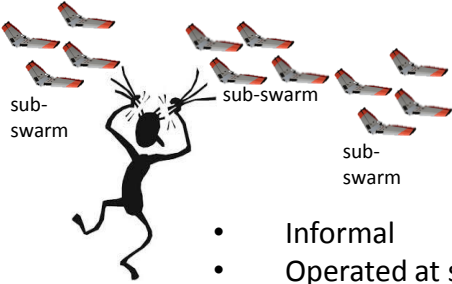


Research Task / Overview

- Swarm systems are being engineered without guidance from swarm doctrine
- Informal relationship between swarm mission engineering and swarm systems engineering is impeding **architecture reusability**
- Swarm system architecture is dominated by bottom-up, behavior-based design



Swarm Commander must make a **cognitively burdensome** number of decisions to manage behaviors of each sub-swarm

- Informal
- Operated at single behavior level
- Different action plans for each mission
- Low flexibility
- Micro-management approach

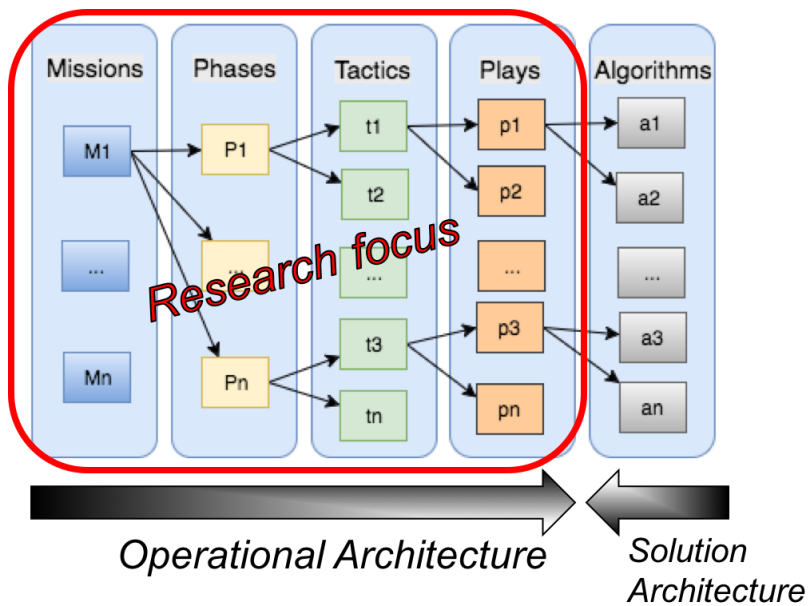
Goals & Objectives

- Formalize relationship between swarm mission engineering and swarm systems engineering to promote architecture reusability
- Transfer typical rule-based decisions from the Swarm Commander to the swarm, freeing the human to make **rules of engagement** related decisions

