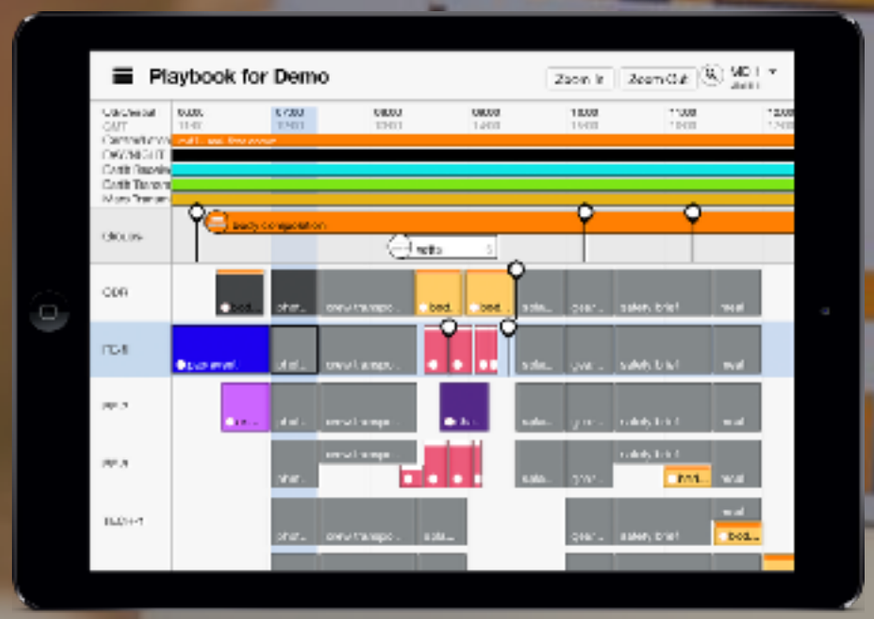
Playbook

Playbook for UAS: UX of Goal-Oriented Planning & Execution

UAS: Unmanned Aircraft System
UTM: UAV Traffic Management
UAV: Unmanned Aerial Vehicle

