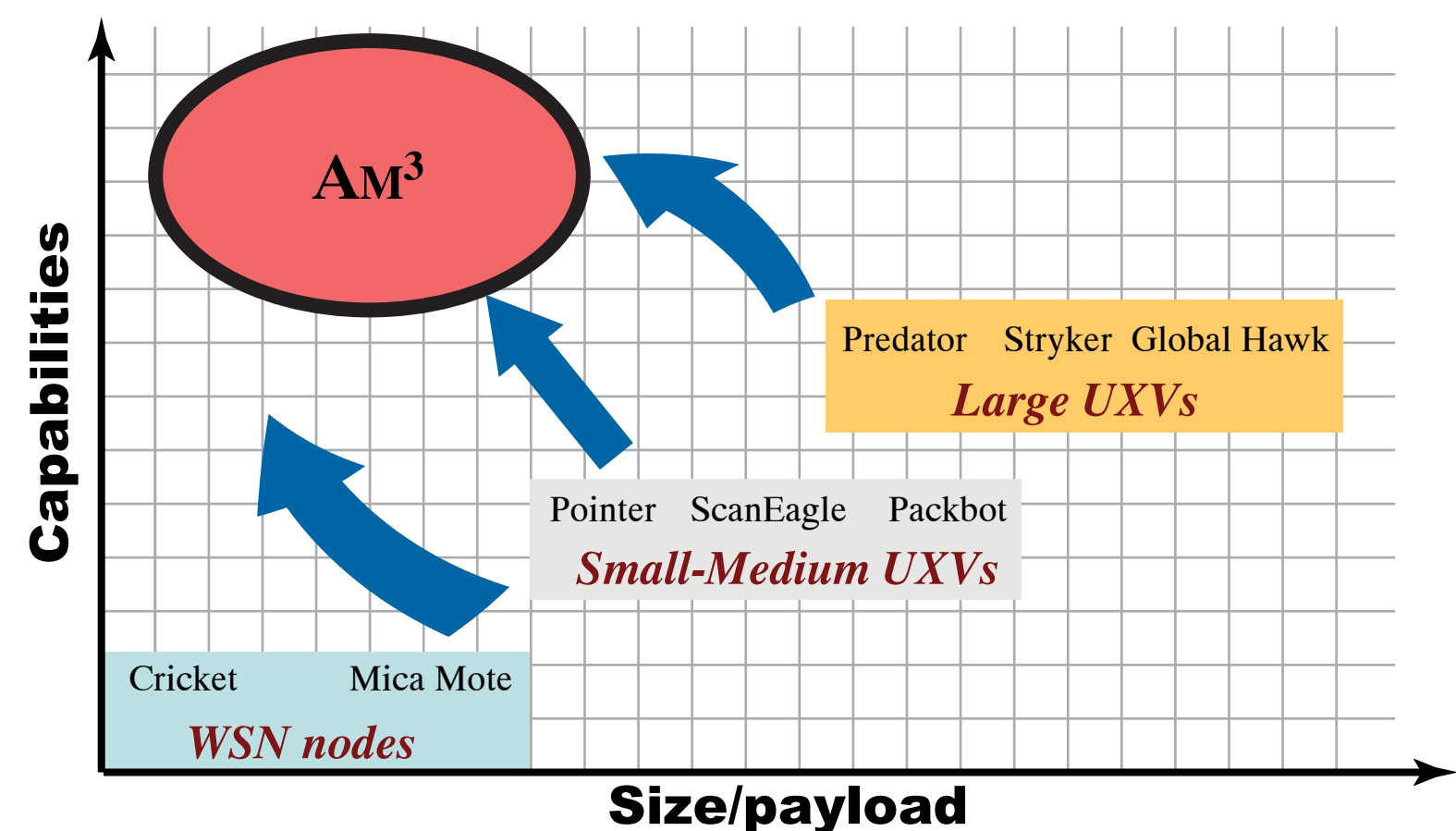


Micro Autonomous Sensors & Technology (MAST) Processing for Autonomous Operation

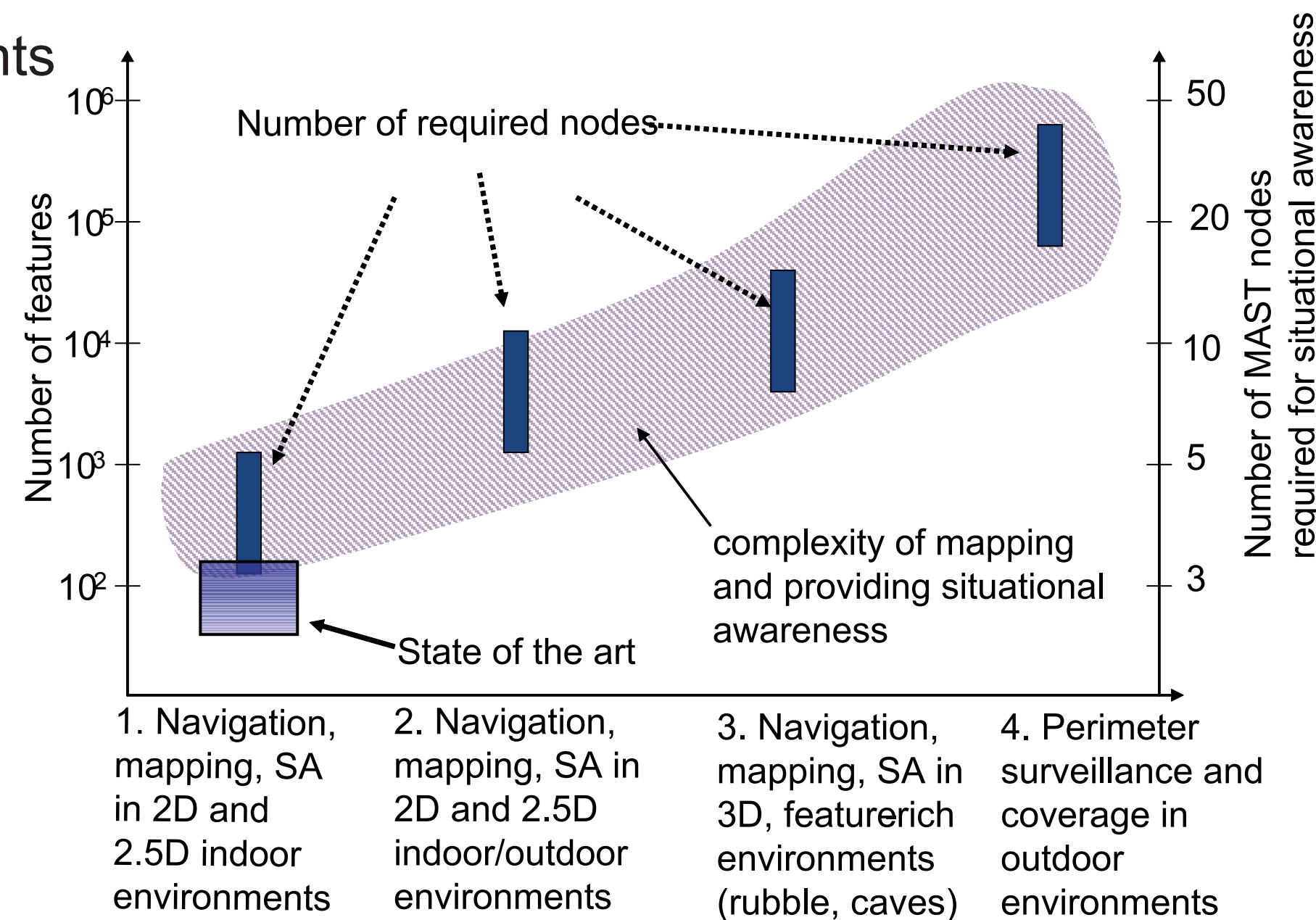
Challenges

- Developing intelligent, capable systems at the micro-scale
- Building a cohesive team that can self-organize, and coordinate based only on high-level task descriptions
- Operation in unstructured, 3-dimensional, harsh environments



