Mission Support for Drones:
a Policy Based Approach

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Overview

Drones, automated or autonomous vehicles, have become an essential component in missions which are dull, dirty, or dangerous. Here we examine the use of dynamic policy modification as a means to adjust to rapidly evolving scenarios, and improve the effectiveness of operations without compromising safety or security. [1]
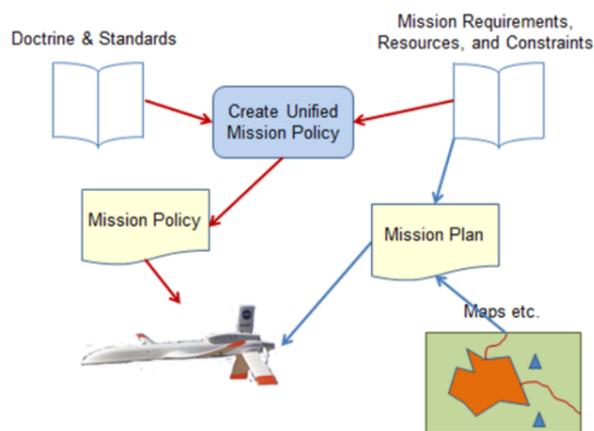

Figure 1: Policies, Plans and Missions

Missions are defined by:
- **Policy** which governs how to react to events and changing circumstances.
- **Plan** which contains objective data for the mission – where, when, how?

Policy Based Management

An Example Scenario

UK and U.S. forces are in a coalition operating in a hostile environment. Both nations deploy drones on surveillance missions from their Forward Operating Bases.
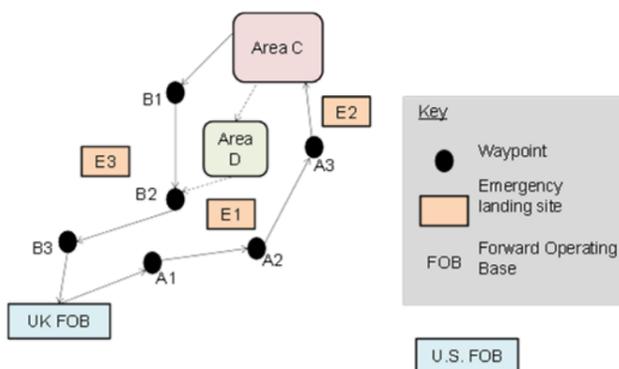

Figure 2: Scenario

A U.S. manned aircraft is lost in Area D and imagery of the crash site is required urgently. A UK drone in Area C is retasked to obtain the imagery but the imagery is too sensitive to be delivered over the air and so the drone must land at a suitable location. How does policy based management accommodate the changing mission with acceptable risks to both the UK and the U.S?

Policy Examples

We show two example policies that fit within the generative architecture introduced in [2].
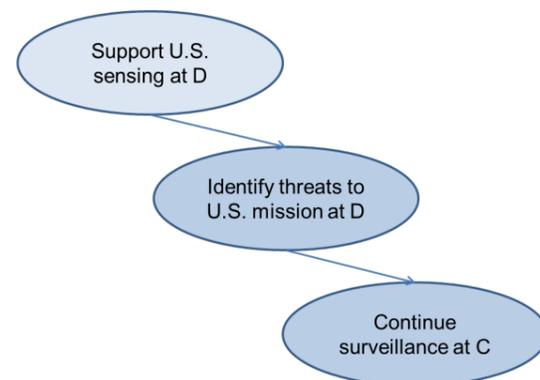

Figure 3: A preference graph showing the order of preference between alternative actions

Event	Request-to-Emergency-Land(E3:landing site)
Condition	Security status of E3 known to be good AND Security status is up to date (<10mins) AND Source of security status is trusted
Action	Land(E3)

Figure 4: A derived generative event-condition-action rule

Conclusion

Dynamic policy based management provides a uniform and automated mechanism to replace many aspects of current remote-piloted mission execution. This reduces manpower and demonstrates the agility of autonomous systems to meet changing intent from the coalition commander.

[1] Based upon Alan Cullen et al, "Mission Support for Drones: a Policy Based Approach", DroNet'17

[2] Elisa Bertino et al, "A Cognitive Policy Framework for Next-Generation Distributed Federated Systems," ICDCS 2017