What is Playbook?
Our mission



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Playbook

Our interest in UAS
Geospatial integration
Future use cases for Playbook

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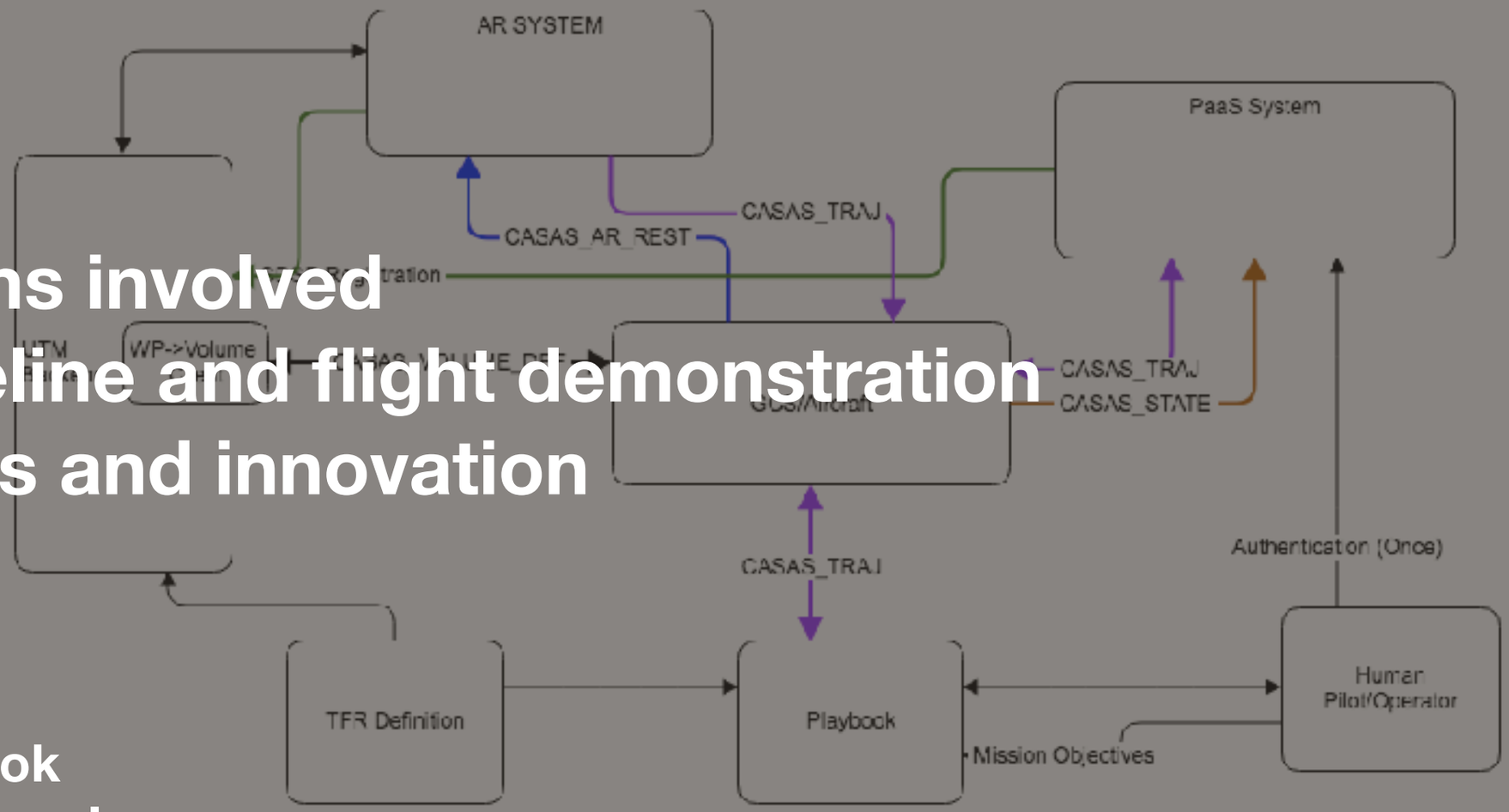
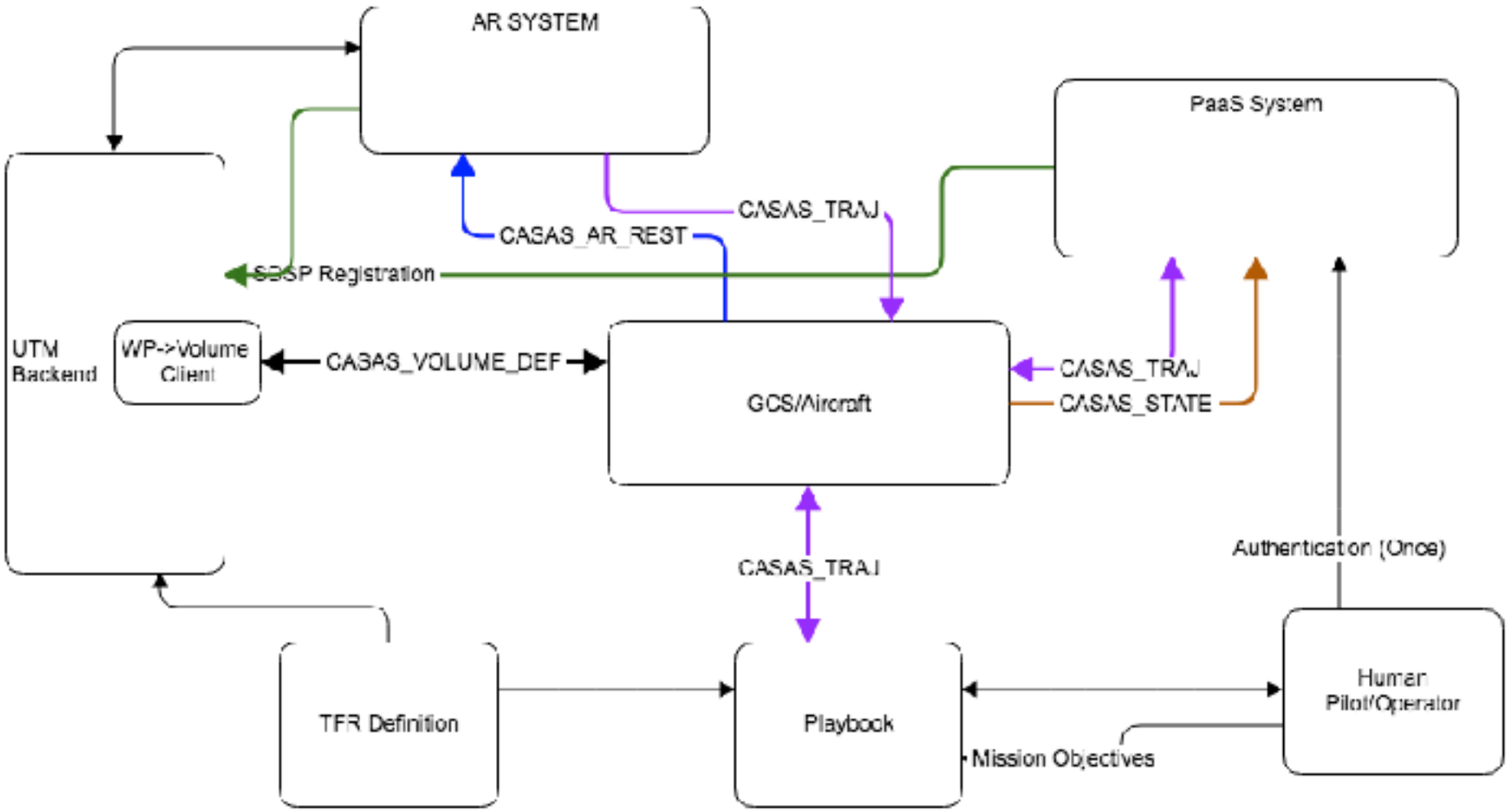
Teams involved
Timeline and flight demonstration
Goals and innovation



