DS-2: Drone Detection

Meet The Team

Xinyi Liu

BS in Software Engineering

4th Year

Dean Maxwell

BS in Computing Security

3rd Year

Qing Zheng

BS in Computing Security

3rd Year

Cameron Scagliarini

BS in Computing Security

2nd Year

Benjamin Carini

BS in Computing Security

3rd Year

The Problem

Our Problem Statement and Beneficiary Discovery

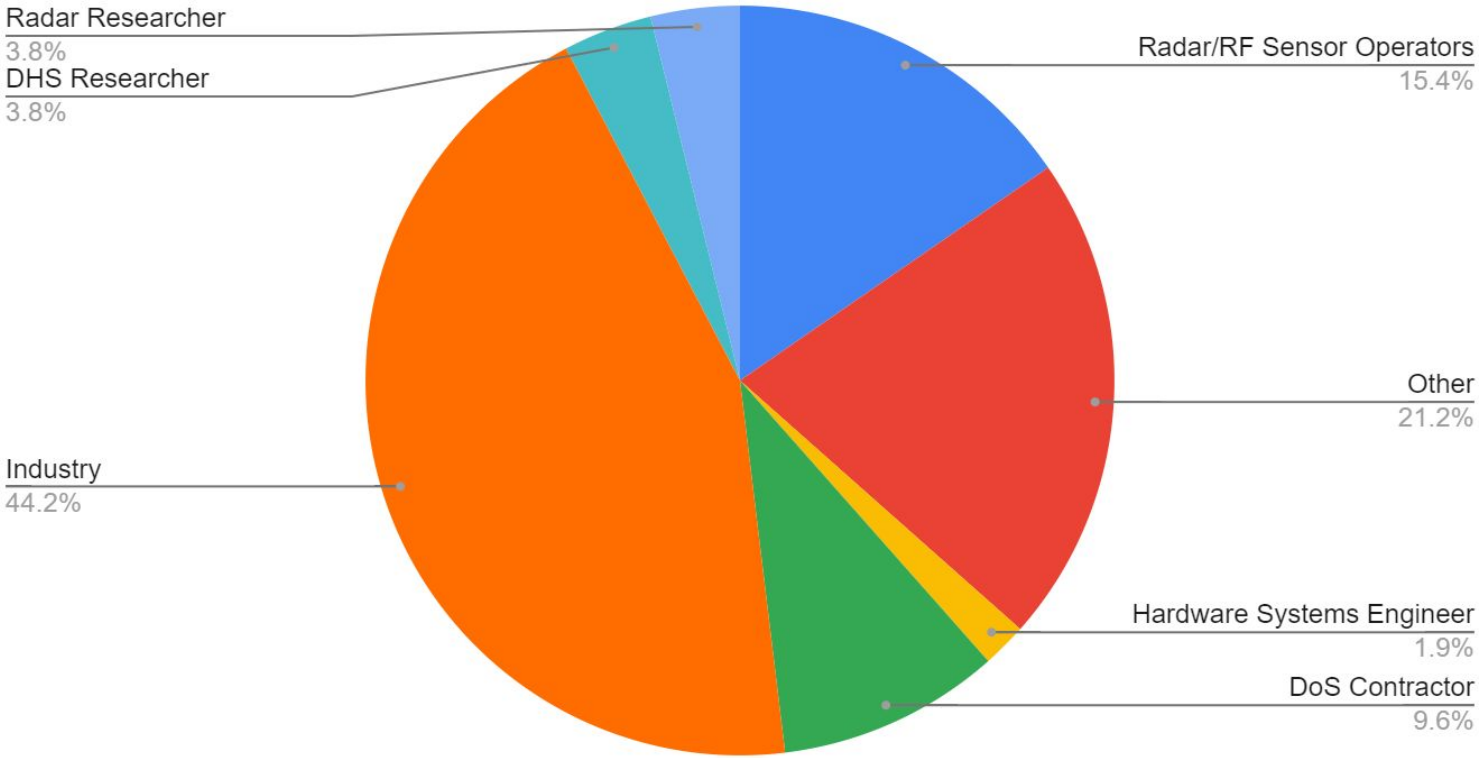
Original Problem Statement

Security engineering officers in U.S. Embassy Baghdad need a better way to detect and locate non-US autonomous drones within 1/2 kilometer of the US Embassy Baghdad in order to prevent adversaries from surveilling and harming the people inside the embassy.

Discovery

- Over 90 touch points
- Over 50 unique touch points
- On-site visit to DoS & Summit Point Training Facility
- Weekly updates with sponsor

