

Remotely Piloted Aircraft Virtual Reality Mission Planner

CAPSTONE PEER REVIEW

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OUTLINE

1. INTRODUCTION

2. BACKGROUND

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5. TIMELINE

6. PROPOSED RESULTS



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INTRODUCTION

ABOUT ME

- 15 years of USAF service
- BS Aeronautics – Embry-Riddle Aeronautical University
- RPA Sensor Operator Instructor
- Air University (CCAF) accredited Formal Training Unit Instructor
- Defense aerospace Technical Writer and Design Engineer





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BACKGROUND



REMOTELY PILOTED AIRCRAFT

Propeller or turbine powered, fixed wing or rotary, small to large airframes. Capable of carrying a variety of sensor payloads, weapons, or other instruments.

SENSOR OPERATOR ●

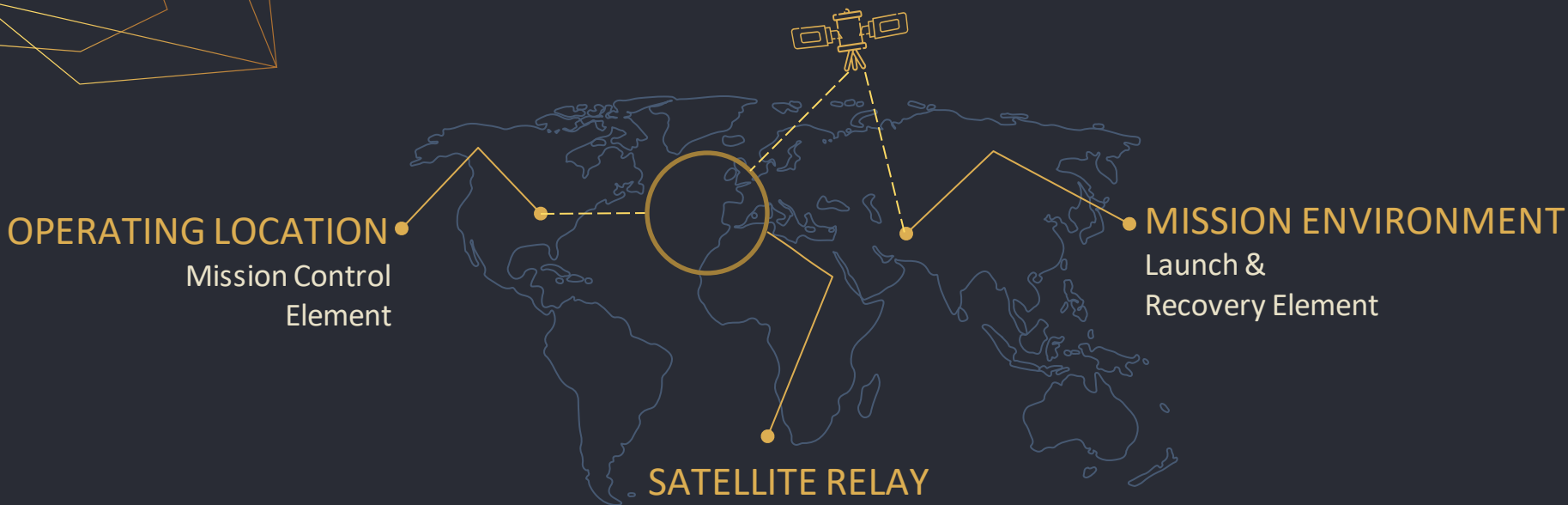
GROUND CONTROL STATION

The Pilot/Sensor Operator workstation. Enables the RPA crew to remotely operate the aircraft and organize and synthesize a variety of situational awareness tools.