GCS
PaaS
Playbook
Auto Resolver
3 Aircraft

Architecture



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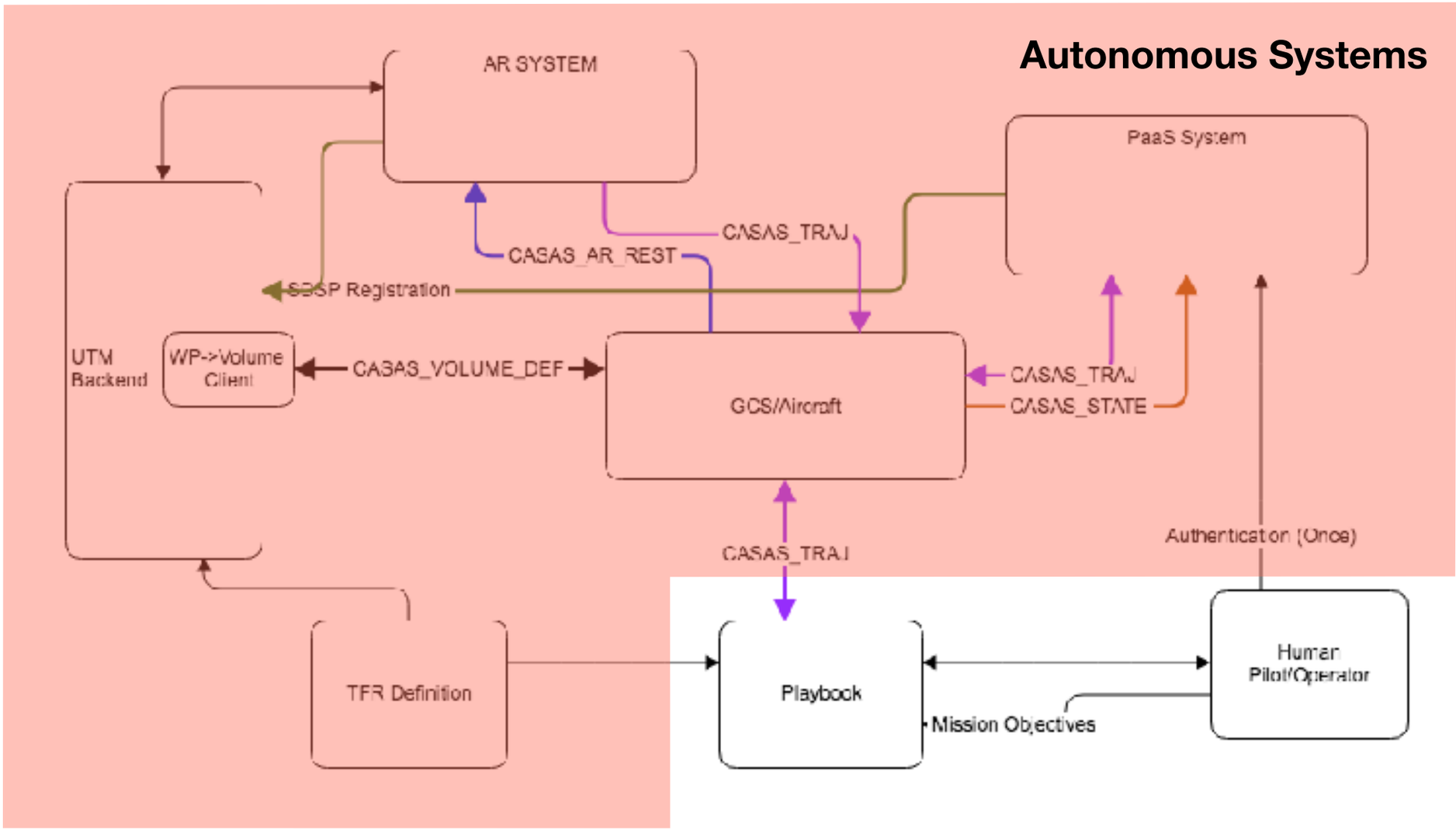

