TEAM PRESENTATION

Assignment Review

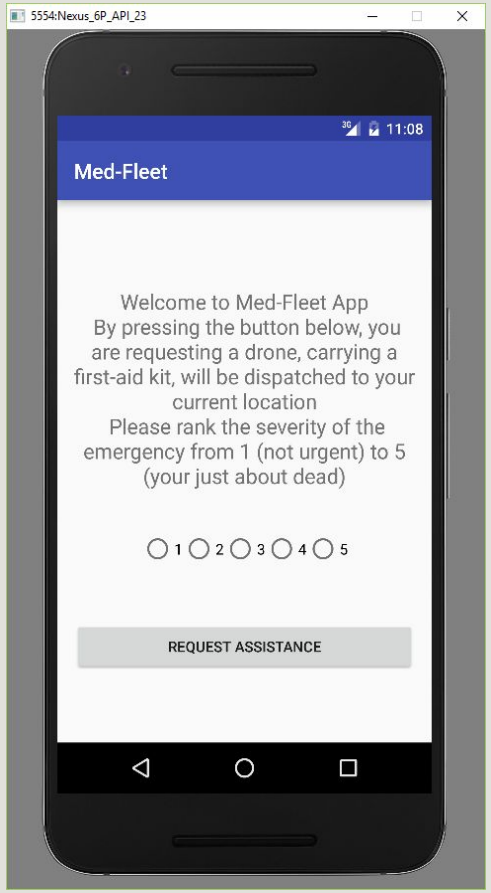
The Med Fleet Project uses a fleet of drones to prioritize and synchronize the delivery of medical supplies in a disaster zone.

Requests for assistance are sent to the application from a mobile app.

Architecture Review

(Peikang Animation)

Mobile App/Ticket Demo



Field Tests

Video Link

Med-Fleet Monitor

Web Application shows real time status of Drones and Missions utilizing google maps, javascript ajax.

http://www.med-fleet-monitor.co.nf/home.html

Ground Station and DroneKit API

- **Ground Station responsibilities:**
  - Receive missions from Mission Control.
  - Connect and send commands to drones; *DroneKit API*.
- **Testing:**
  - Static testing.
  - Simulator: Software in the Loop (SITL) and MavProxy.
  - Iris Plus.
- **Easy to use “Ready to Fly (RTF)”:**
  - Automatically connect to drones and the system.

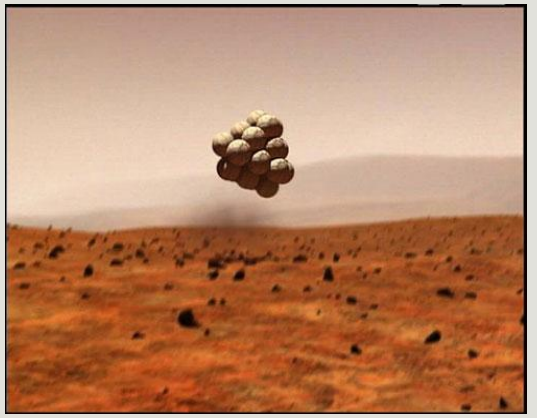
Future Sprints

1- Add multiple drones to project.