Interview Breakdown



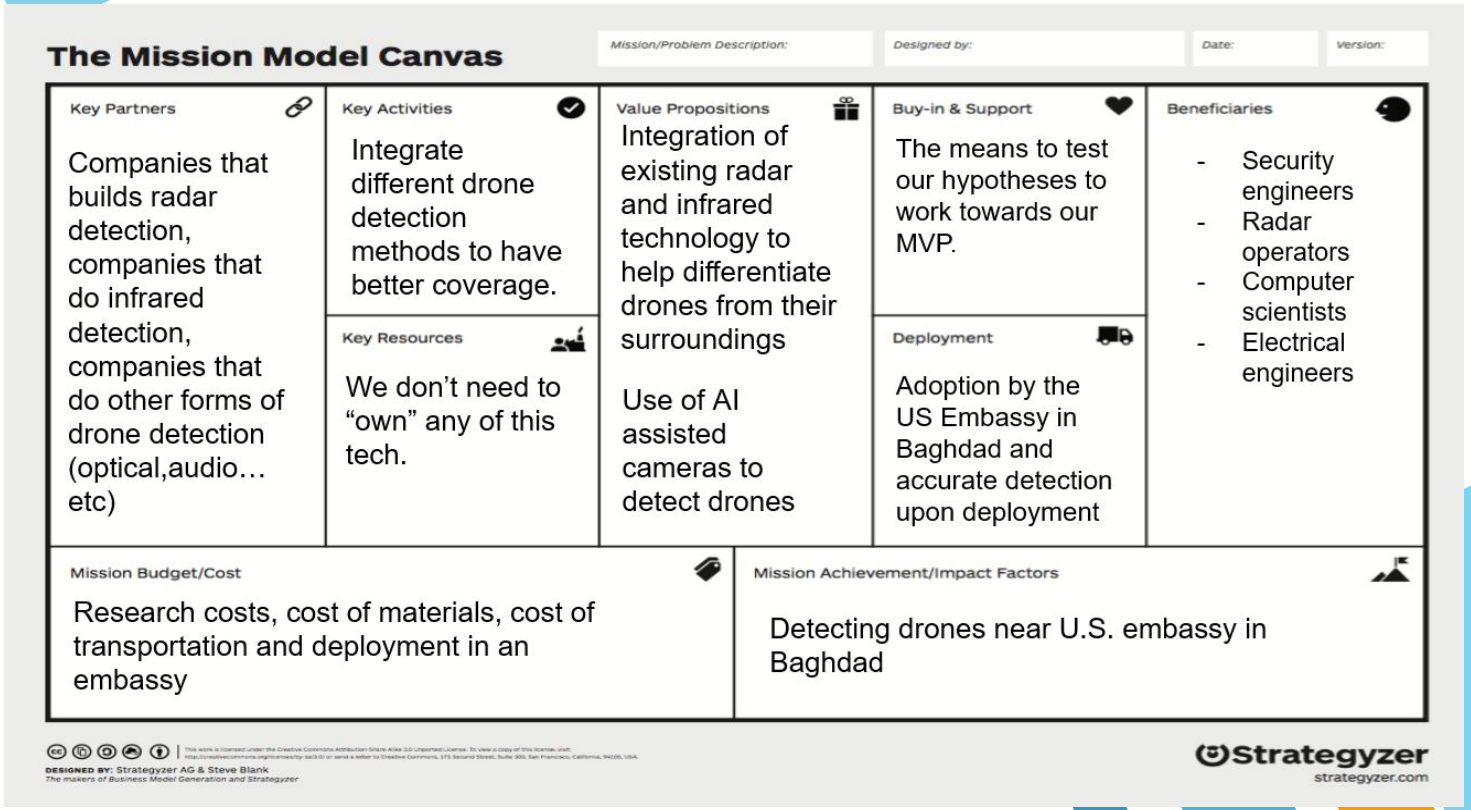
Our Process

Iterations of our work

Week 1-8

19 total interviews

MMC First Iteration



The Mission Model Canvas

Mission/Problem Description:

Designed by:

Date:

Version:

Key Partners

Companies that builds radar detection, companies that do infrared detection, companies that do other forms of drone detection (optical,audio… etc)

Key Activities

Integrate different drone detection methods to have better coverage.

Key Resources

We don't need to "own" any of this tech.

Value Propositions

Integration of existing radar and infrared technology to help differentiate drones from their surroundings

Use of AI assisted cameras to detect drones

Buy-in & Support

The means to test our hypotheses to work towards our MVP.

Deployment

Adoption by the US Embassy in Baghdad and accurate detection upon deployment

Beneficiaries

- Security engineers
- Radar operators
- Computer scientists
- Electrical engineers

Mission Budget/Cost

Research costs, cost of materials, cost of transportation and deployment in an embassy