Distributed Perception in Harsh Environments

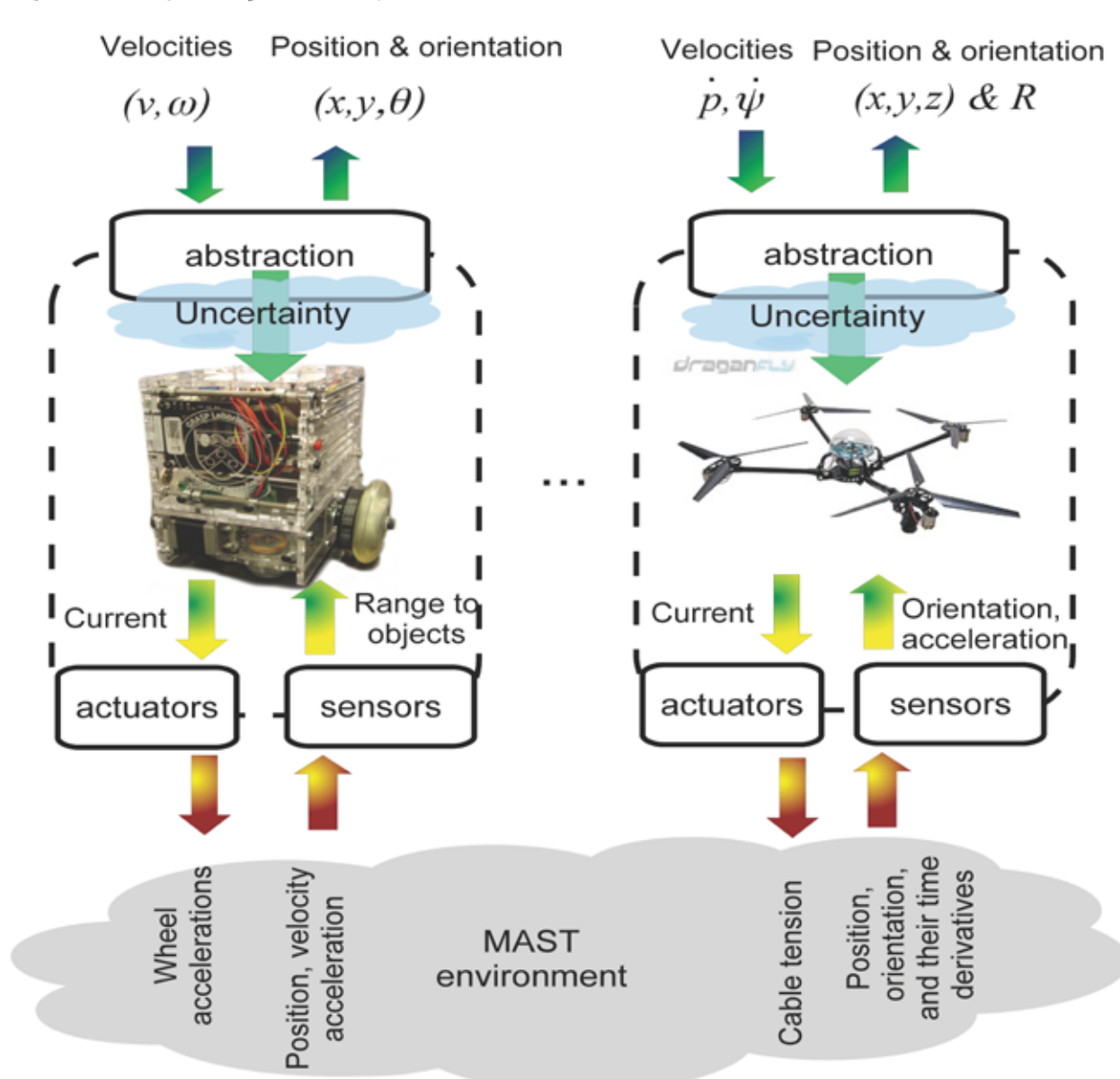
- 3-D localization without GPS
- Mapping in 3-D environments
- Distributed algorithms in noisy environments



