National Aeronautics and Space Administration

Modeling Mitigations and Hazards in UAS Emergency Response Operations

Ethan Jordan
University of North Dakota

Carlos Paradis
KBR @ NASA Ames Research Center

Misty Davies
NASA Ames Research Center

Charles Werner
DRONERESPONDERS

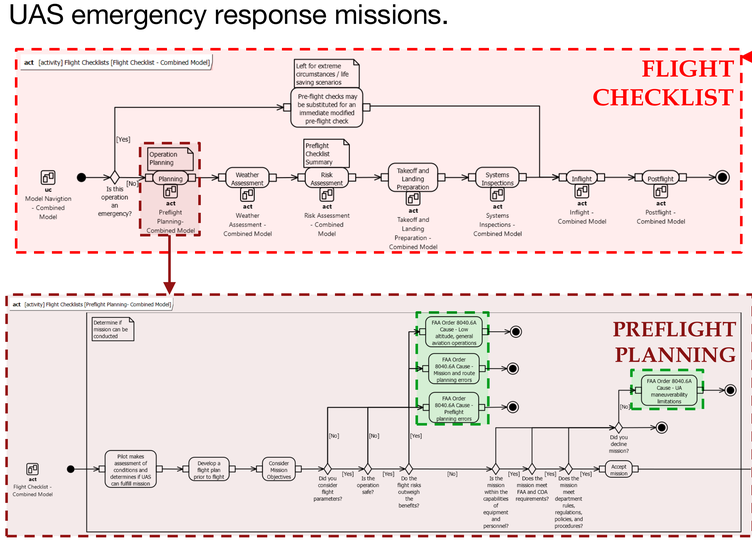
Becky L. Hooey
NASA Ames Research Center

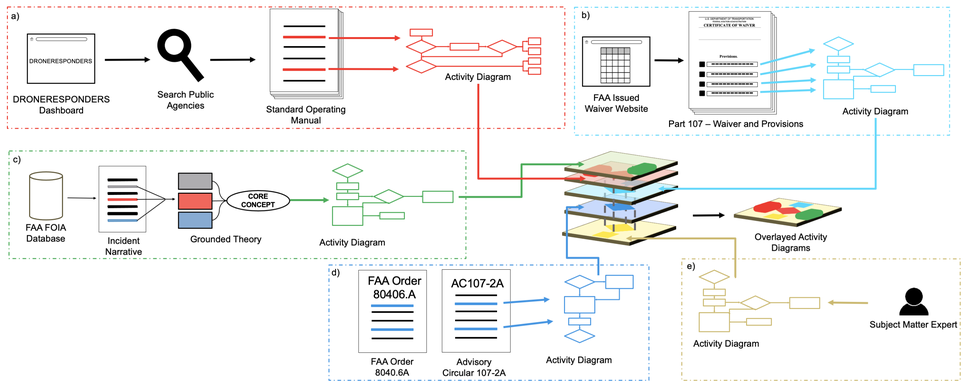
Introduction

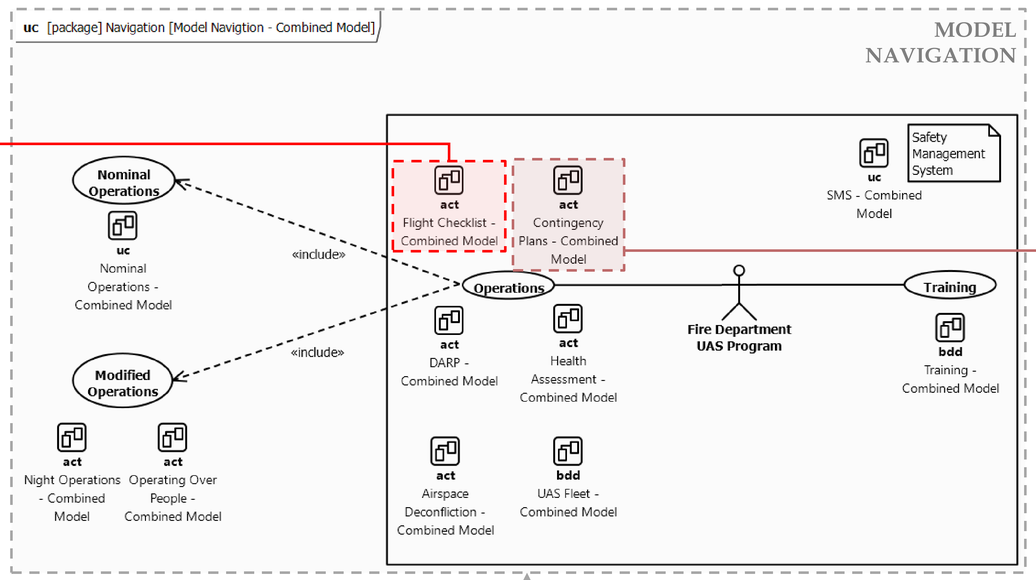
Emerging aviation includes the use of small Unmanned Aerial Systems (sUAS) in novel operations. Yet, operations are not as standardized across agencies, which could benefit from lessons learned in novel scenarios. Standardization would also facilitate novel hazard assessment spread across incident databases.