Mission Achievement/Impact Factors

Detecting drones near U.S. embassy in Baghdad

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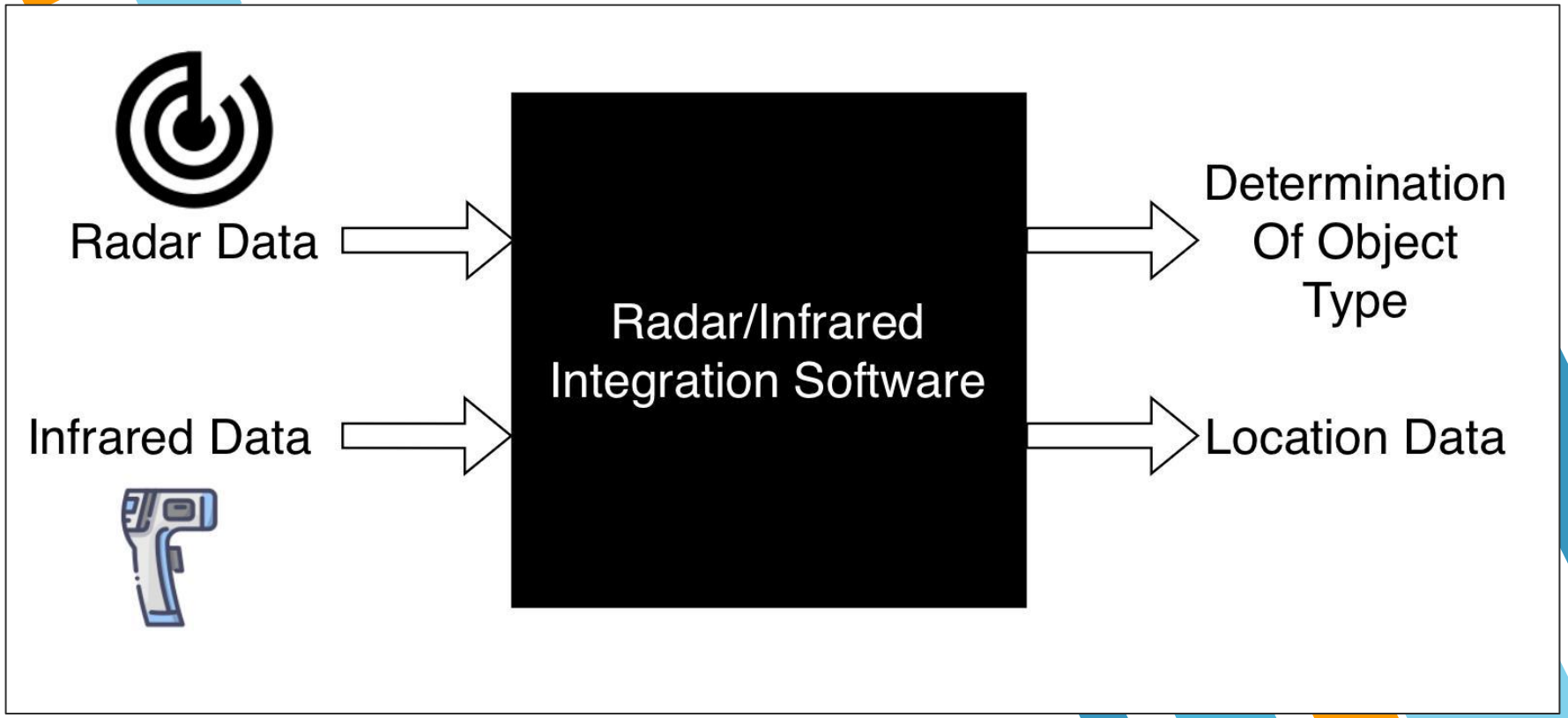
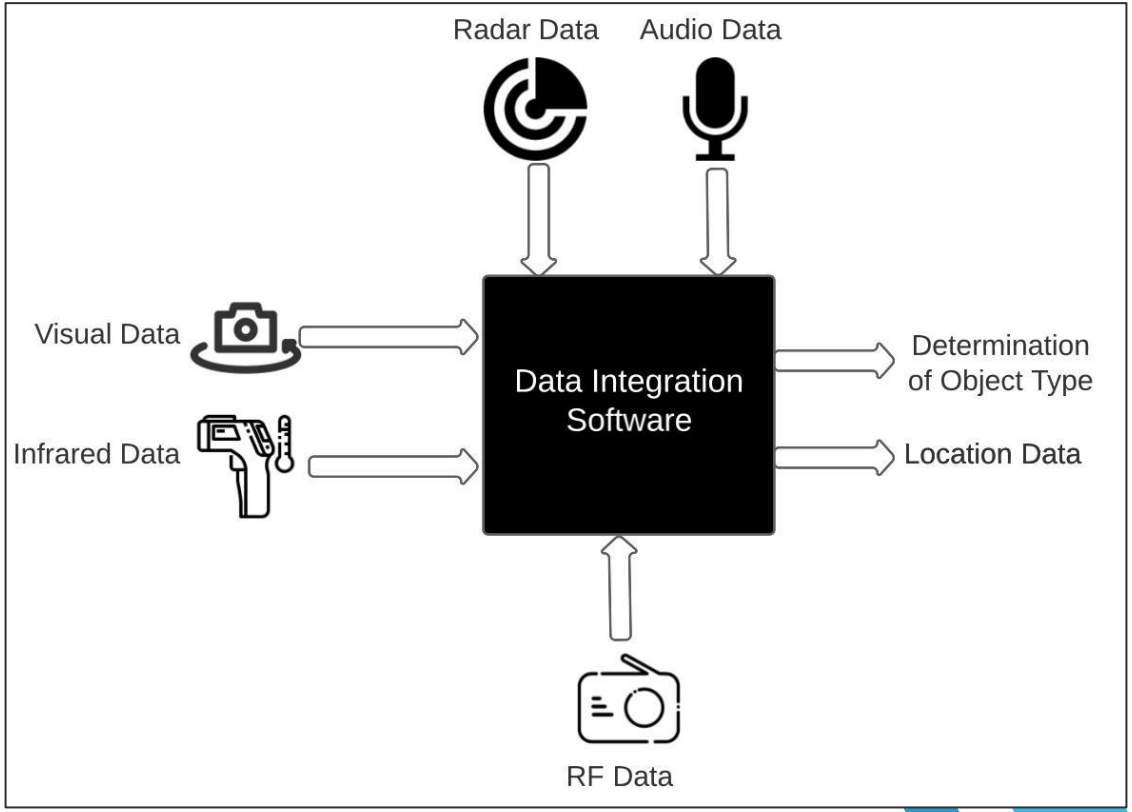
MVP First Iteration



