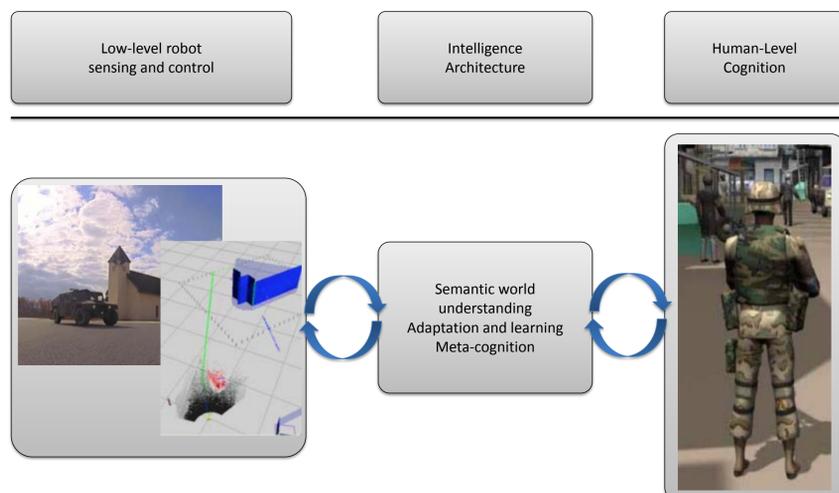


## S&T Campaign: Science for Maneuver/Information Sciences System Intelligence and Intelligent Systems

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### Research Objective

- Research projects in this area examine vehicle behaviors, including planning, monitoring, and correcting behaviors to achieve desired mission goals
- Build elemental machine skills into increasingly complex and adaptive behaviors
- Build behaviors not just for individual platforms, but also for heterogeneous teams
- Increase vehicle intelligence at all three levels of vehicle control architecture



### ARL Facilities and Capabilities Available to Support Collaborative Research

- Indoor urban test facility with full-size multi-story buildings for air and ground autonomous systems experimentation
- A fleet of mobile robots, including PackBots and Jackals, with a wide array of sensor capabilities



### Challenges

- Developed algorithms must be robust and adaptable to a large range of environments
- Systems must be capable of operating in dynamic, unstructured and austere environments
- Systems must be capable of operating without constant human supervision



Sample signal strength while conducting patrol mission in limited-communications environment

### Complementary Expertise / Facilities / Capabilities Sought in Collaboration

- Expertise in 3D scene understanding – going from registered point clouds and images to labeled objects
- Expertise in spatial semantics – turning natural language statements about the physical world into usable spatial representations
- Experience with machine learning: the connections between physical scenes and natural language
- AI Planning alongside multi-modal task-oriented dialogue
- Undergraduate and graduate students to:
  - design and conduct experiments,
  - develop data annotation schemes,
  - propose, implement, and test algorithms for natural language processing of collected dialog data.



"Navigate to the back of the building that is behind the car."