

# Improving Human-UAV Interaction for Intelligence, Surveillance, and Reconnaissance

Jill L. Drury, Sc.D.

781-271-2034 • [jldrury@mitre.org](mailto:jldrury@mitre.org)

Air Force MOIE



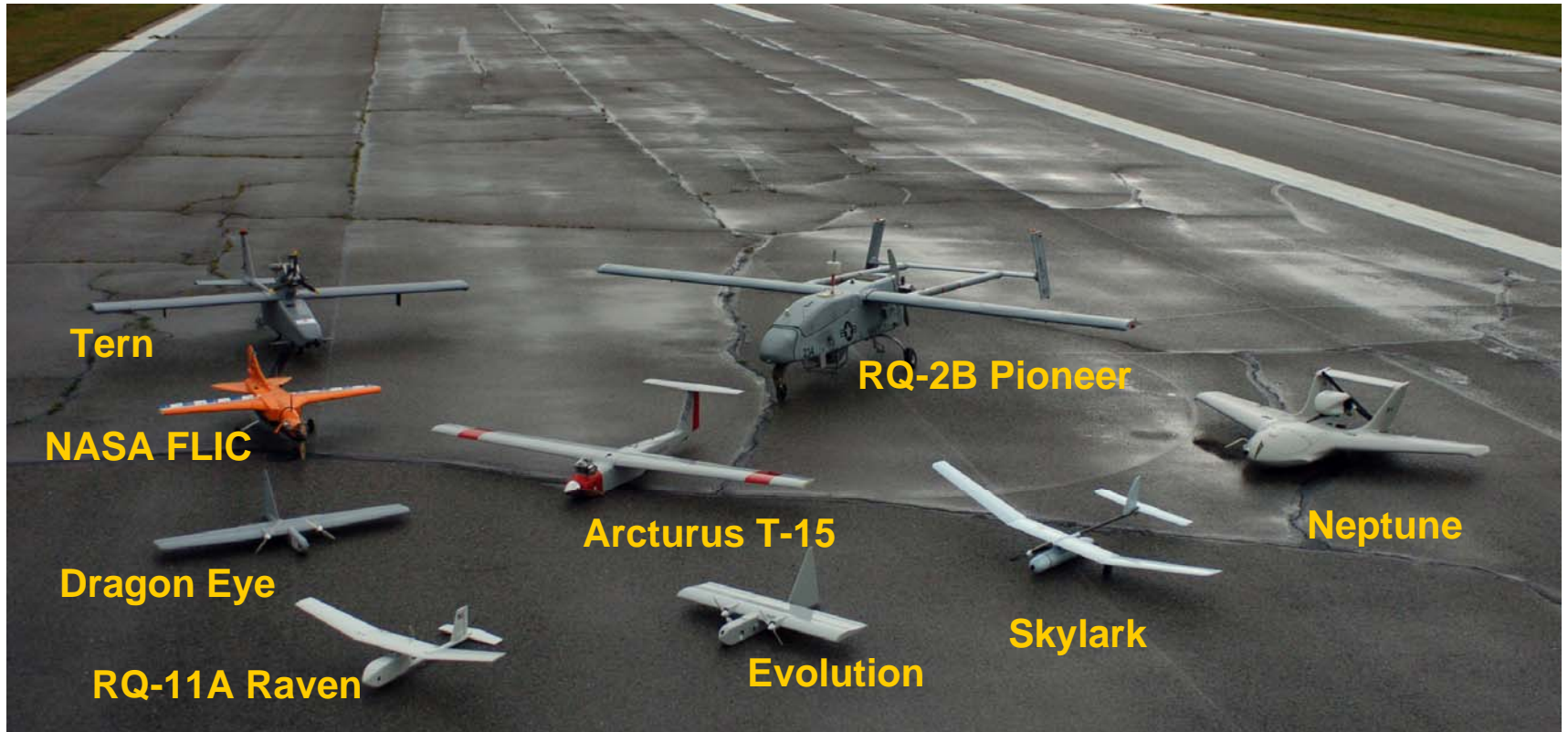
**MITRE**  
Technology  
Program

# Problem

- **Uninhabited aerial vehicles (UAVs) are filling urgent needs, but UAVs are being lost due to poor “human-system integration”**
  - **50–60% according to Air Force Scientific Advisory Study released August 2004**
  - **> 50% according to a study by Tveryanas et al., 311<sup>th</sup> Human Systems Wing, Brooks AFB**
- **It is especially difficult for operators to direct multiple UAVs simultaneously**

# Background

Wide range of sizes, speeds, capabilities, and autonomy levels



DoD photo no. 050627-N-0295M-021

**MITRE**

© 2006, The MITRE Corporation

# Objectives

- **Develop and evaluate interaction designs that support small teams operating multiple UAVs simultaneously**
- **Implement “awareness mechanisms” to allow distributed team members to better understand each others’ activities**
- **Generalize our understanding of what can improve situation awareness to other domains**

# Activities

- **Partner** with the military, academia, other MITRE research, and direct project efforts
- **Observe** and interview UAV crews
- **Analyze** observation/interview data and critique current UAV designs
- **Prototype** improved designs
- **Validate** designs, including flying our own small UAVs as testbeds for new designs
- **Transfer** knowledge as appropriate

# Highlight

## Observed/analyzed Predator Multiple Aircraft Control



Photo courtesy of 57<sup>th</sup> Operations Group, Creech AFB, Nevada

# Highlight

**Proto-  
typing**  
using a  
3D game  
engine  
as a  
building  
block



# Impacts

- **A smaller number of operators placed in harm's way due to enhanced capability to monitor multiple aircraft simultaneously**
- **Fewer aircraft lost to mishaps**
- **UAV interaction that better supports situation awareness and team coordination, leading to more effective missions**

# Future Plans

**Prototyping** that incorporates team collaboration mechanisms...and then..

**Transferring** our UAV design work to military UAV programs and other situation awareness-related programs (such as mission planning) so their interfaces can benefit



USAF photo by SrA Kenny Kennemer; available at <http://www.af.mil/shared/media/photodb/photos/040623-F-0000C-002.jpg>



USAF photo by MSGT Rob Valenca; available at: <http://www.af.mil/shared/media/photodb/photos/050926-F-0000R-001.jpg>

**MITRE**