



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

RAMP

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Robotic Armed Maneuver Platform (RAMP) aka Wingman



Interoperable Software Architectures



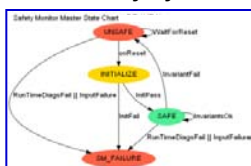
Notional Armed Turret



Integrated Platform And Turret Control



UGV Safety Systems



Notional UGV Platform



Autonomous Navigation & Behaviors System



Purpose:

Develop, integrate, and demonstrate an armed robotic platform that is capable of performing tactically relevant maneuvers.

Products:

Safe Armed Operations

- Aided target recognition & engagement
- Automated turret control
- Low latent remote fire

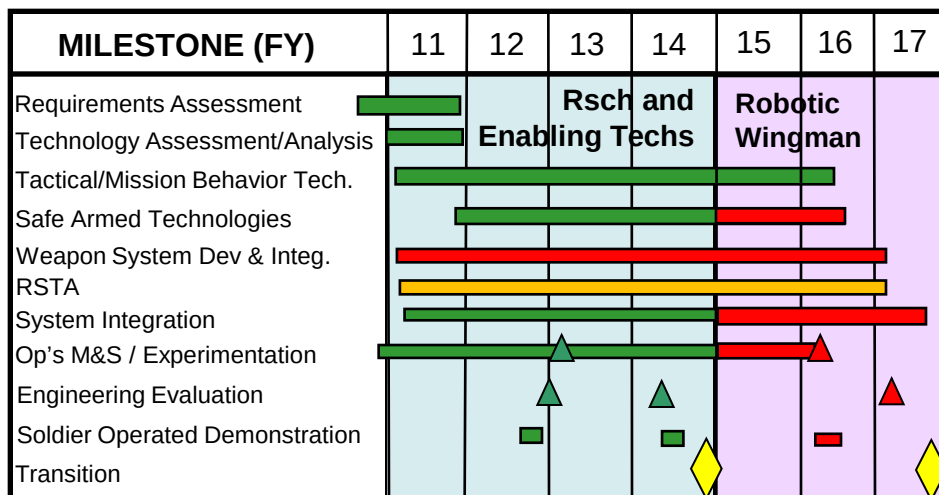
Autonomous Tactical Behaviors

- Automated maneuvers in tactical formations
- Interaction of Manned and Unmanned Systems:
- Manned/unmanned intelligent teaming through advanced unmanned vehicle systems
- Common command and control of platform and turret

Payoff:

- Get Robotic Platforms in the Hands of the User
- Reduce Fleet Weight
- Increased Warfighter Survivability
- Increased Warfighter Lethality
- Reduced risk of future armed UGV integration

Schedule & Cost





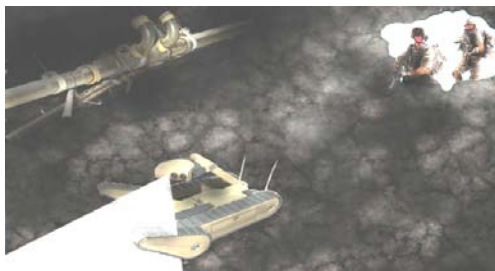


SOURCE

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D.TAR.2009.03 Safe Operations of Unmanned systems for Reconnaissance in Complex Environments (SOURCE)



Schedule & Cost

MILESTONE (FY)	09	10	11	12
Technology/Requirements Assessment				
Perception & Control Technologies - Safe Operations, Situational Awareness		5		6
Tactical/Mission Behavior Technologies - Cooperative & Dynamic Behaviors		5		6
Platform Integration				
Engineering Evaluation				
M&S Experiments				
Field Experiments		5		6
Total				
TARDEC				
ARL				
ERDC				

Purpose:

Develop and demonstrate Perception, Intelligence, control and Tactical Behavior technologies that are required for autonomous collaborative unmanned systems (UMS) & Soldiers to conduct safe operations in a dynamic urban environment.

Products:

- Perception sensors & planning algorithms for safe operations in dynamic/urban environments
- Tactical behaviors for mission execution (including MULE and SUGV class robots)
- Modeling & simulation software
- Integrated testbeds and data to develop UGV safety & testing procedures/methodologies in preparation for Interim Qualification Testing (IQT)
- Quantitative performance data to enable development of TTPs for UGVs

Payoff:

- Remove warfighter from hostile situations
- Safer operations of UGVs in proximity to pedestrians and vehicles
- Increase in vehicle autonomy to enable less supervisory burden and reduced network loads
- Increased UGV situational awareness
- Robust soldier/robot and robot/robot teaming behaviors
- Robust UGV performance in all environments/conditions