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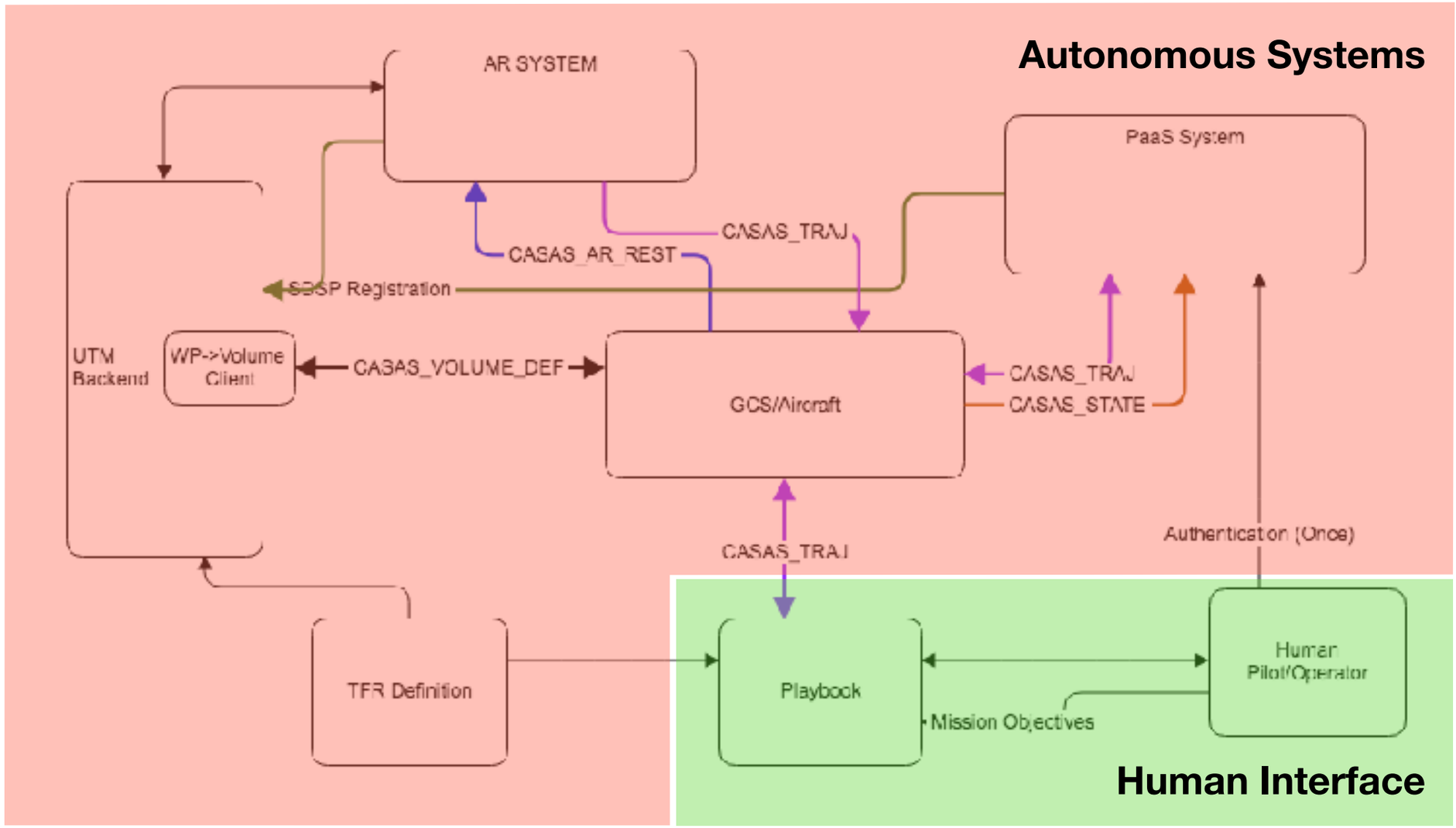

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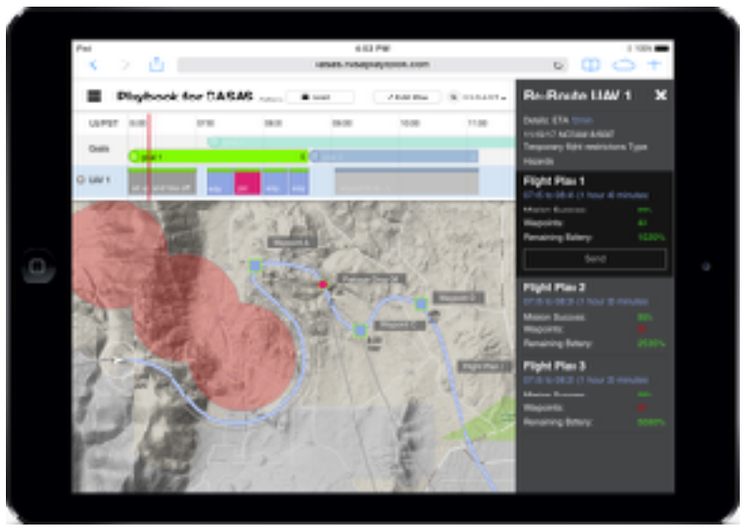
Our interface

Timeline, Geospatial, Stream View



Playbook for UAS: UX of Goal-Oriented Planning & Execution

Playbook for CASAS

Actions: Hold | Edit Plan | 11/14/17

US/PST 06:00 07:00 08:00 09:00 10:00 11:00

Goals: goal 1 (5) | goal 2 | goal 3 (6)

UAV 1: set up and take off | way | pac | way | way | waypoints G - L

Waypoint A
7:15
125'
Package Drop-Off
7:35
2'
Waypoint C
8:00
100'
Waypoint D
8:25
125'
Flight Plan 1
UAV 1
225'

Re-Route UAV 1

Details: ETA 12min
11/20/17 NOTAM 8/6007
Temporary flight restrictions Type: Hazards

Flight Plan 1
07:05 to 08:45 (1 hour 40 minutes)
Mission Success: 90%
Waypoints: 4/4
Remaining Battery: 10-20%

Send

Flight Plan 2
07:05 to 08:35 (1 hour 30 minutes)
Mission Success: 95%
Waypoints: 3/4
Remaining Battery: 25-35%