PILOT ●

REMOTE SPLIT OPERATIONS

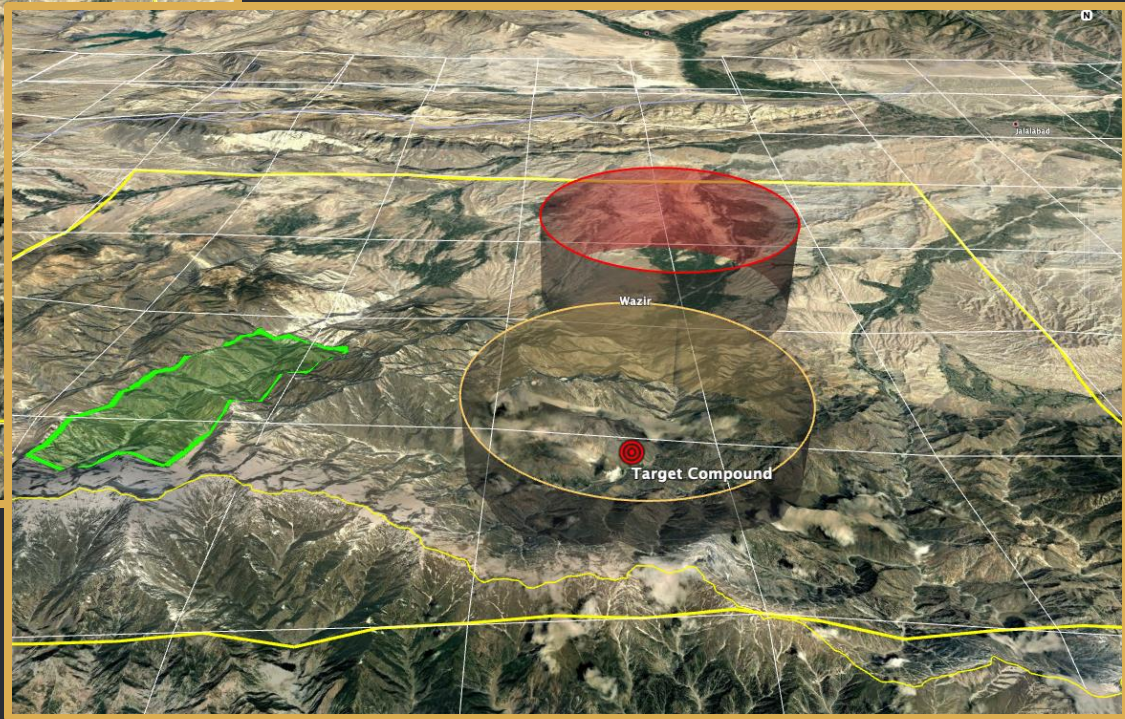
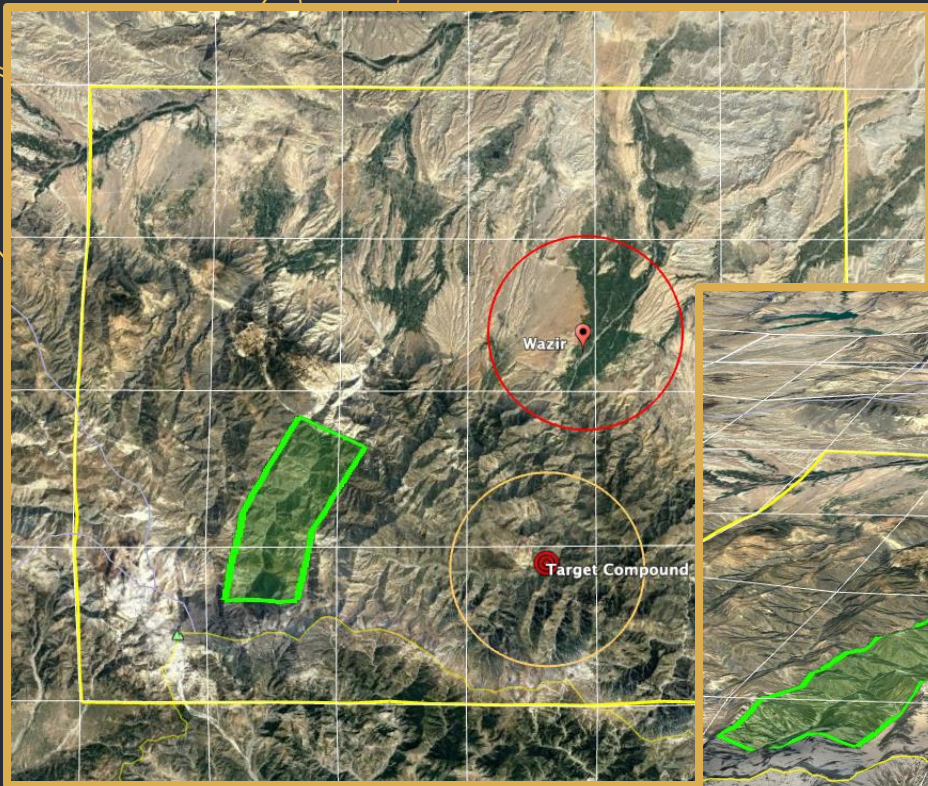


