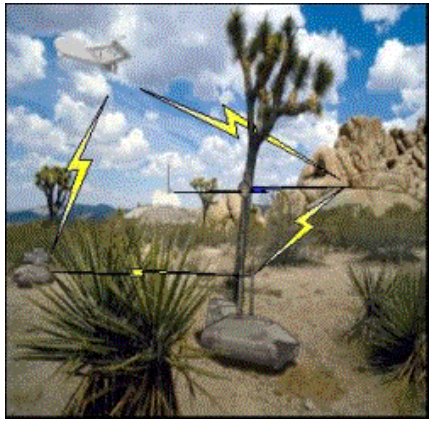
Live Fire Test and Evaluation
Manned vs. Unmanned Vehicles

- ✓ Systems must be survivable.
- ✓ Capable of taking abuse and continuing the mission.
- ✓ Operable by the soldier from a safe distance.

As defined by Section 2302(5), Title 10, LFT&E is not required for current Unmanned Ground Vehicles.

However, future unmanned vehicles must define survivability and lethality requirements.

Panther in Bosnia



Future Combat Systems

THE ISSUE

Are there or will there be any special issues associated with LFT&E of UGVs ?

D7G w/MCAP

TO ANSWER THE QUESTION

We should :

- Define LFT&E and its Requirements
- Talk About Today and Near Term UGV's
- Posture about Future UGV's
- Reach a Conclusion

LFT&E: BACKGROUND, DEFINITIONS & REQUIREMENTS

- FY 1986 Congressional Legislation Officially Initiated Live Fire Test & Evaluation

- LFT&E Consists of Two Parts:

  - o Survivability of Platforms
    - oo Ability to Complete Mission
    - oo Crew Protection
  - o Lethality of Weapon Systems
    - oo Munitions (Ph/Pk)
    - oo Missiles (Ph/Pk)

Bradley

- LFT&E Program has grown/evolved since 1986
  - o Under DOT&E since 1995
  - o Approximately 80 Programs - evenly split between survivability and lethality

LFT&E: BACKGROUND, DEFINITIONS & REQUIREMENTS

Section 2366, Title 10, U. S. Code

"Major systems and munitions programs: Survivability testing and lethality testing required before full scale production "for covered systems."

M1 Abrams Tank

LFT&E: BACKGROUND, DEFINITIONS & REQUIREMENTS

Covered Systems

SURVIVABILITY: A vehicle, weapon platform, or conventional weapon system that-

- includes features designed to provide some degree of protection to users in combat; and
- is a "major system" within the meaning of that term in section 2302(5) of Title 10 U.S. Code
  - $115 Million in RDTE funds (FY 90 constant dollars) or
  - $ 540 Million in Procurement funds(FY 90 constant dollars)

Light Amphibious Vehicle

LETHALITY: The term "major munitions program" means

- a munitions program for which more than one million rounds are planned to be acquired; or
- a conventional munitions program that is a "major system" as defined above.

LFT&E AND UNMANNED GROUND SYSTEMS

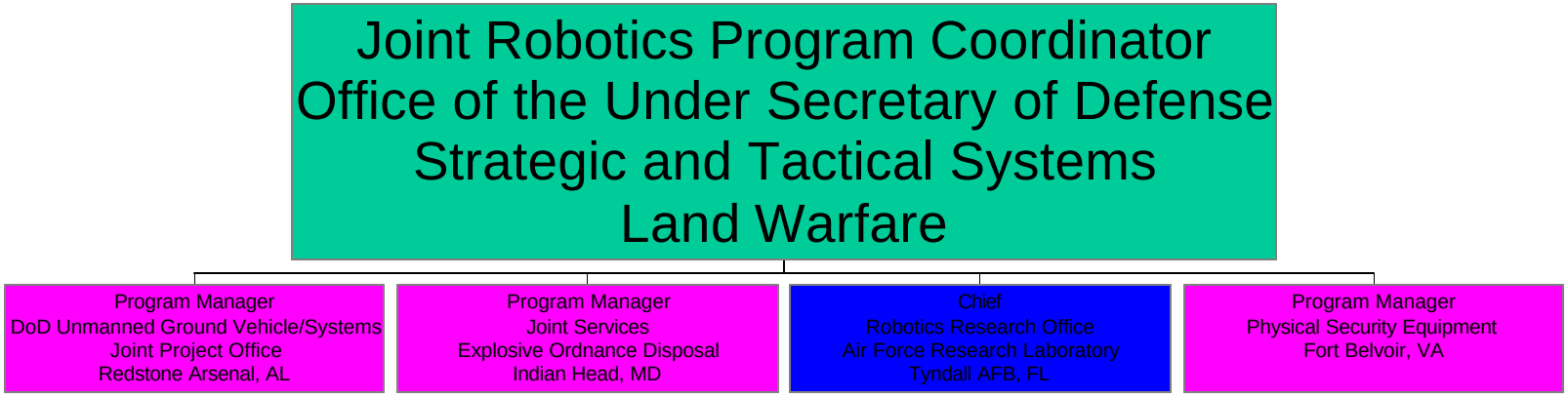
Given the LFT&E Background, Definitions & Requirements,

how are DoD's Unmanned Ground Vehicles (UGV's) developed

and what UGVs exist now and are planned for the future?