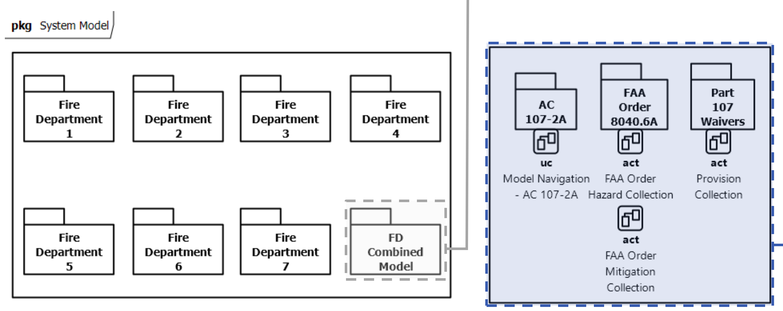
Method

UAS Standard Operating Manuals (SOP), Title 14 CFR Part 107, FAA Orders, Waiver Provisions, Hazards, and Interviews are modeled using Model Based Systems Engineering (MBSE) to display the safety architecture of UAS emergency response missions.









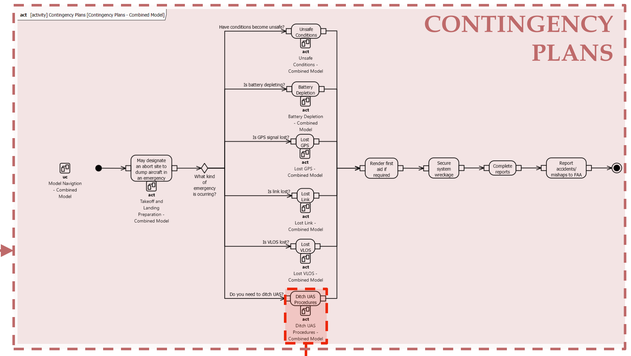
Results: Flight Checklists

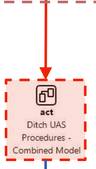
Fire departments use a variety of checklists for planning. We modeled these checklists in different levels of specificity. Flight checklists convey broader steps in the operation while more specific models such as preflight planning are conveyed separately for mitigation-hazard gap analysis.

www.nasa.gov

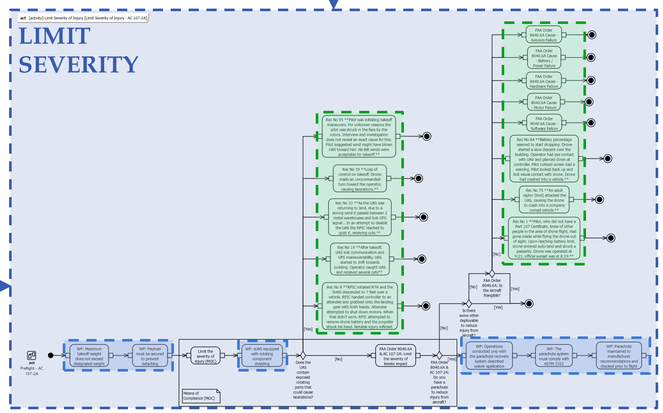
Results: Contingency Plans

Contingency plans are used to mitigate immediate hazards during operations (e.g., battery failure). Specific contingencies are in place for specific scenarios, such as Ditch Procedures. An SOP mitigation-hazard gap is exemplified on the absence of UAS safety procedures limiting the severity of accidents, which is present in AC 107-2A.





DITCH PROCEDURES



Contact: carlos.v.paradis@nasa.gov