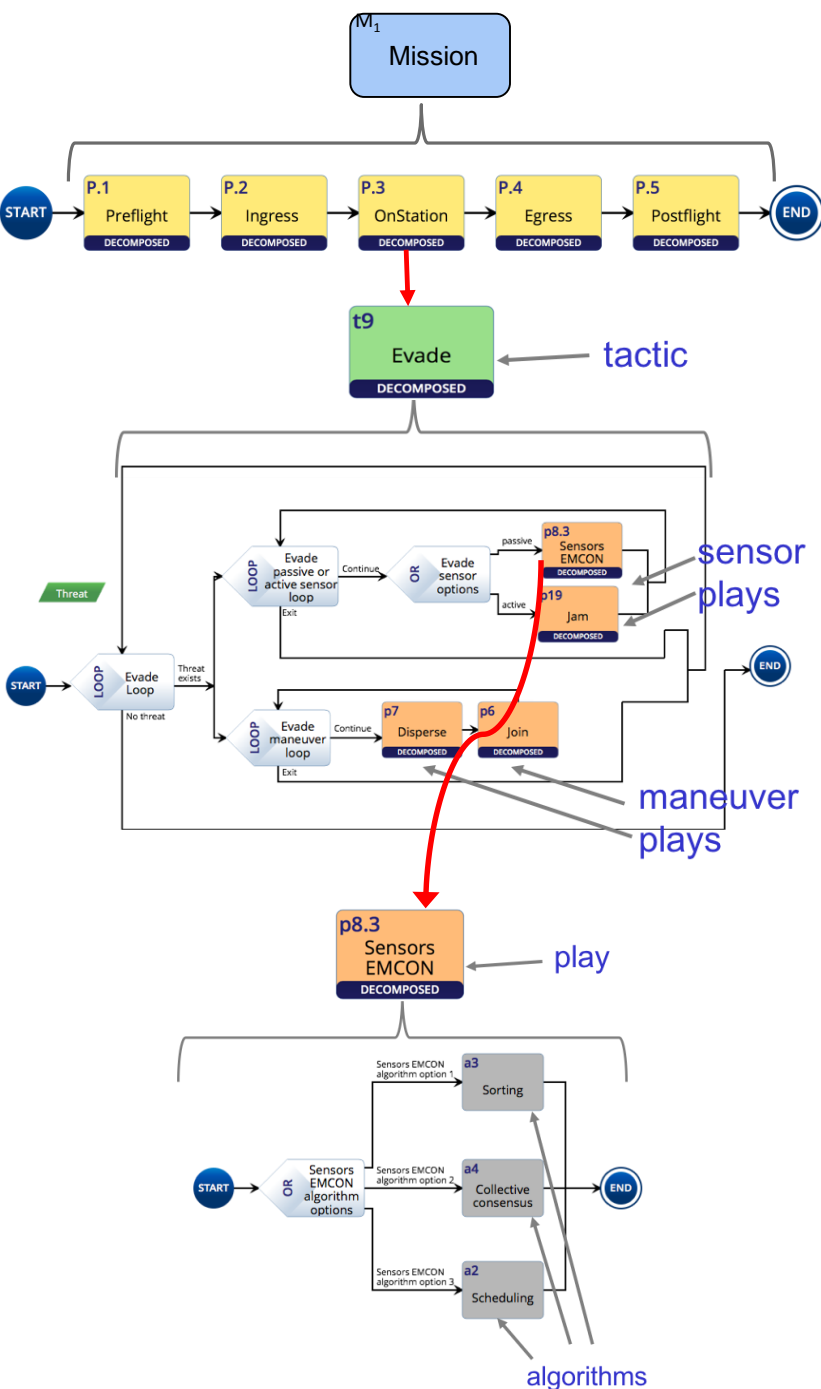
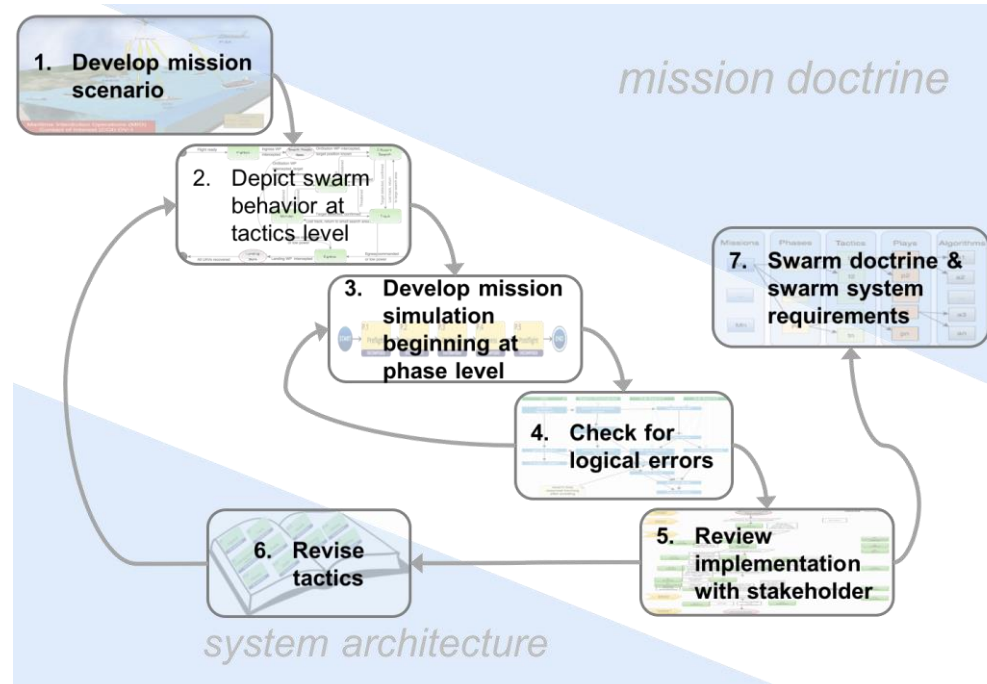


- Formal
- Reusable common patterns
- Modular
- Intuitive
- Platform agnostic
- Experiential heuristics-based

System Architecture



Methodology



Future Research

- Support improved graphical user interface for UAV swarm operations
- Explore additional software tools that allow for easier exhaustive use-case generation directly from finite state machine
- Incorporate system and operational failure modes into simulation
- Develop swarm system measures of performance

Contacts/References

- CDR Katy Giles, USN kbgiles@nps.edu
- Advisor: Dr. Kristin Giammarco, Ph.D. kmgiamma@nps.edu