PURPOSE



Narrow the human/machine divide inherent in RPA flying operations

- Improve the RPA mission planning process
- Increase the level of spatial and situational awareness of the mission environment



TERRAIN MASKING

When an opaque environmental
object obscures the clear line of sight
from the viewer

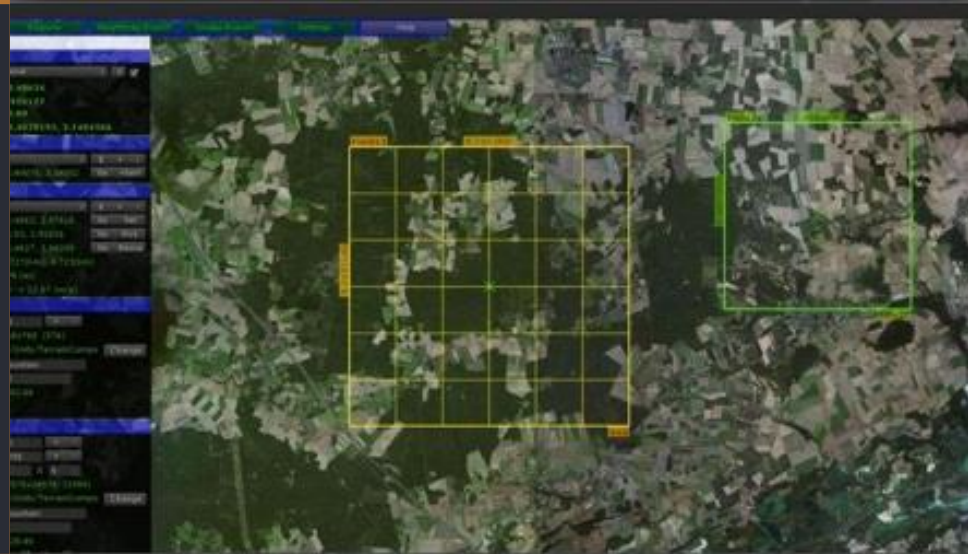




VIRTUAL REALITY MISSION PLANNER

TERRAIN GENERATION

Creates terrain imagery and height maps
from global selectable imagery



VR DEVELOPMENT

Made with



- VR modeling in Unity
- Oculus Rift VR hardware





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METHODOLOGY

SEQUENCE OF EVENTS

RPA CREW SELECTION

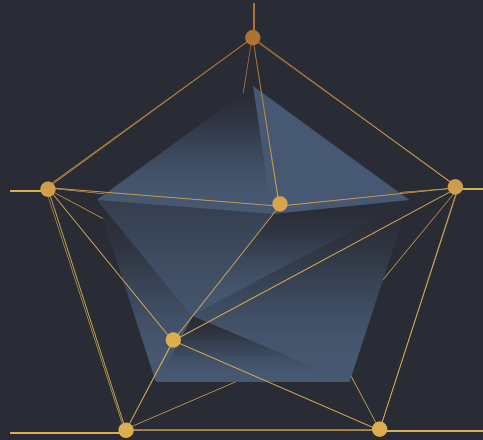
C1 & C2: Respective Pilot and Sensor Operator RPA crew of similar experience

EVALUATION

Crews performance is evaluated against standards. Crews given survey.