MVP Second Iteration

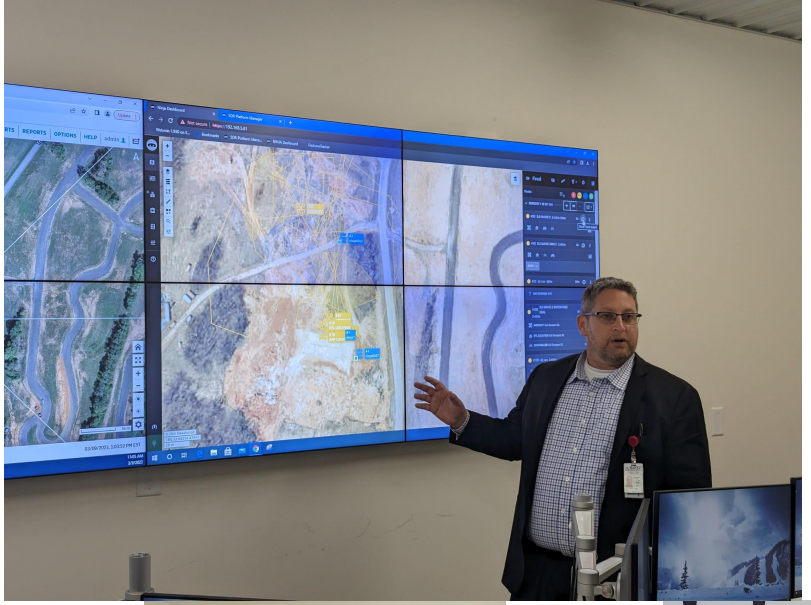


Week 9

60 total interviews

Our Trip to Washington D.C.

Xator Visit and Tour



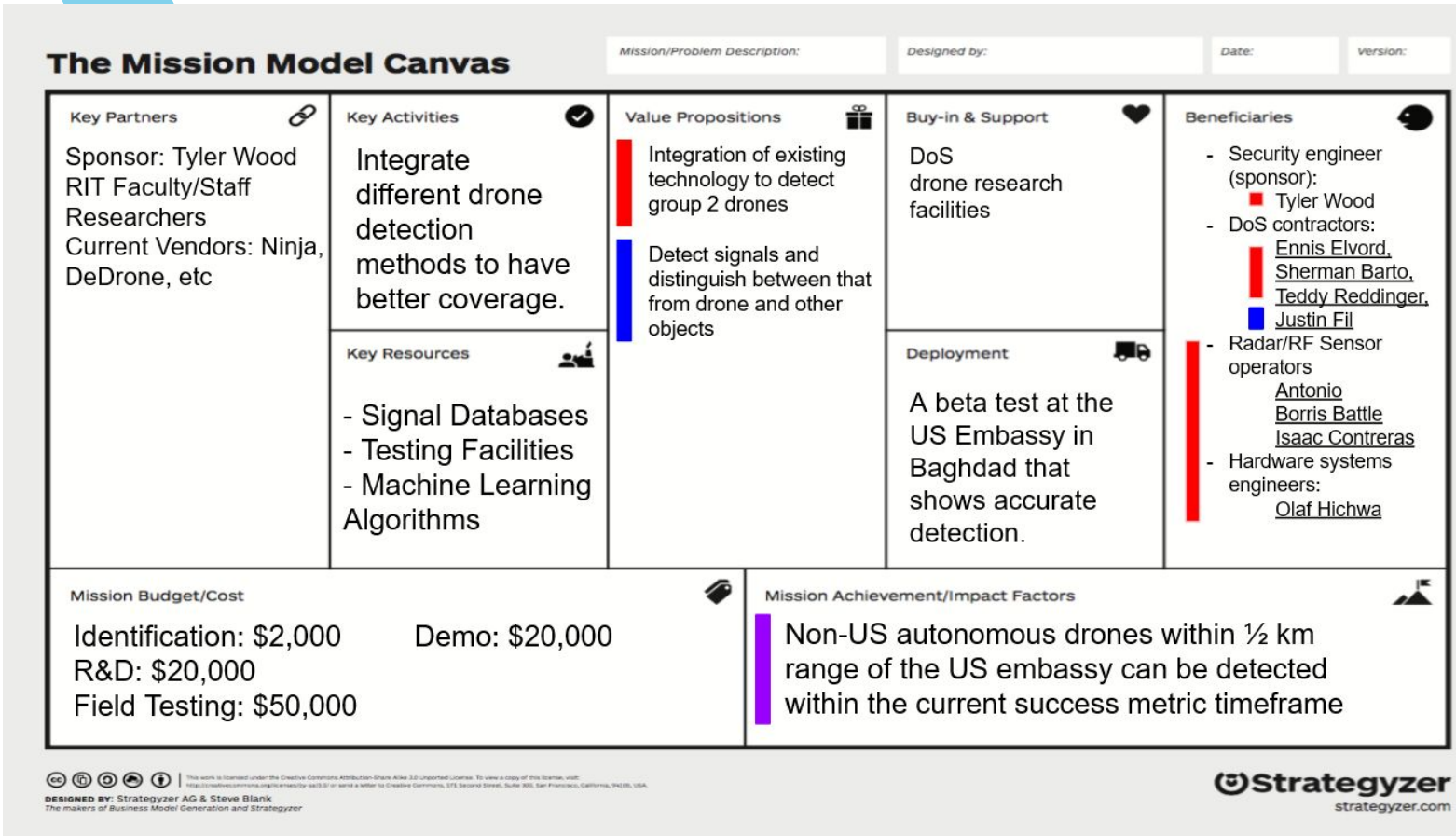
Week 10-12

78 total interviews

Our Post D.C Process

A large Pivot

MMC Second Iteration



The Mission Model Canvas

Mission/Problem Description:

Designed by:

Date:

Version:

Key Partners

Sponsor: Tyler Wood
RIT Faculty/Staff Researchers
Current Vendors: Ninja, DeDrone, etc

Key Activities

Integrate different drone detection methods to have better coverage.

