



Affordable Moving Surface Target Engagement (AMSTE)



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Outline

SPO

- Motivation
- AMSTE Concept
- Feasibility Study
- AMSTE Program
- Summary



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Motivation

- Affordably destroying moving surface targets is an essential future capability
- Existing approaches:
 - Sophisticated sensors
 - Man in the loop
 - Dispersive munitions



Mobile Targets

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Observation

Modern technology provides basis for the *affordable* precision targeting of moving surface targets

- Planned GMTI sensors
- Precision weapons
- Communication networks
- High performance processing



GMTI Systems

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U-2

Manned Aircraft:

- Stand-off, look in
- Large payload
- Multifunction capabilities
- On-board BM/C3

Fighter MTI

- APG-73
- APG-76
- APG-68
- JSF



ARL



ASTOR (UK)



JSTARS



RTIP JSTARS

Others:

- Tactical UAV
- Special platforms

Global Hawk



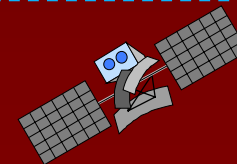
Unmanned Aircraft:

- Penetrating
- Multifunction capabilities
- Low Cost

- Space based:**
- world wide access
 - peace & war
 - ground BM/C3

DISCOVER II
MTI demo

**Space
Based
MTI?**



1990

2000

2010

2020



Precision Weapons *SPO*

- Extended Range Guided Munition
- Joint Direct Attack Munition
- Joint Stand Off Weapon
- Joint Air to Surface Standoff Missile
- Small Smart Bomb
- Tomahawk Land Attack Missile
- Tactical Tomahawk



AMSTE Concept

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- Network GMTI sensors
 - Improve detection
 - Increased revisit rate
 - Reduced location errors
- Precision fire-control tracking
- Command guided weapons



AMSTE Features

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- Moving land and sea targets
- Reduced cost weapons
- Shooter survivability
- Targeting selectivity and precision
- Reduced logistics
- Increased load-out



Feasibility Study

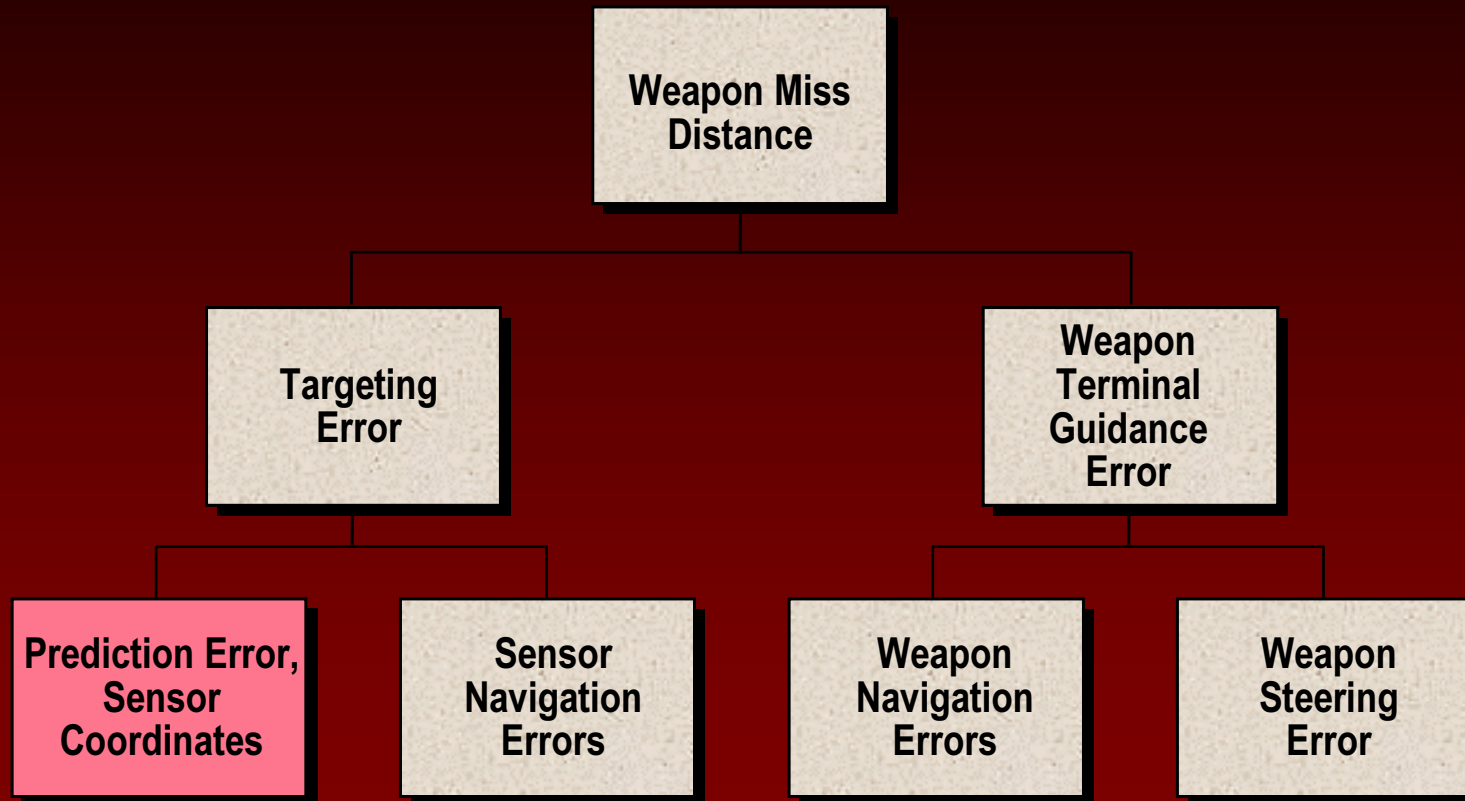
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- Weapon miss-distance analysis
- Event-level simulation
 - High-fidelity vehicle movement
 - GMTI sensor/platform simulation
 - Laboratory GMTI tracker emulation
 - High-fidelity weapon simulation
- Error-source analyses