Flight Plan 3
07:05 to 08:25 (1 hour 20 minutes)
Mission Success: 98%
Waypoints: 2/4
Remaining Battery: 50-60%

iPad 4:53 PM 100%

casas.nasaplaybook.com

Playbook for CASAS

Actions: Hold | Edit Plan | 11/14/17

US/PST 06:00 07:00 08:00 09:00 10:00 11:00

Goals: goal 1 5 | goal 2 | goal 3 6

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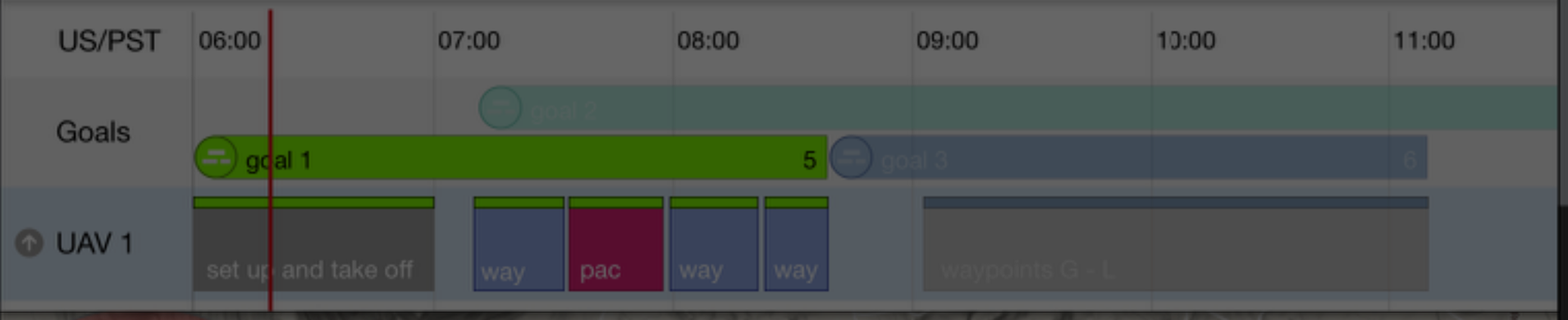