1. Navigation, mapping, SA in 2D and 2.5D indoor environments
2. Navigation, mapping, SA in 2D and 2.5D indoor/outdoor environments
3. Navigation, mapping, SA in 3D, feature-rich environments (rubble, caves)
4. Perimeter surveillance and coverage in outdoor environments

Control for Situational Awareness

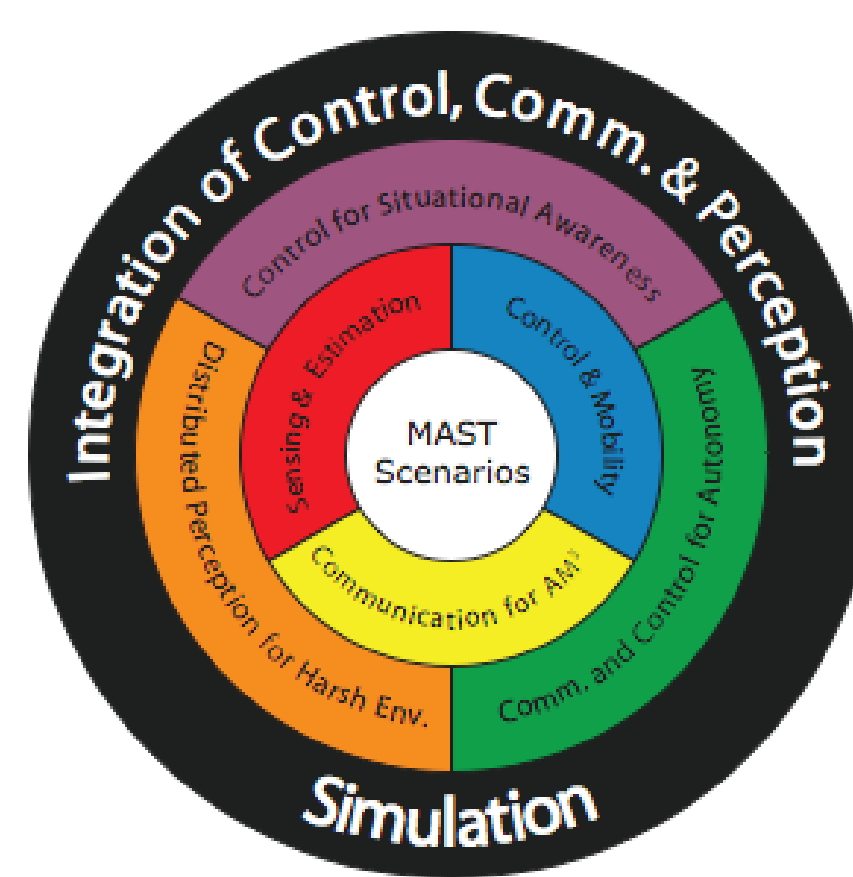
- Abstractions for modeling, simulation and control
- Navigation in 3-D, unstructured environments
- Adaptation with resource-constrained platforms



