Chief Roboticist Panel

Ground Robotics Capability Conference & Exhibition

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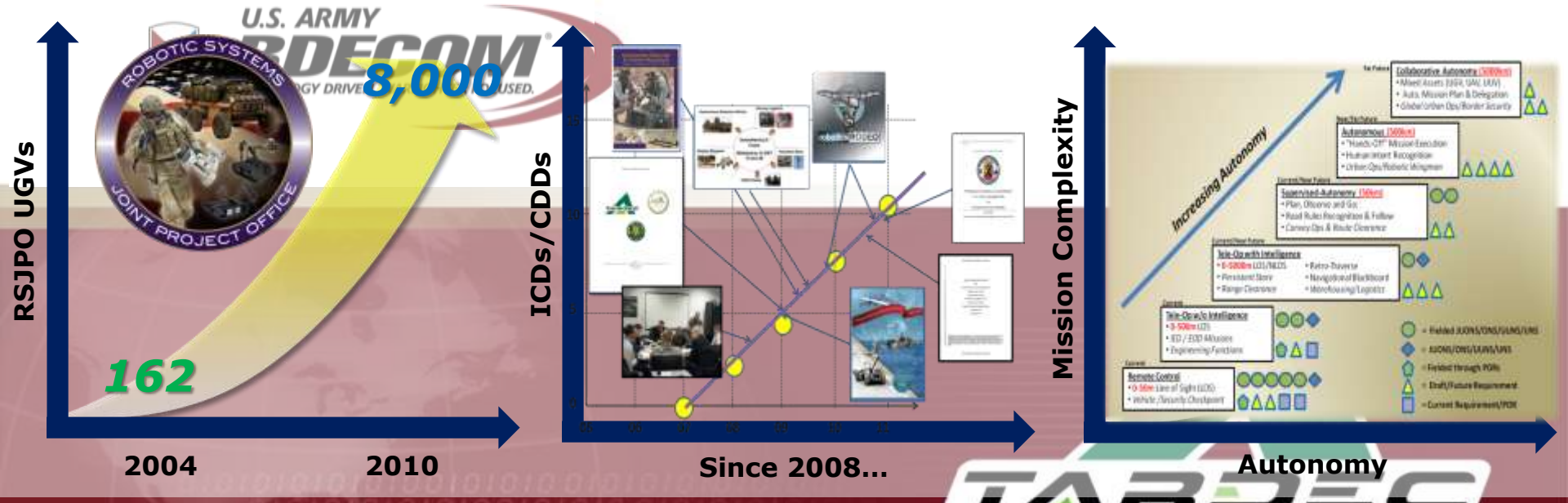
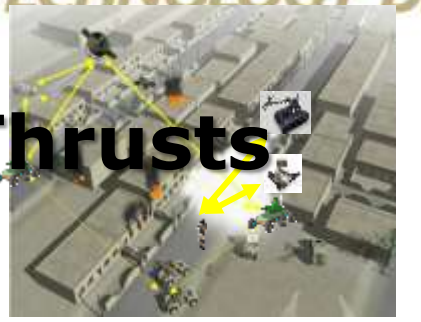


TARDEC

Increasing demands and operational flexibility
Require technology investments in key areas

TECHNOLOGY DRIVEN WARFIGH

Strategic Thrusts



Ongoing Robotics Efforts
How the Army will keep it's Technology Edge

MAST CTA
Basic Research for Micro-systems
BAE, JPL, Michigan, Penn, Maryland, GA Tech, UC Berkeley, MIT

- *Autonomous operation of a collaborative ensemble of multi-functional, mobile micro-systems*
- *Micro-mechanics*
- *Micro-electronics*
- *Processing for autonomy*
- *Integration of multi-functional component technologies*


Near-term Quad-rotor

Robotics CTA
Fundamental Robotics Research
GDRS ,CMU , UPENN, Qinetiq , UCF, Boston Dynamics, FAMU

- *Fundamental technology to enable teaming of "intelligent "unmanned systems with soldiers*
- *Perception*
- *Planning, learning, & adaptation to dynamic, unknown environments*
- *Human-robot interaction*
- *Dexterous manipulation & unique mobility*


CAMS JCTD vehicle

MAGIC
International Robotics Challenge
U of MI, U of PA, Robotics Research

- *Harvest "Best-in-class" technology for teaming of autonomous SUGVs*
- *Many robots/few operators*
- *Autonomous mobility*
- *Planning for dynamic environments*
- *Minimize required soldier interaction*
- *Tactical behaviors*
- *Heterogeneous teaming*


Team RASR's modified TALONs

RDP's
Research & Demonstration Projects Conducted by RDECOM & other Army Organizations

- *Focused Research and Advanced Development programs directed at maturation and demonstration of new technical capabilities*
- *Safe Operations of Unmanned Systems in Complex Environments (SOURCE)*
- *Improved Mobility and Operational Performance through Autonomous Technologies (IMOPAT)*


TARDEC APD Testbed Platform

Robotics Rodeo
Industry S&T Market-Survey
iRobot, Oshkosh, John Deeere

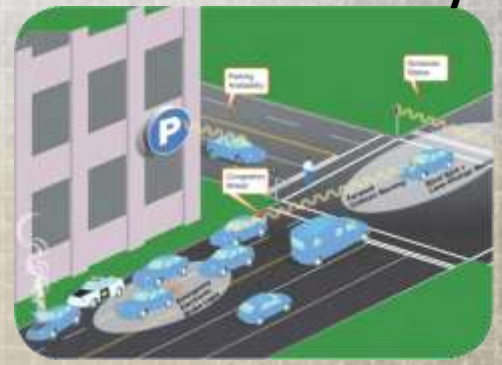
- *Open solicitation for developers to bring systems for assessment by both soldiers and technologists*
- *Structured assessments in relevant environments and exposition of broad swath of available technology*
- *Opportunity to include new & novel technology into Army Acquisition*


GUSS vehicle

'New' Partners

Automotive Safety Sensors

Automotive Industry



Wireless V-to-X communications

Automatic Platooning Systems

New Sensor Designs

Computer Industry

High Performance GPUs

New Players in Autonomy

The Innovation Circle

Military

Commercial

Maker

Discussion and Way Ahead

Robotics are *enablers* and catching on but, mainly as *force multipliers* – Not yet replacing *force structure*

Some Challenges:

Cultural

- An unwillingness to reduce force structure.
- Trust and confidence issues related to autonomous behaviors (safety)
- Appreciation of the potential return on a robotic investment.

Moral

- Responsibilities associated with the Unmanned application of force

Social

- The incurious nature (lack of curiosity in a machine).
- Lack of comfort for people to operate in close proximity to machines.

- Move beyond ONS/JUONS capability gaps
- Develop a Robotic Environment (Test Bed or Base Ops)
- Leverage modeling and simulation for comprehensive DOTMLPF impact

1) Determine return on investment for tasks robotics could perform (like robotic convoying)
2) Confirm that at various places along Bloom's taxonomy* or some combination of dull, dirty, or dangerous tasks, we can replace humans.
3) Determine personnel life-cycle cost savings
4) Expose the user and the military community to semi-autonomous robotics through test bed, base and installations operations

remembering-understanding-applying-analyzing-evaluating-creating