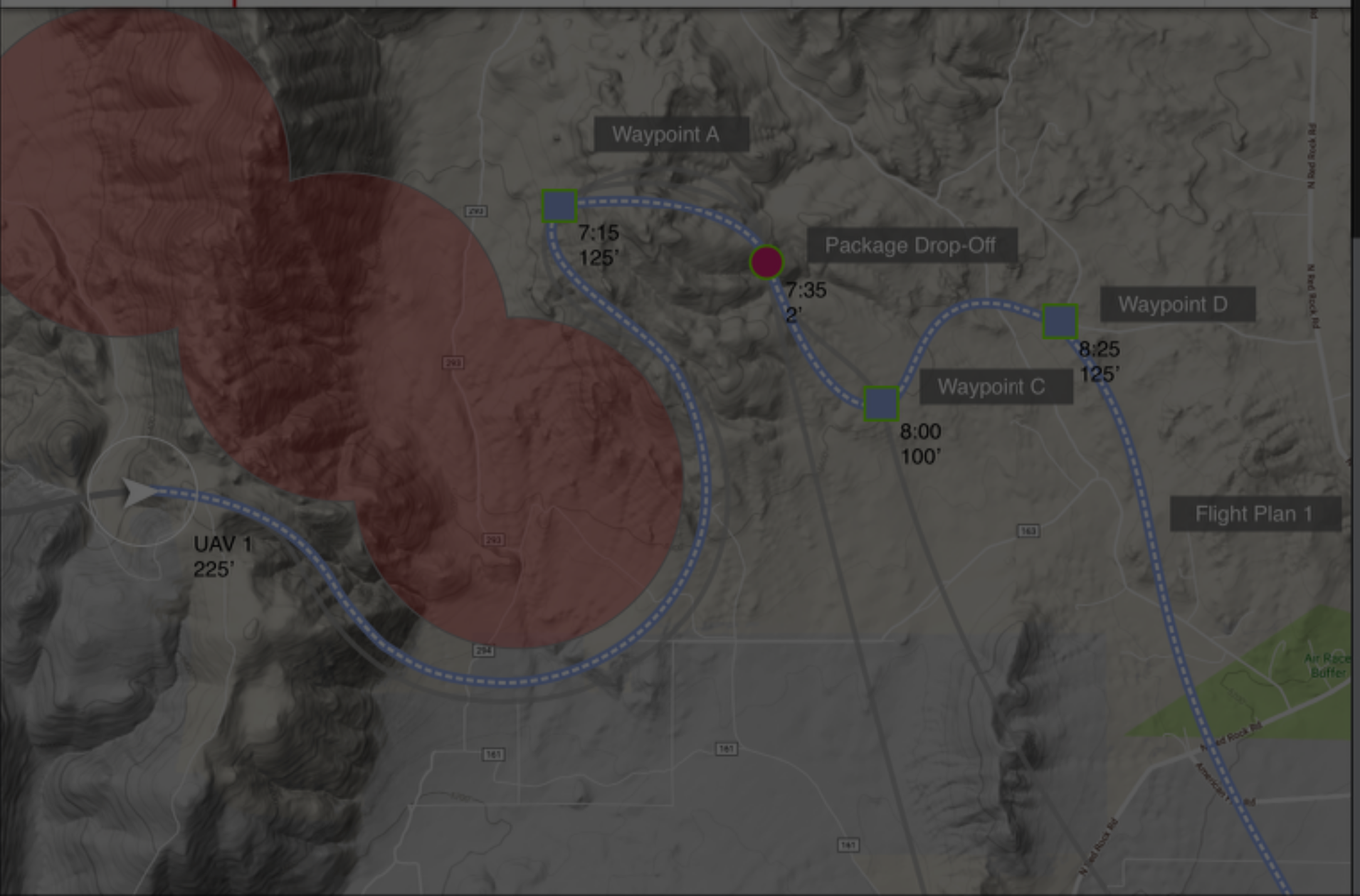

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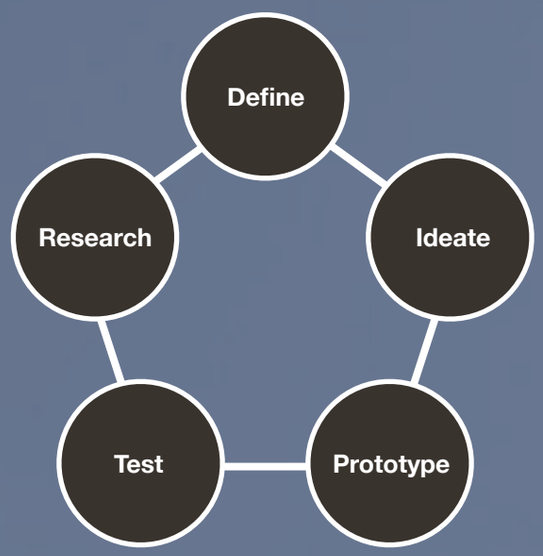
Research

Methodology Participants (DART) Human Centered Design

Ames Disaster Area Response Team
California Urban Search and Rescue Task Force 3



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Human Centered Design
Exploratory testing
Rapid prototyping

Research

Human Centered Design
Exploratory testing
Rapid prototyping

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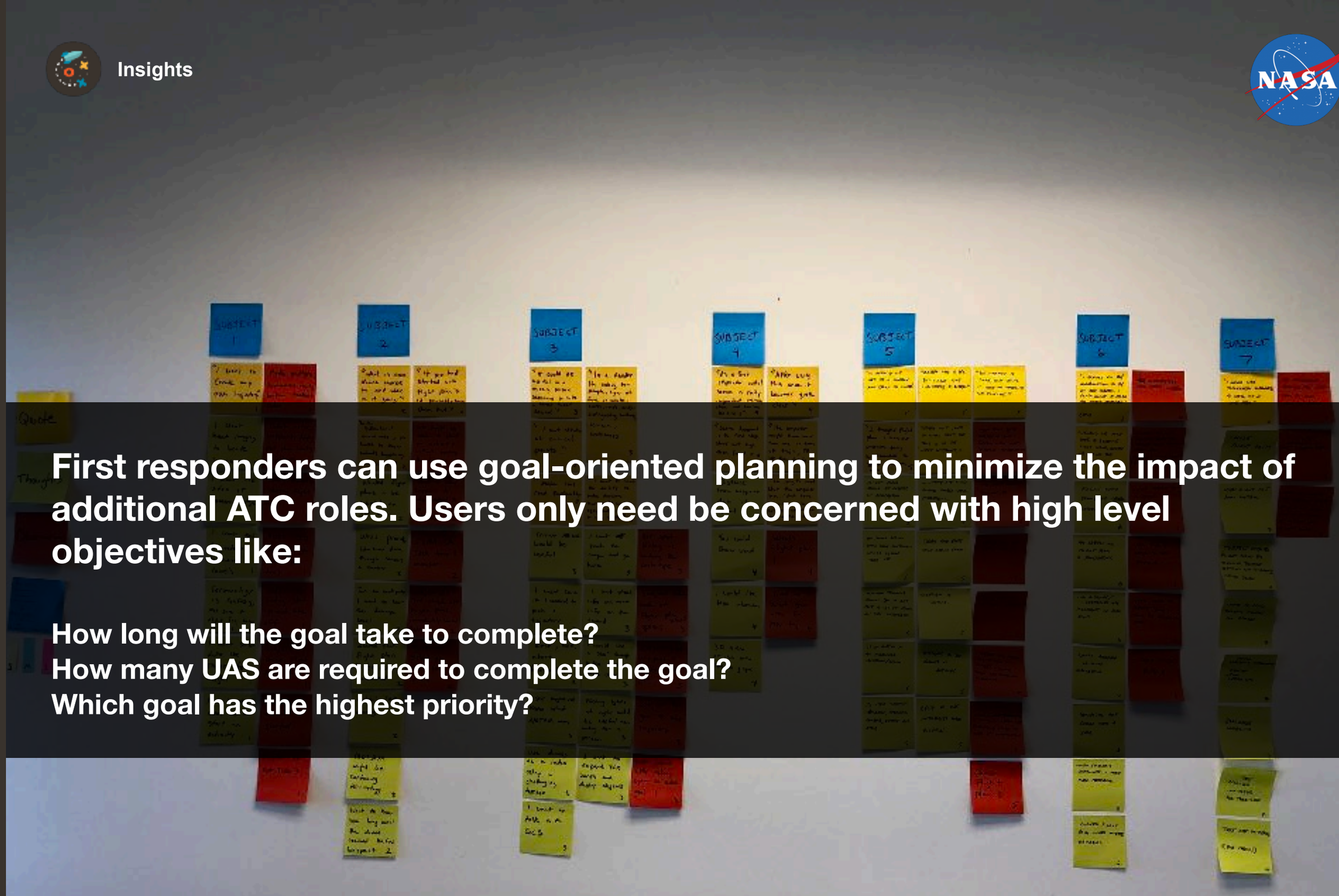
Insights
Recommendations
User feedback



