



Autonomy COI



Technology Taxonomy

Machine Perception, Reasoning & Intelligence (MPRI):

- Common Representations and Architectures
- Learning and Reasoning
- Understanding the Situation/Environment
- Robust Capabilities



Human/Autonomous System Interaction and Collaboration (HASIC):

- Calibrated Trust
- Common Understanding of Shared Perceptions
- Human-Agent Interaction



Scalable Teaming of Autonomous Systems (STAS):

- Decentralized mission-level task allocation/assignment
- Robust self-organization, adaptation, and collaboration
- Space management operations
- Sensing/synthetic perception



Test, Evaluation, Validation, & Verification (TEVV):

- Methods & Tools Assisting in Requirements Development and Analysis
- Evidence based Design and Implementation
- Cumulative Evidence through Research, Development, Test, & Evaluation (RDT&E), Developmental Testing (DT), and Operational Testing (OT)
- Run time behavior prediction and recovery
- Assurance Arguments for Autonomous Systems

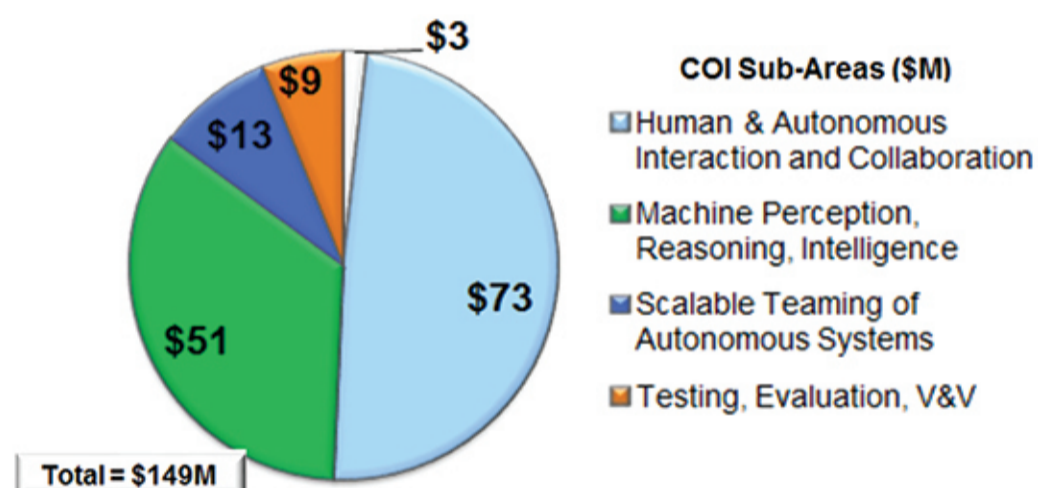


Purpose

Advancement of autonomous systems, and identification of potential investments to advance or initiate critical enabling technology development.

What's driving Autonomy S&T?

- **Manpower efficiencies**
reduce human footprint and personnel cost
- **Rapid response and 24/7 presence**
timely, persistent, enduring
- **Harsh environments**
day, night, hot, cold, weather, rubble
- **New mission requirements**
increasing competence, new capabilities
- **Advanced medical applications**
critical response, end-to-end critical care
- **Logistical support**
reduce logistics burden



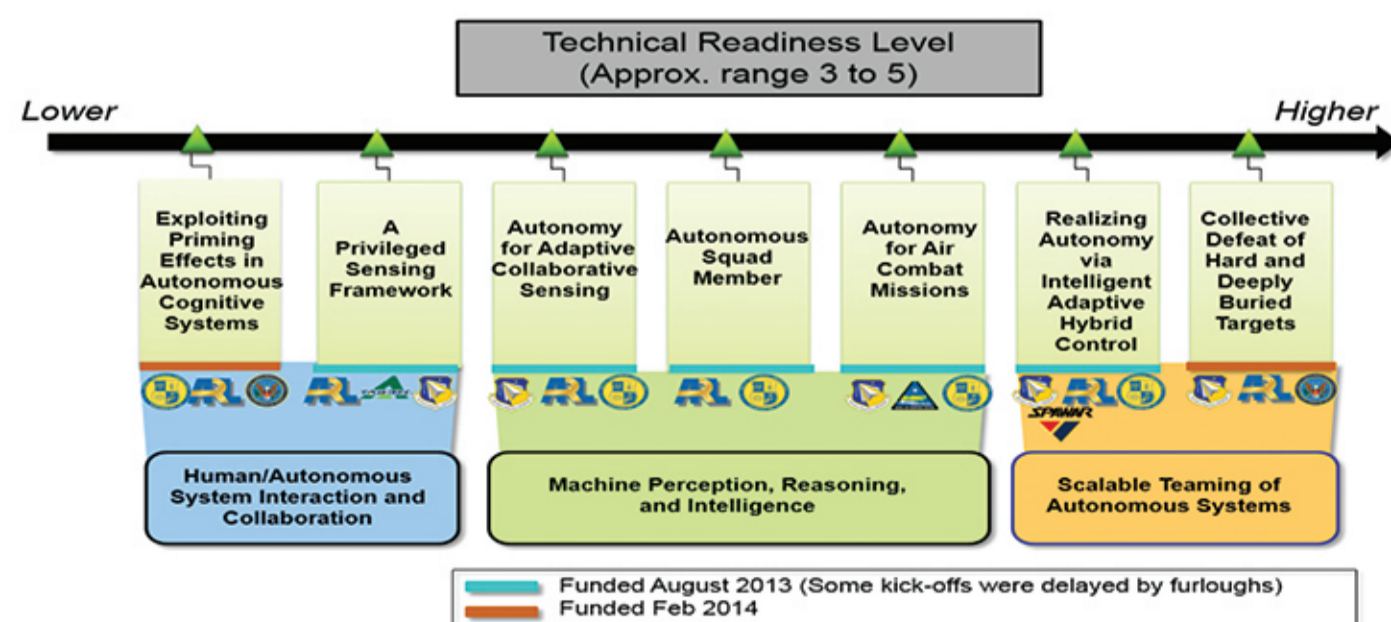
Enduring Gaps

- Open, cognitive architectures that facilitate interaction between intelligent systems and human
- Planning and reasoning for dynamic, uncertain operational and physical environments
- Concepts for decentralized perception, planning, and collaboration among large groups of heterogeneous, autonomous agents
- Robust supervised and unsupervised learning
- Natural, intuitive communications between humans and intelligent agents/systems
- Creation of "common ground" and communicating intent (abstract reasoning)
- Means for assessing the safety and performance of systems that learn and alter behavior over time



Air, Land, Sea, Cyber, Non-Physical Systems

Autonomy Research Pilot Initiative (ARPI) Investigations



- Pilot test of an OSD-sponsored innovation program, directed by ASD (R&E), and executed by the Services.
- Promote development of innovative, cross-cutting S&T for autonomous systems able to meet future DOD system and mission requirements.

Industry Engagement Opportunities

- Partner with the DoD labs to develop both technology and methodologies/ concepts as part of an open architecture
- Provide independent experience (performance) and data
- While the Department is focused upon the solution of specific military problems, the technology has applicability well beyond the department, as evidenced by recent interest from non-defense based organizations.
- Defense Innovation Marketplace – centralized, online resource for market research to learn about Department of Defense (DoD) S&T/R&D investment priorities, capability needs and technology interchanges.