Key Resources

- Signal Databases
- Testing Facilities
- Machine Learning Algorithms

Value Propositions

- Integration of existing technology to detect group 2 drones
- Detect signals and distinguish between that from drone and other objects

Buy-in & Support

DoS
drone research facilities

Deployment

A beta test at the US Embassy in Baghdad that shows accurate detection.

Beneficiaries

- Security engineer (sponsor):
  - Tyler Wood
- DoS contractors:
  - Ennis Elvord,
  - Sherman Barto,
  - Teddy Reddinger,
  - Justin Fil
- Radar/RF Sensor operators
  - Antonio Borris Battle
  - Isaac Contreras
- Hardware systems engineers:
  - Olaf Hichwa

Mission Budget/Cost

Identification: $2,000
R&D: $20,000
Field Testing: $50,000
Demo: $20,000

Mission Achievement/Impact Factors

Non-US autonomous drones within ½ km range of the US embassy can be detected within the current success metric timeframe

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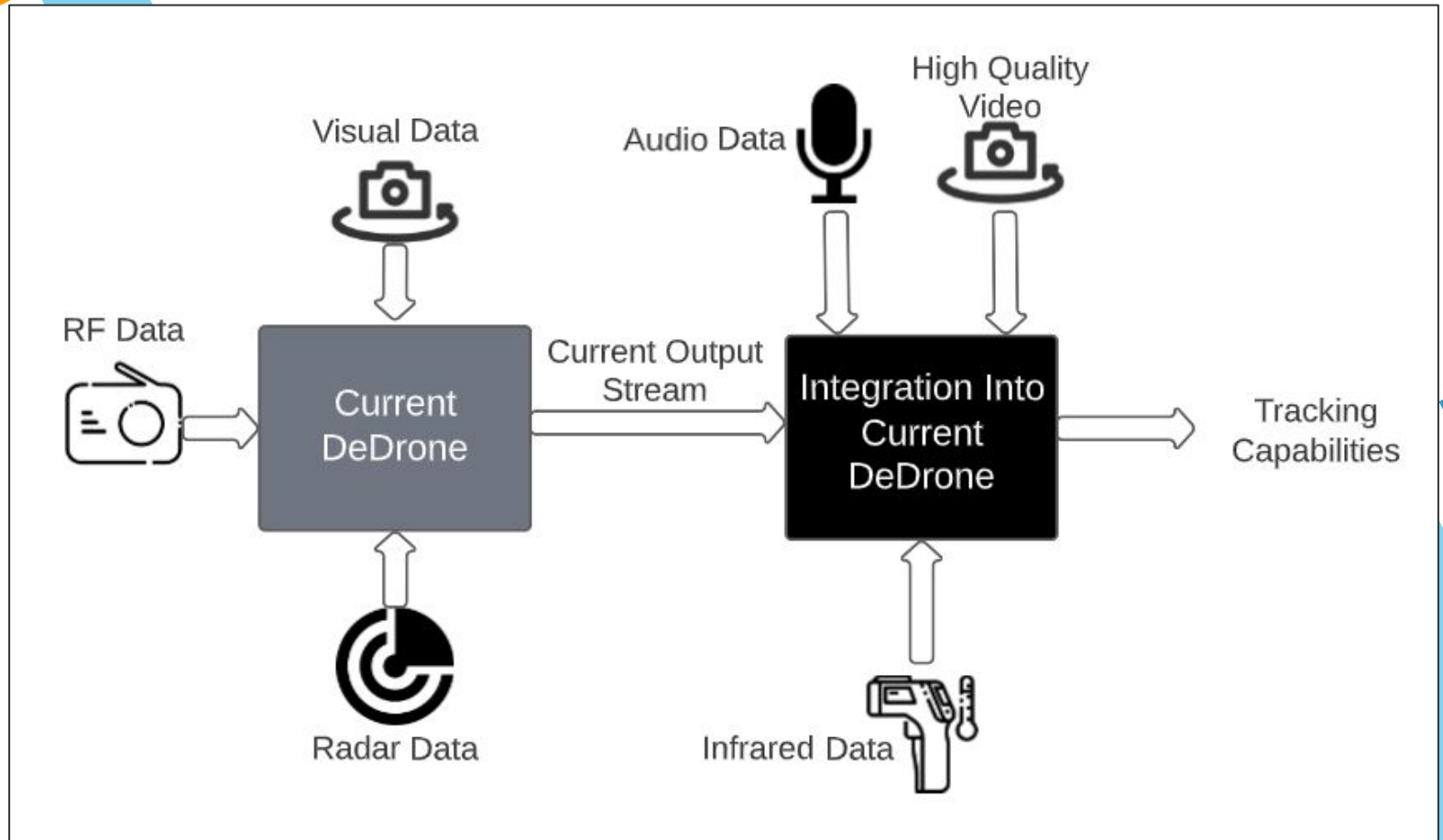
Problem Statement Pivot

Security engineering officers in U.S. Embassy Baghdad need a better way to detect and locate non-US autonomous **group 1-3 UAS** with **different types of signals** within 1/2 kilometer of **high risk US Embassies** in order to prevent adversaries from surveilling and harming the people inside the embassy.