First responders can use goal-oriented planning to minimize the impact of additional ATC roles. Users only need be concerned with high level objectives like:

How long will the goal take to complete?
How many UAS are required to complete the goal?
Which goal has the highest priority?

Insights

Situational awareness is essential when evaluating a disaster area. Users first need an overall scene assessment, then more low level details at key moments within the mission.

“Scene assessment is the first step, start out high, then focus in”

Insights

Guiding many UAVs at once increases the amount of information the user has to hold in their head. Clear labels on zones, trajectories, and flight plan options reduce cognitive loads on the user when guiding multiple UAVs.

“I want notifications at critical points”

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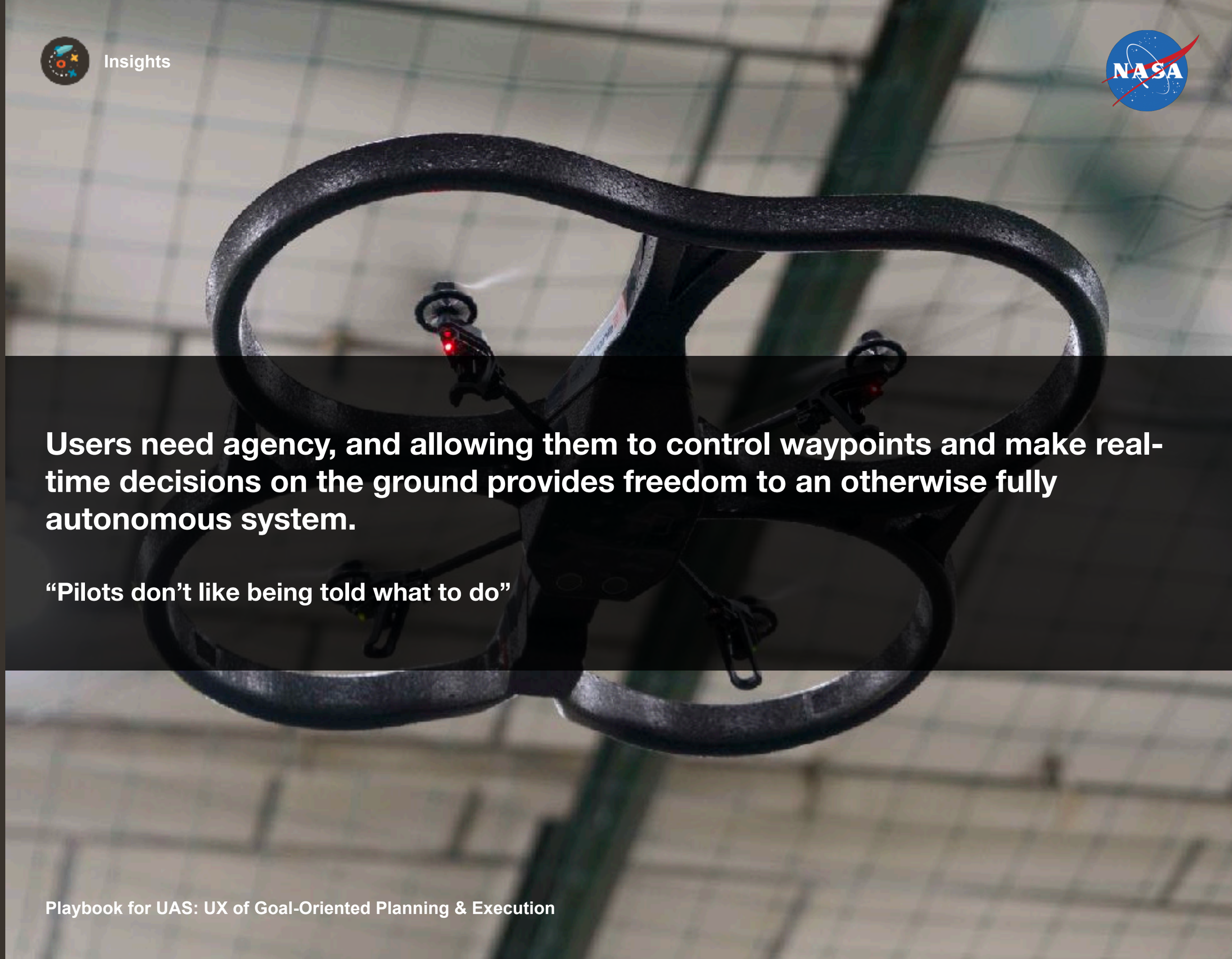
Insights



Users need agency, and allowing them to control waypoints and make real-time decisions on the ground provides freedom to an otherwise fully autonomous system.

