



Chapter I





Air Force Research Laboratory Autonomy Science & Technology Strategy



Integrity ★ Service ★ Excellence

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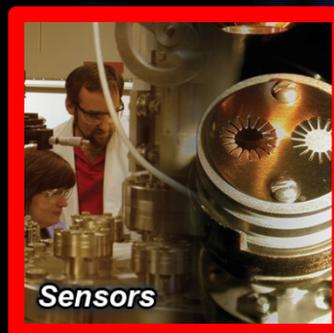




AFRL Autonomy Team



**Autonomy Research conducted at many of the AFRL
Technical Directorates**





Autonomous Systems and Technologies Cut Across Domains



Space – once launched systems must operate “on their own” in a harsh environment



Cyber – systems handle massive, distributed, and data/information-intensive tasks



Aircraft – systems operate in complex environment needing to synchronize space and mission mgmt

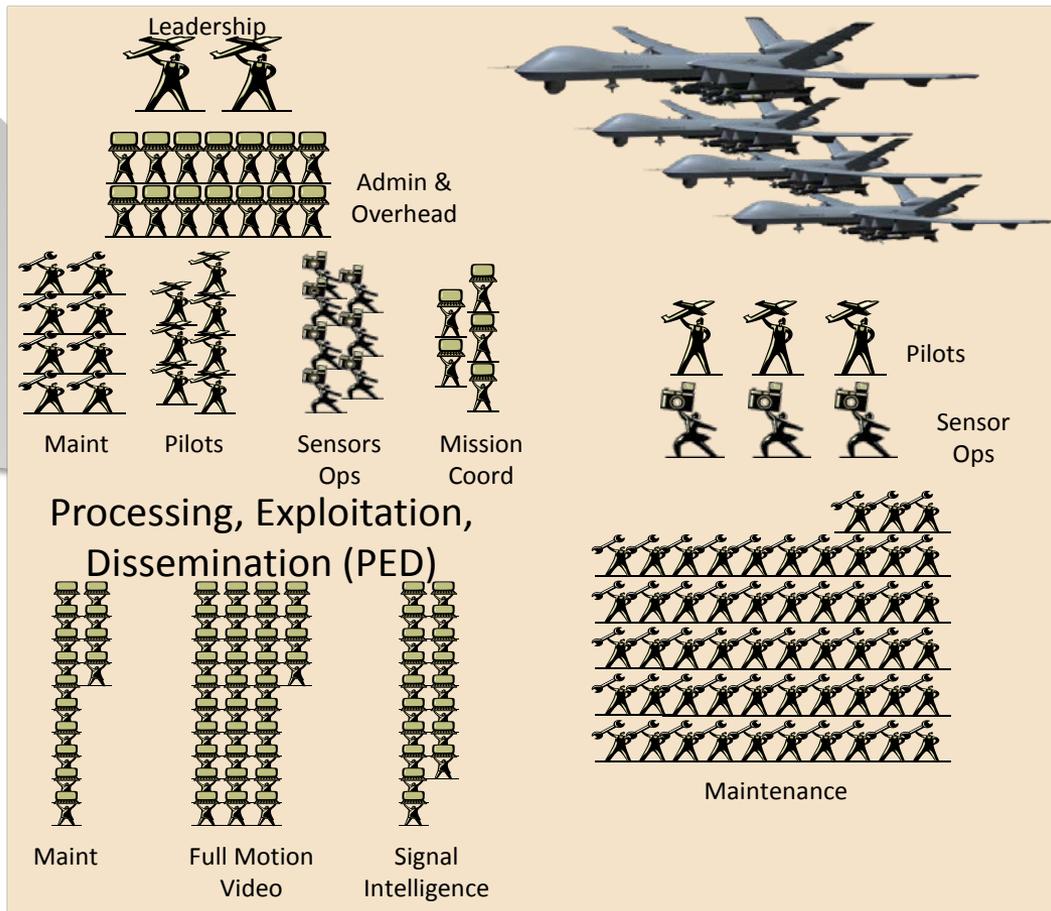


Weapons – systems that coordinate mission execution





Today's Unmanned Systems Challenge



DoD "Unmanned Vehicles" are Unmanned in Name Only...





Key AF Challenges Addressed by Autonomy



Decentralization, Uncertainty, Complexity...Military Power in the 21st Century will be defined by our ability to adapt – adaptation is THE underlying foundation of autonomous technology

- Manpower efficiencies
 - Rapid response
 - 24/7 presence
 - Harsh environments
 - New mission requirements
- Across Operational Domains





Automation and Autonomy



Automation

The system functions with no/little human operator involvement; however, the system performance is limited to the specific actions it has been designed to do.

Typically these are well-defined tasks that have predetermined responses (i.e., simple rule-based responses).

Autonomy

Systems which have a set of intelligence-based capabilities that allow it to respond to situations that were not pre-programmed or anticipated in the design (i.e., decision-based responses).

Autonomous systems have a degree of self-government and self-directed behavior (with the human's proxy for decisions).





AFRL Autonomy Vision



Intelligent machines seamlessly integrated with humans - maximizing mission performance in complex and contested environments



AFRL Autonomy Vision & Goals



Ensure operations in complex, contested environment



Demonstrate highly effective human-machine teaming

Intelligent machines seamlessly integrated with humans - maximizing mission performance in complex and contested environments

Create actively coordinated teams of multiple machines



Ensure safe and effective systems in unanticipated & dynamic environments