	Group 1	Group 2	Group 3
Weight (lbs)	0 - 20	21 - 50	51 - 1320
Max Speed (kts)	100	250	250
Example			

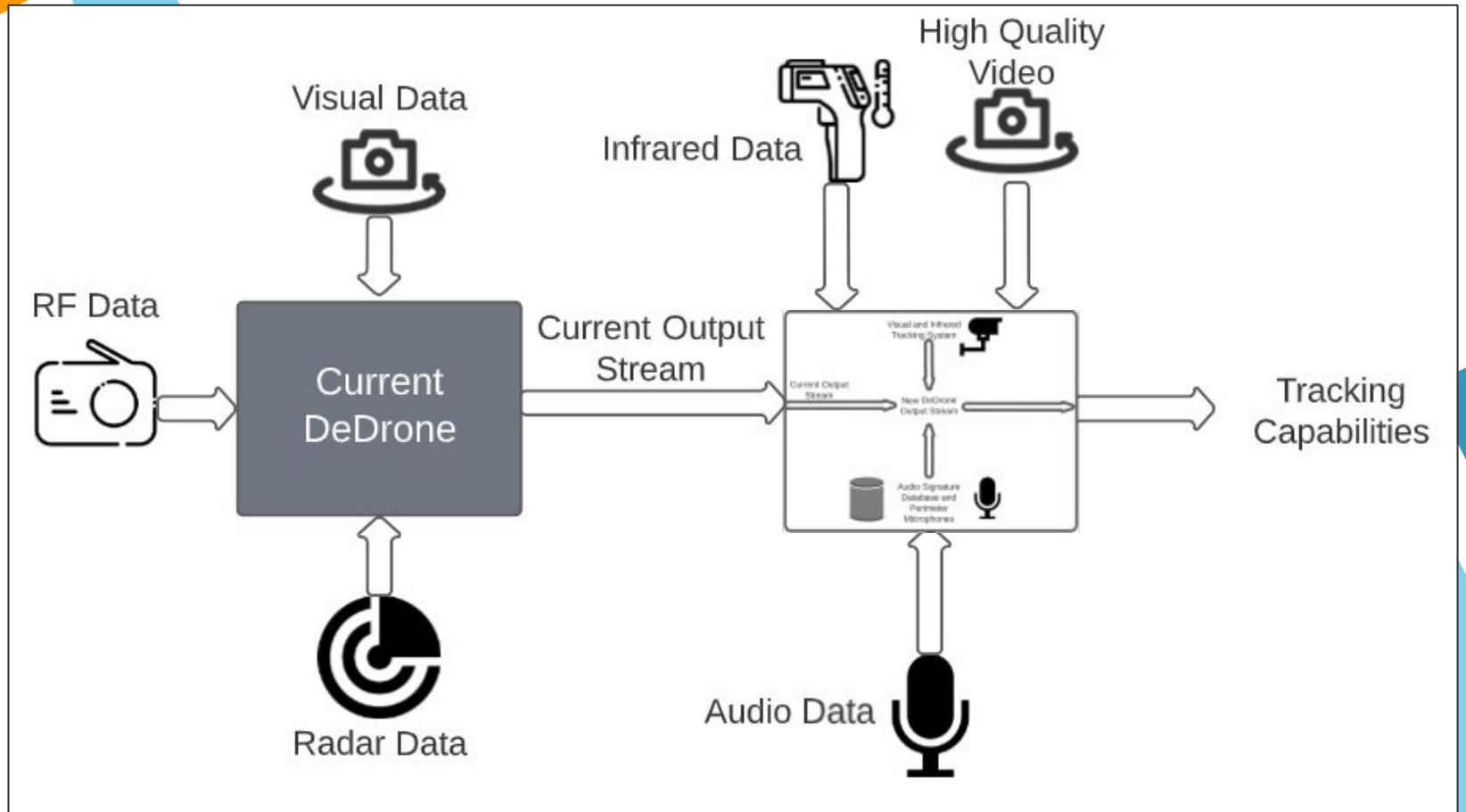
MVP Third Iteration

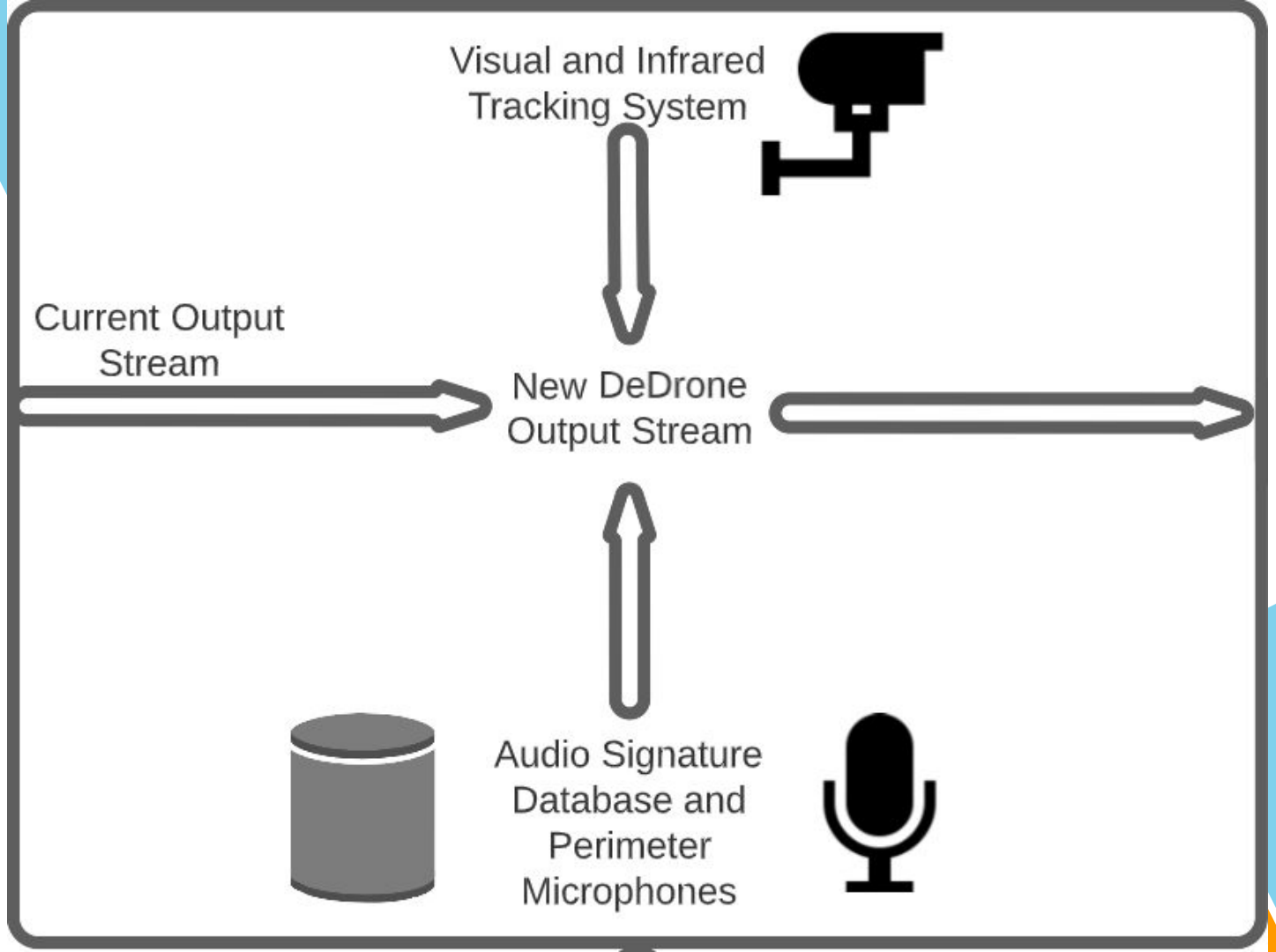


Week 13-15

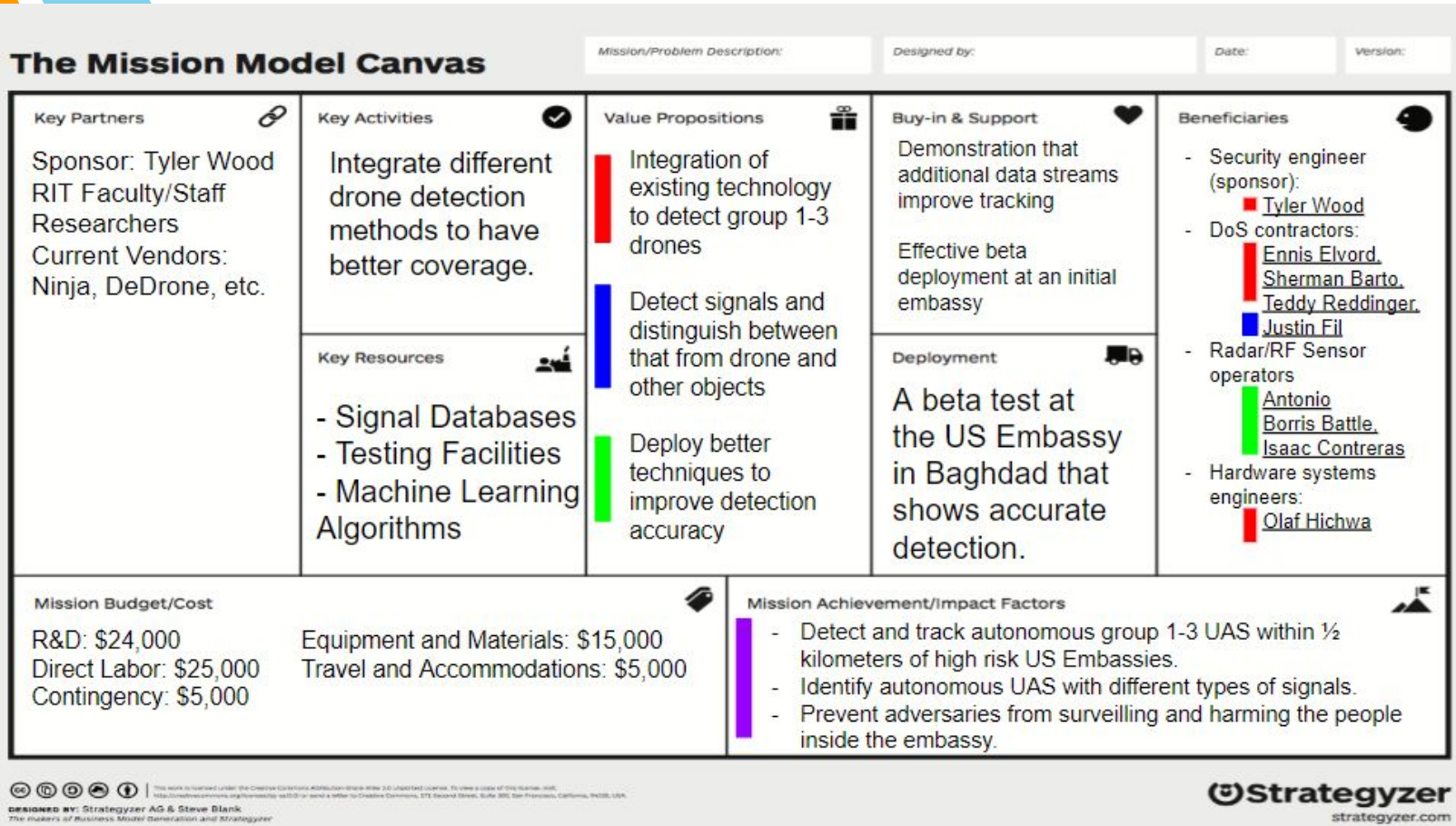
90 total interviews

Final MVP


Visual Data
High Quality Video
Infrared Data
RF Data
Current DeDrone
Current Output Stream
Tracking Capabilities
Radar Data
Audio Data


Visual and Infrared
Tracking System
Current Output
Stream
New DeDrone
Output Stream
Audio Signature
Database and
Perimeter
Microphones

Final MMC



The Mission Model Canvas

Mission/Problem Description:

Designed by:

Date:

Version:

Key Partners

Sponsor: Tyler Wood
RIT Faculty/Staff Researchers
Current Vendors: Ninja, DeDrone, etc.