“Pilots don’t like being told what to do”

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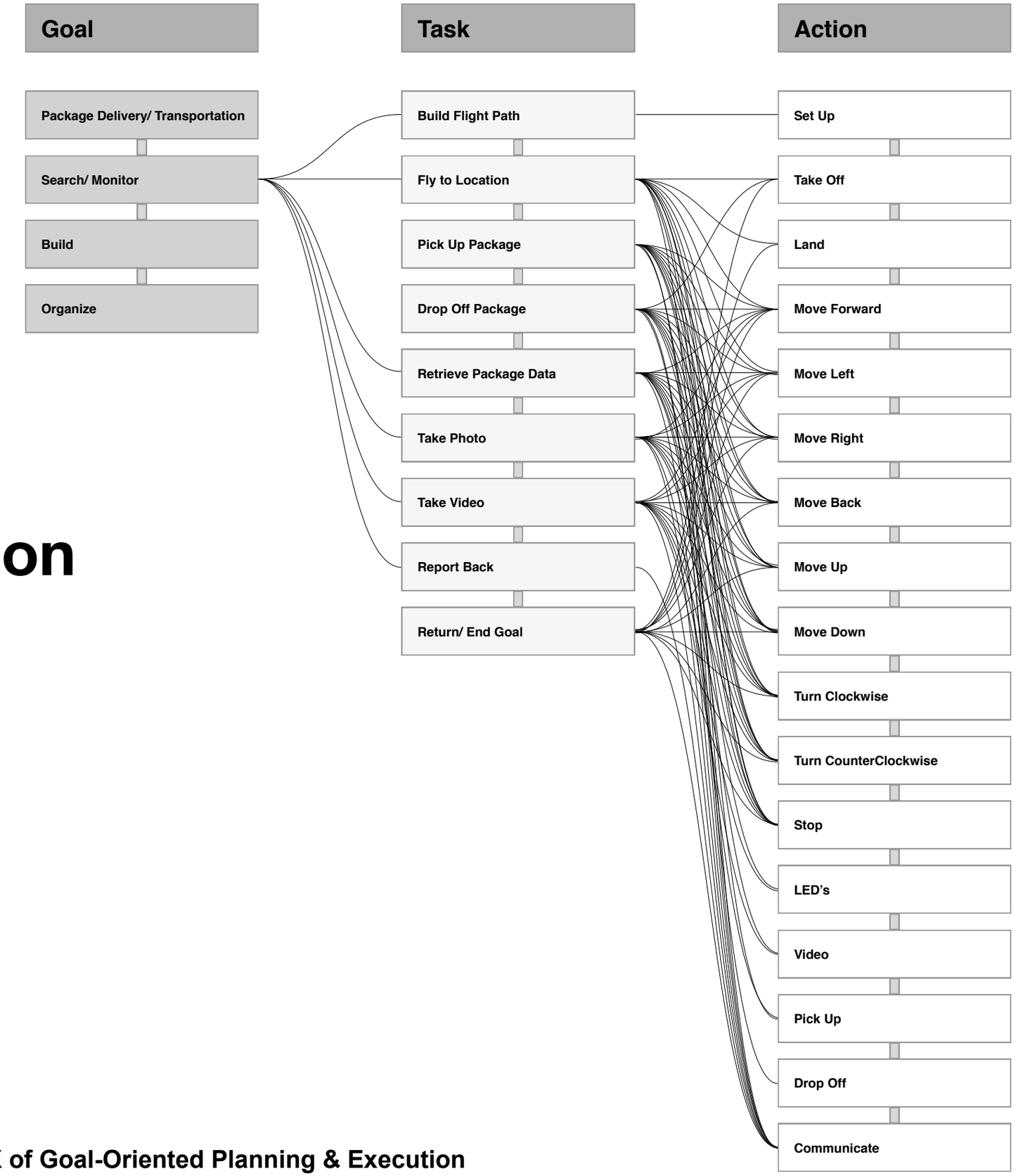
Interface recommendations
Future steps & discussion

Users hesitate before sending instructions to the swarm. Go - NoGo indicators could reduce hesitation when sending alternate trajectories or waypoints to GCS.

“It’s a military thing, double check everything”

First responders in some cases need to create their own trajectories and requested the ability to drag waypoints. This is preferred when negotiating temporary flight restriction (TFR) volumes as the areas can change from moment to moment.


Goal
Task
Action
Package Delivery/ Transportation
Search/ Monitor
Build
Organize
Build Flight Path
Fly to Location
Pick Up Package
Drop Off Package
Retrieve Package Data
Take Photo
Take Video
Report Back
Return/ End Goal
Set Up
Take Off
Land
Move Forward
Move Left
Move Right
Move Back
Move Up
Move Down
Turn Clockwise
Turn CounterClockwise
Stop
LED's
Video
Pick Up
Drop Off
Communicate

Conclusion

Thank you