**Robust Counter UxS Strategies Against Multi-Domain Super Swarms**

### Why
- Large-scale adversarial swarms are an **imminent threat**
- Future adversarial swarms will employ multiple, switching tactics
- **Defensive strategies must be robust** to uncertainty of sophisticated swarms

### Objectives
- Robustness guarantees against highly uncertain threat
- Quantitative metrics for mission success/failure (risk)
- Estimation/Optimization/Analysis tools
- “**Super Swarm**” scalability, from $O(10)$ to $O(10^6)$ agents!

### How
- Optimize defensive strategies for **robustness against variable swarm tactics**
  - Swarm cooperation mechanisms are a **black box** to defenders
  - Develop robustness guarantees against this uncertainty
- Analyze **thousands of counter-swarm scenarios** to quantitatively assess
  - Defender capabilities matrix, asset allocation, attacker type/priority
- Develop **universal counter UxS strategies** that
  - Don’t require **a priori knowledge** of attacker swarming algorithms
  - Ensure engagement outcomes are **robust vs. unknown swarm tactics**

### What / Deliverables
- Robustness training database
  - **Scalable counter-swarm engagement database**, multiple defensive & offensive tactics, available to NPS, ONR, and DoD researchers
- New metrics for **quantifying mission risk/success** against adversarial swarms
  - e.g., # of perimeter penetrators, # of lost defenders, etc.
- **Asset Allocation Estimates** for counter UxS/swarm defense
- Fundamental research findings shared through:
  - Student theses, class projects, CRUSER reports and presentations
  - Conference and Journal publications
  - xSwarm, Counter-Swarm 2020 Workshop

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**FY20 Call for Proposals**

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