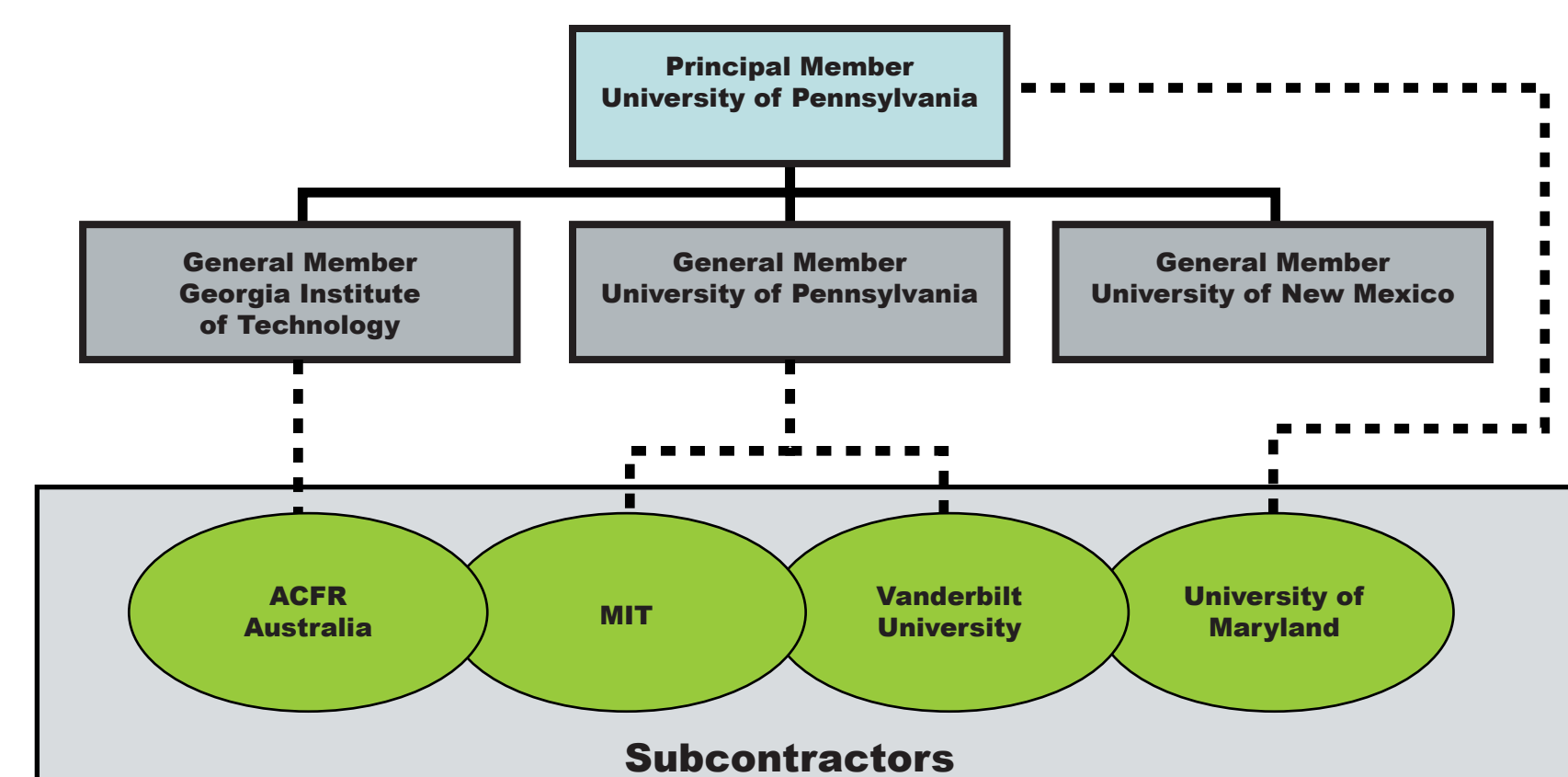
Communication and Control for Autonomy

- Maintaining ad-hoc networks in lossy environments
- Adapting to dynamic environments with changing topologies and fading
- Optimization and trading off sensing, communication and control