MISSION EXECUTION

Crews execute their briefed plan



MISSION PLANNING

C1: 2D mission planning products
C2: 2D & 3D planning products

PLAN ILLUSTRATION

Crews illustrate and brief their plan



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GOALS &
OBJECTIVES

PERFORMANCE OBJECTIVES



FLIGHT PLANNING

Improved understanding of the mission and environmental factors affecting mission success



SITUATIONAL AWARENESS

Increased awareness of all mission elements in play and reaction to unexpected changes



SPATIAL AWARENESS

An increased awareness and tactical consideration of terrain and aircraft positional issues



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TIMELINE

PROJECT STAGES



STAGE 1

Finalize unity VR Mission Planner.



STAGE 2

Develop ISR mission simulation. Refine performance criteria. Develop tactical objectives.



STAGE 3

Select RPA crews for simulation. Test simulation.



STAGE 4

Crews execute mission simulation. Evaluate crew performance.



STAGE 5

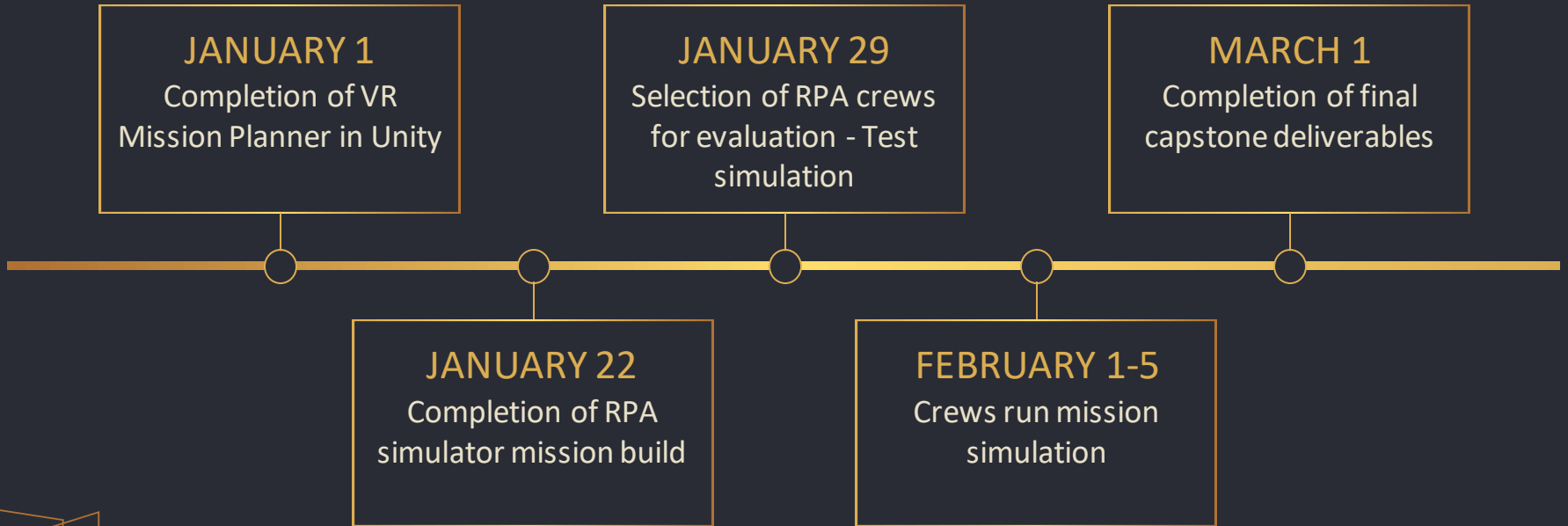
Finalize capstone deliverables.



STAGE 6

Present capstone at conference.

TIMELINE





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PROPOSED
RESULTS



VR MISSION PLANNER

PROTOTYPE



+SPATIAL AWARENESS

Through 3D visualization

+SPATIAL

AWARENESS

For crew members with low spatial ability by decreasing cognitive load

+FLIGHT

PLANNING

Avoiding terrain masking and lost targets

“Conformation of the ground is of the greatest assistance in battle.”

—SUN TZU, The Art of War



THANKS

DO YOU HAVE ANY QUESTION?

email spm47@psu.edu

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