THE JOINT ROBOTICS PROGRAM

THE JOINT ROBOTICS PROGRAM

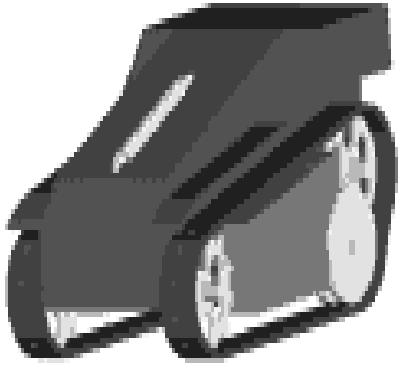


UNMANNED VEHICLES/PLATFORMS IN DOD TODAY

RONS

ARTS

SRS D7G



RCSS

Urban Robot

Gladiator

UNMANNED VEHICLES IN DOD TODAY

RONS

- Joint Explosive Ordnance Disposal (EOD)
- No Lethality Issue
- Close to 200 systems in DoD Inventory
- Remote Operator - No Survivability Issue
- Below Major System Threshold

Does Not Meet LFT&E Requirements

UNMANNED SYSTEMS IN DOD TODAY

ARTS

- USAF Multi-Purpose Bomb/Sub-Munitions
- No Lethality Issue
- Used for Range Clearance/Force Protection
- 37 Systems Planned for Fielding
- Remote Operator - No Survivability Issue
- Below Major System Threshold

Does Not Meet LFT&E Requirements

UNMANNED SYSTEMS IN DOD TODAY

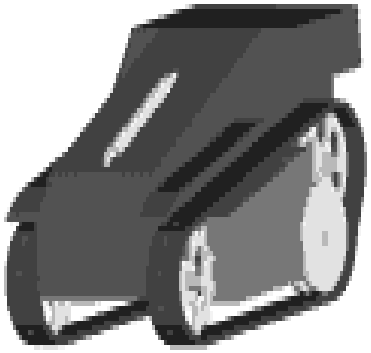
M1 Abrams Panther

T-3 Dozer

- Army Anti-Tank Mine Clearing/Proofing
- <u>No Lethality Issue</u>
- 6 Systems Used for Kosovo and Bosnia Operations with over 57 other Dozer and Vehicle Applications Planned for Fielding
- Remote Operator - <u>No Survivability Issue</u>
- Below Major System Threshold

Does Not Meet LFT&E Requirements

UNMANNED SYSTEMS IN DOD TODAY



RCSS

- Army Anti-Personnel Mine & Booby Trap Clearing
- No Lethality Issue
- 8 Prototype Systems used in Balkan Operations with 135 Type Classified Systems Planned for Fielding
- Remote Operator - No Survivability Issue
- Below Major System Threshold

Does Not Meet LFT&E Requirements

NEAR TERM DoD UNMANNED SYSTEMS

Matilda

- Army Functions in MOUT and in Homeland Security Activities
- <u>No Lethality Issue</u>
- Requirements Evolving
- Remote Operator - <u>No Survivability Issue</u>
- Below Major System Threshold

Does Not Meet LFT&E Requirements

NEAR TERM DoD UNMANNED SYSTEMS

Gladiator

- USMC MOUT and RSTA Support
- Evolving Requirements include Machine Gun - Lethality Issue
- Remote Operator - No Survivability Issue
- Below Major System Threshold but Lethality is an Issue

Still Does Not Meet LFT&E Requirements - Not a Major System

EXSUM OF TODAY AND NEAR TERM UGV'S & LFT&E

FOX

- No Survivability Issues
- No Lethality Issues - Except Gladiator but...
- No Major Systems (Funding Definition)

No LFT&E Requirements for Today's or Near Term UGV's ---- But Wait

FUTURE COMBAT SYSTEMS (FCS) ARE ON THE HORIZON

Early Evolving FCS Concepts

- SURVIVABILITY - Designed as Unmanned: Still Not an Issue - No Apparent LFT&E Requirement
- LETHALITY - Direct and Indirect Fire Platforms Envisioned: Big Time Issue - LFT&E Possible
- MAJOR SYSTEM DEFINITION - Cost Driver Anticipated to be a “Yes” Answer for System

LFT&E Likely for Future FCS UGV’s

BOTTOM LINE FOR UGV'S AND LFT&E

- LFT&E and Acquisition Communities Need to Get Ready to Consider LFT&E on selected Unmanned Ground Vehicles to Insure Mission Completion Even When No Human Operator is On-Board.

- Should Section 2302(5), Title 10, U.S. Code be Reviewed To Accommodate UGVs That Do Not Have Human Crew Members?

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The Horizon is Almost Here - For Planning Purposes