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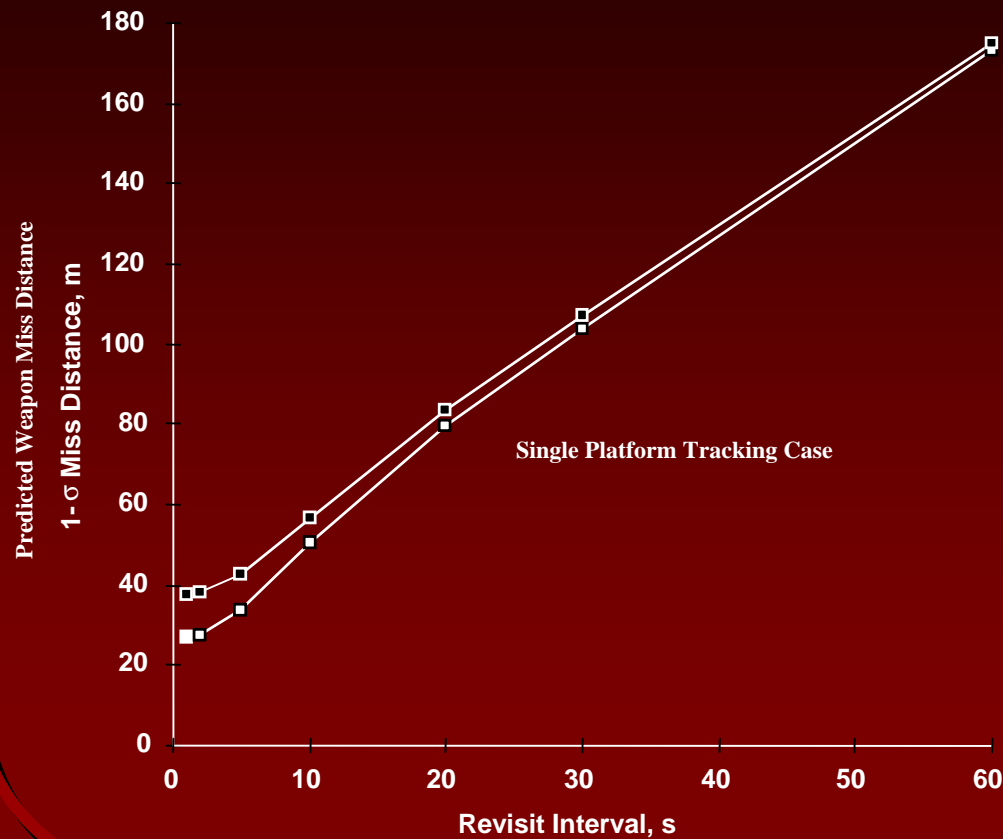
Error Sources





Track Prediction

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- Track Prediction Error
- RSS Miss Distance

Single Sensor

100 m 1σ Position
Measurement Error

15 m/s Target Speed

Speed Variation
2.5 m/s speed variation
5 s correlation time

Nav Errors
6.6 m horizontal
13.8 m vertical

DTED Error
20 m vertical

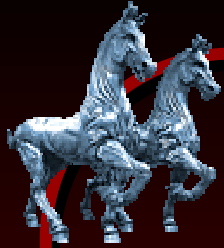
Steering Error
1 m

Impact Angle
45°



Targeting Accuracy **SPO**

ERROR SOURCE	CURRENT ERROR	FUTURE ERROR
TRACK PREDICTION	178 m	7 m
DTED VERT.	20	3
SENSOR HOR. NAV.	14	5
WEAPON VERT. NAV.	7	3
WEAPON HOR. NAV.	7	3
WEAPON STEERING	1	1
RSS MISS DISTANCE	180 m	10 m



Study Conclusions

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- AMSTE is feasible
- Precision tracking is key
 - Multi-platform data needed
- Weapon system studies needed
 - Cost-performance trade space
 - Identify technical risks



Program Structure *SPO*

Phase I:
Concept
Development

BAA

Phase II:
Fire Control
Experiments

Phase III:
Weapon
System
Experiments



Phase I: Approach

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- Conduct weapons-system studies
 - Assess feasibility/cost
- Develop and evaluate fire-control precision tracking algorithms
 - Collect multi-platform data
- Investigate critical supporting targeting technologies



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Summary

- Affordable moving target engagement is a critically needed capability
- DARPA's AMSTE program is developing and demonstrating technologies to support the *affordable* engagement of surface moving targets