Key Activities

Integrate different drone detection methods to have better coverage.

Key Resources

- Signal Databases
- Testing Facilities
- Machine Learning Algorithms

Value Propositions

- Integration of existing technology to detect group 1-3 drones
- Detect signals and distinguish between that from drone and other objects
- Deploy better techniques to improve detection accuracy

Buy-in & Support

Demonstration that additional data streams improve tracking

Effective beta deployment at an initial embassy

Deployment

A beta test at the US Embassy in Baghdad that shows accurate detection.

Beneficiaries

- Security engineer (sponsor):
  - Tyler Wood
- DoS contractors:
  - Ennis Elvord,
  - Sherman Barto,
  - Teddy Reddinger,
  - Justin Fil
- Radar/RF Sensor operators
  - Antonio Borris Battle,
  - Isaac Contreras
- Hardware systems engineers:
  - Olaf Hichwa

Mission Budget/Cost

R&D: $24,000
Direct Labor: $25,000
Contingency: $5,000

Equipment and Materials: $15,000
Travel and Accommodations: $5,000

Mission Achievement/Impact Factors

- Detect and track autonomous group 1-3 UAS within ½ kilometers of high risk US Embassies.
- Identify autonomous UAS with different types of signals.
- Prevent adversaries from surveilling and harming the people inside the embassy.

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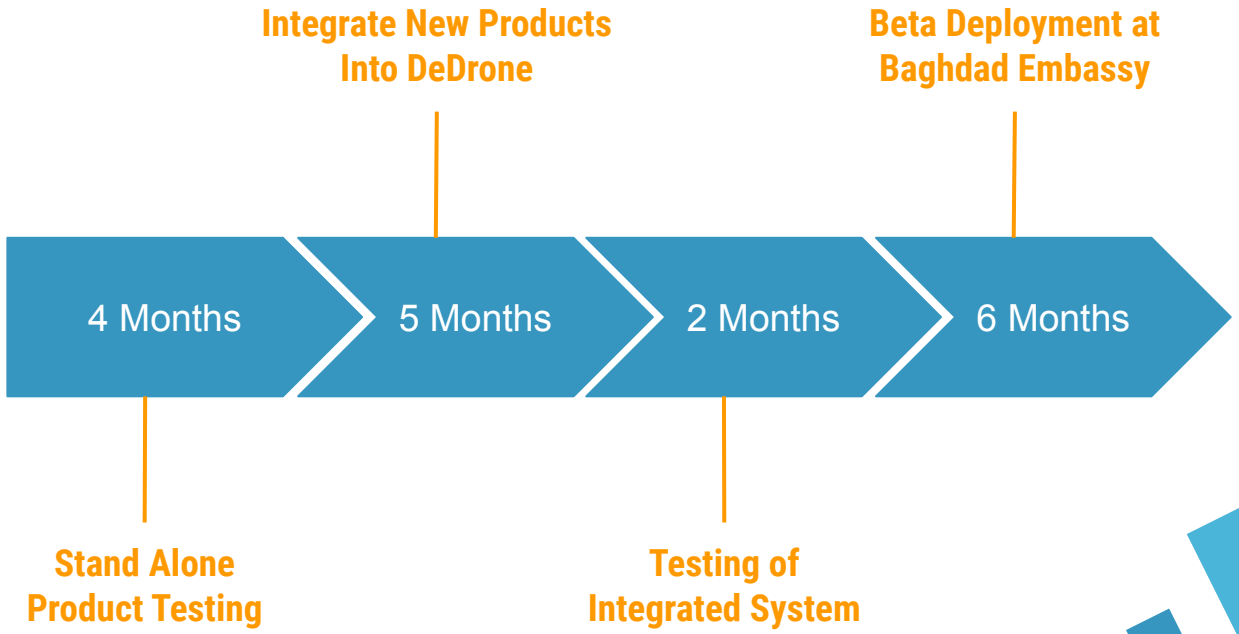
Projected Deployment Timeline



Special Recognition

Problem Sponsor: Tyler Wood

Mentors: Eitan Danon & Rob Mennell

Dr. James Santa

THANK YOU