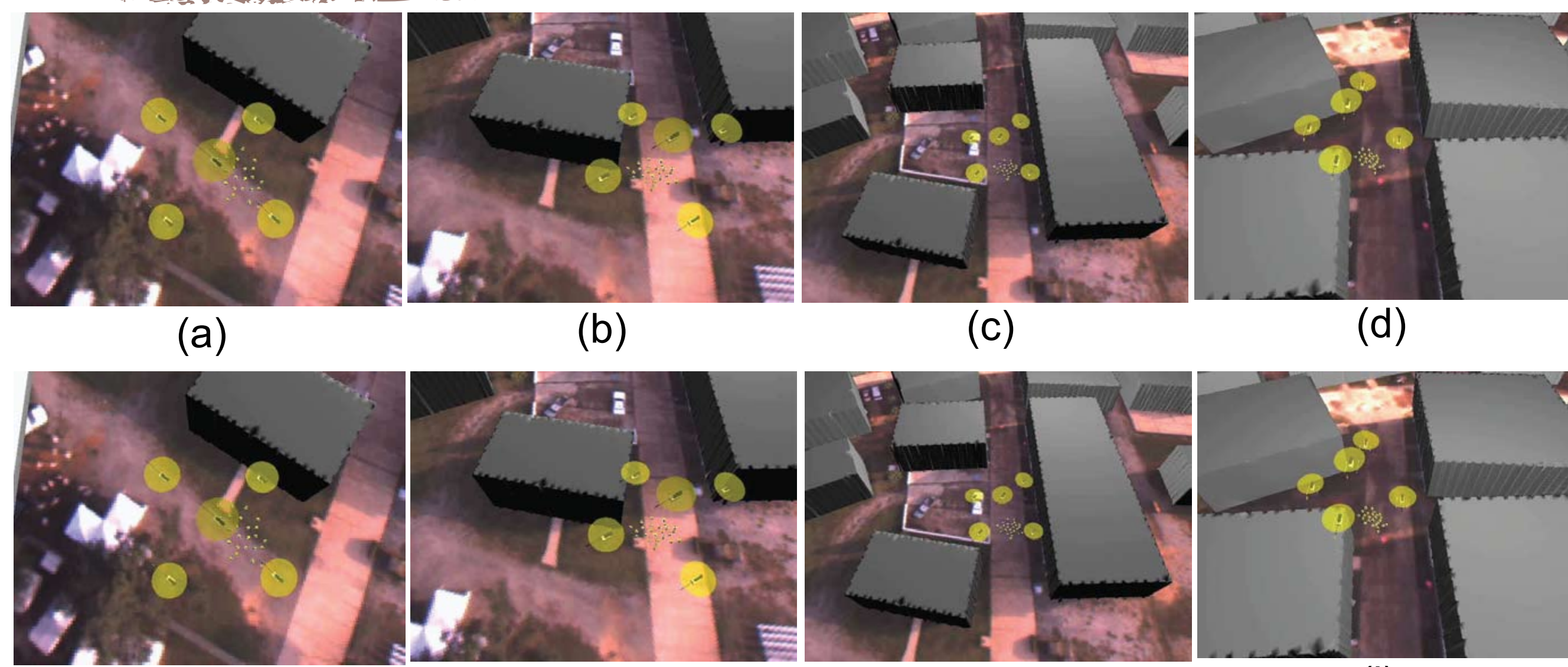
Thrusts



Team



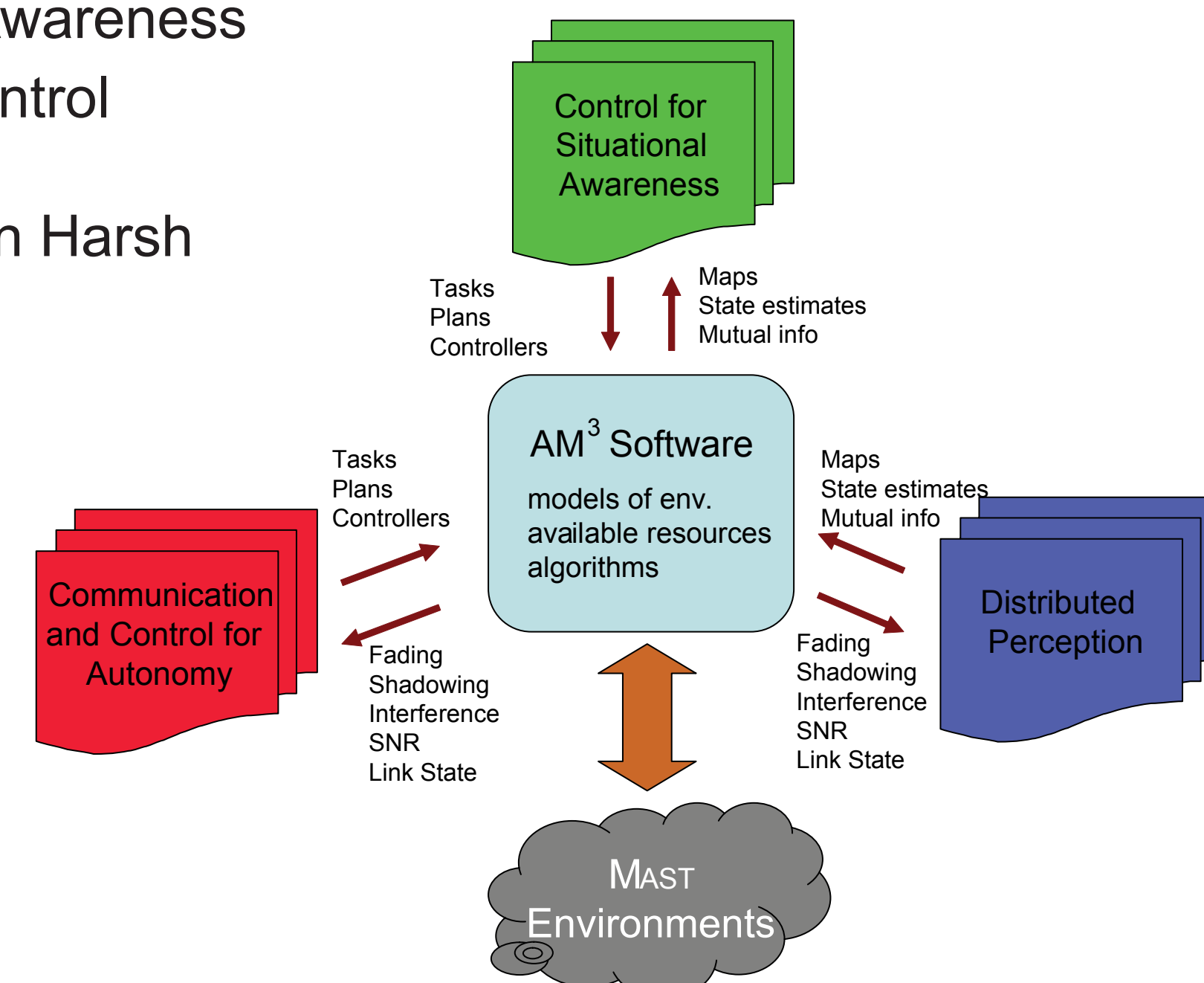
Simulation



It is essential to develop a simulation environment for MAST platforms to enable prototyping, testing and evaluation in MAST environments

Software Integration

- Control for Situational Awareness
- Communication and Control for Autonomy
- Distributed Perception in Harsh Environments



Timeline

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Core technologies Control and Mobility Sensing and Estimation Communication for AM ³	[Progress bar]				
Mission-driven research Control for Situational Awareness Communication and Control for Autonomy Distributed Perception for Harsh Environments	[Progress bar]				
Software Integration Integ. of Control, Comm., Perception Software Architecture Simulation	[Progress bar]				
Motivating MAST Scenarios Annual Milestones Demonstrations	1. Navigation, mapping, SA in 2D/2.5D indoor environments	2. Navigation, mapping, SA in 2D/2.5D indoor/outdoor environments	3. Navigation, mapping, SA in 3D, feature-rich environments (caves, rubble)	4. Perimeter surveillance and coverage in outdoor environments	