D.TAR.2009.03 SOURCE Joint Partnership Overview

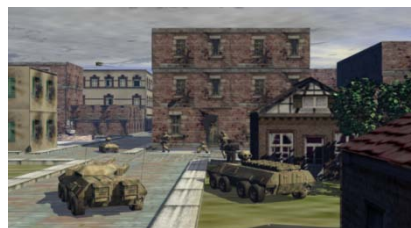
TARDEC

- Maturation, Integration & Demonstration



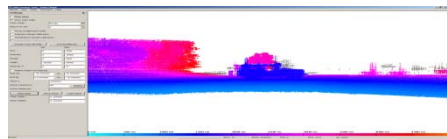
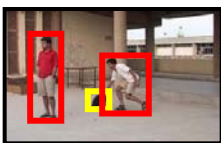
ERDC

- Physics-based Simulation



ARL/VTD

- Perception, Planning & Tactical Behavior Algorithms



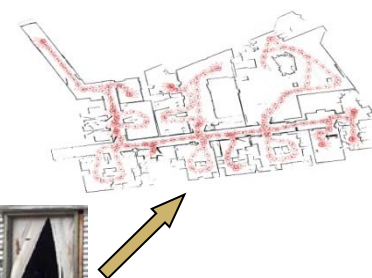
ARL/HRED

- Soldier-robot teaming and trust in automation



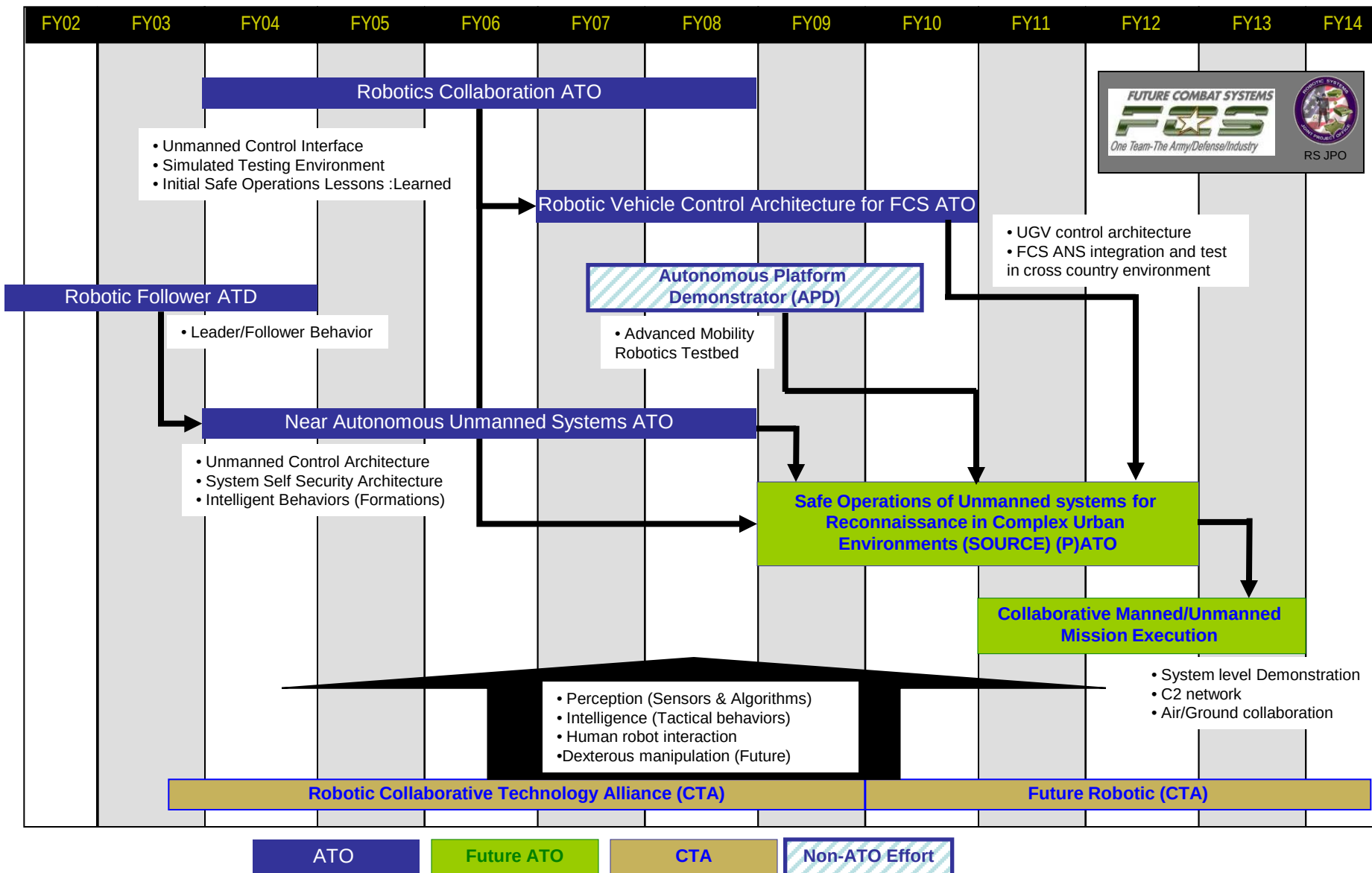
ARL/CISD

- Indoor Navigation & Mapping





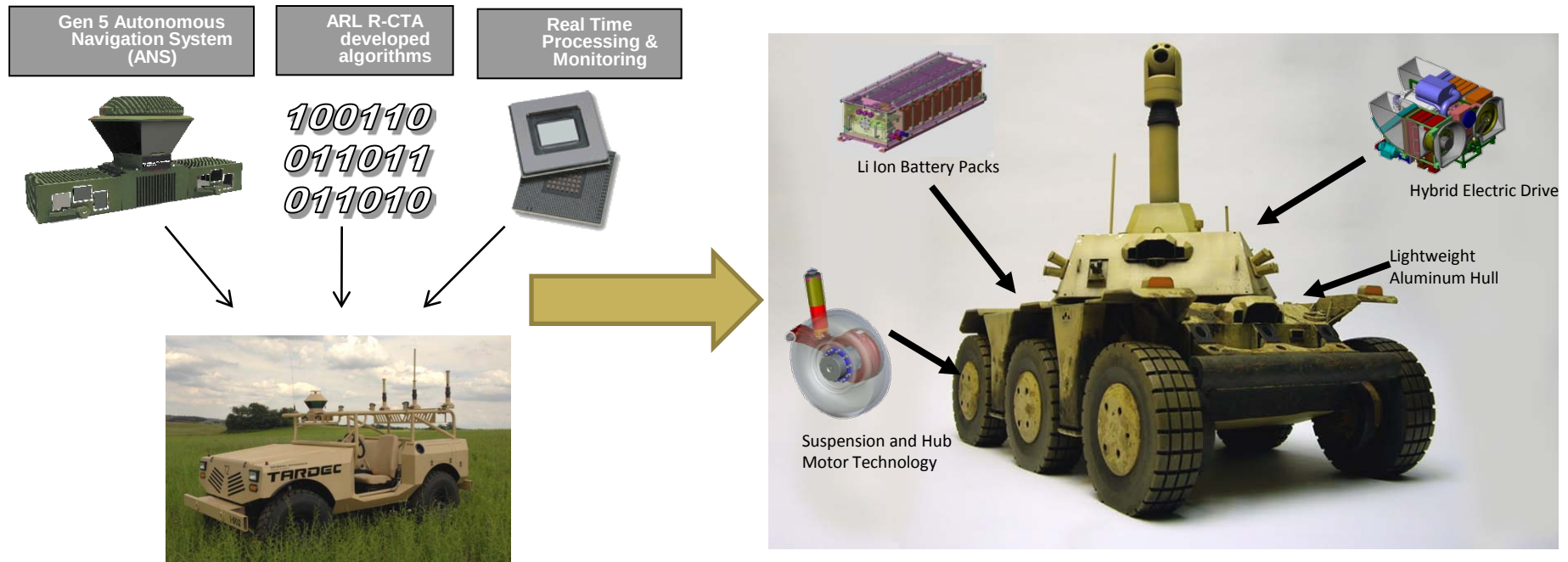
D. TAR 2009.03 Safe Operations of Unmanned systems for Reconnaissance in Complex Environments (SOURCE)





SOURCE Large Platform

- Autonomously maneuver, operate and negotiate urban terrain
- Autonomously traverse paved roads at sustain speeds of 45KPH
- Autonomously traverse complex urban terrain at 8 KPH
- Detect oncoming vehicles at oncoming speeds of 80KPH and ranges of 50m
- Detect and Track humans up to 50m (standing and moving) and at speeds up to 10KPH
- Detect and avoid non-human entities moving at 10KPH





SOURCE – Small Robots

OBJECTIVE

- Enable dismounted operations of small scale robots in urban and complex environments using collaborative semi and fully autonomous behaviors, persistent surveillance, and mapping.

CHALLENGES

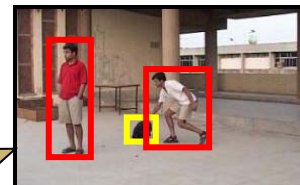
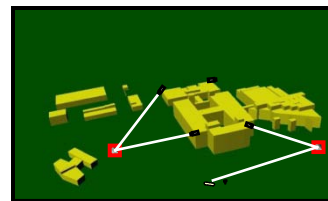
- Limited autonomous behaviors for SUGV
- Sensors don't yet exist to enable full autonomy on small robots
- Localization challenges in GPS-denied environments
- Persistent surveillance technology (including on moving robot)

SOLDIER PAYOFF

- Reduced Soldier Workload
- Enhanced Situational Awareness

Technology Partners: ARL, SPAWAR, INL

Persistent Surveillance



Indoor Navigation And Mapping



Indoor Navigation And Mapping