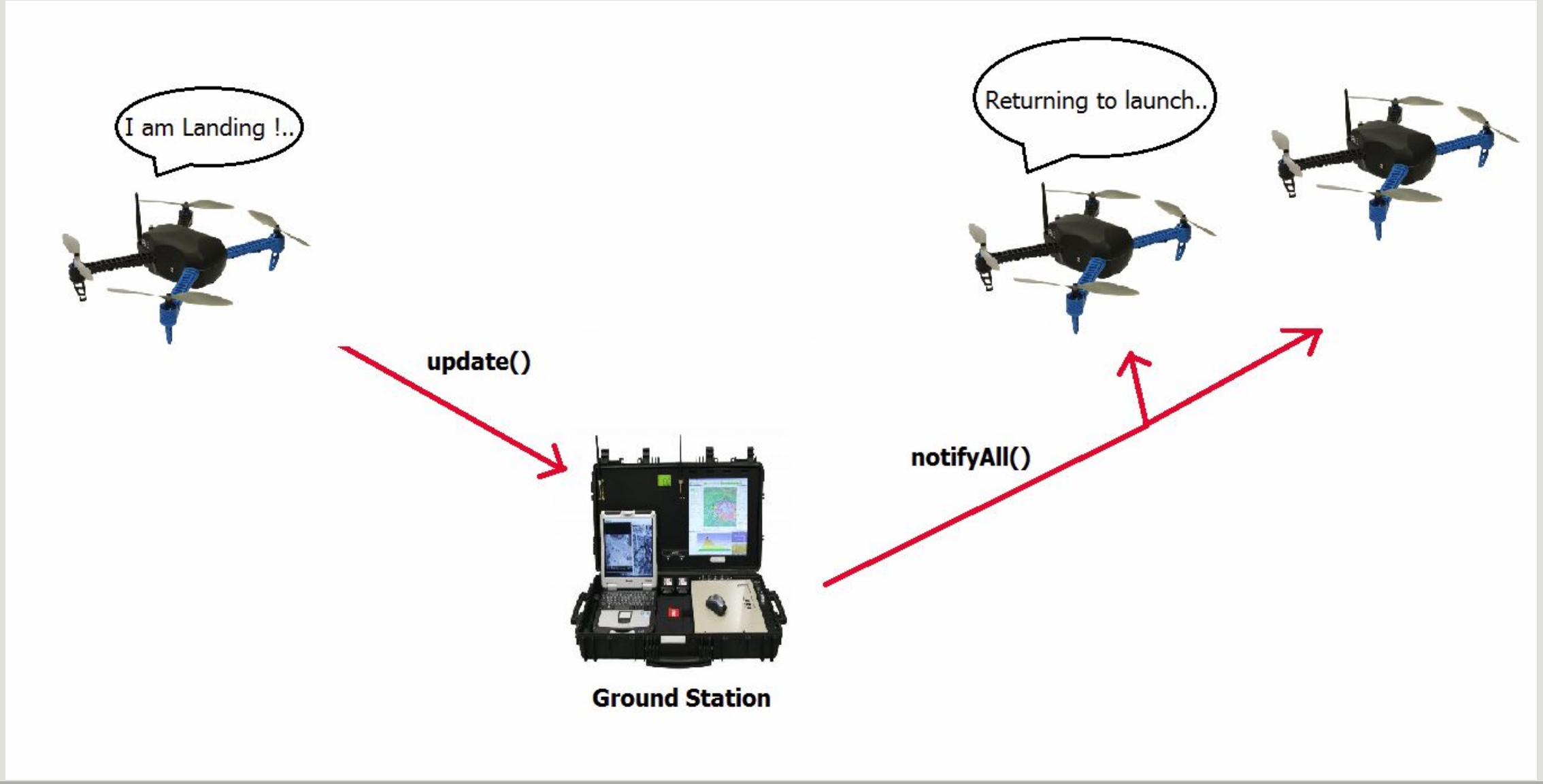
2- Options for delivery: land or drop.

3- Managing air traffic.

- Assign each drone to fly in a different altitude.
- Add an observer to Ground Station.



MFGS Observer



FMECA

- Drones and Emergency Situations make Med-Fleet a Safety Critical Project
- Through our FMECA we discovered our Safety Limitations could be broken down into three main categories:
  - **Hardware Issues**
  - **Software Issues**
  - **Regulatory Issues**
- Dissecting the intricacies that each issue grouping can create and how they affect another is essential to the success of our project.
- The impact on the customer could be Fatal!

FMECA

Hardware Issues

- Due to Safety Critical nature of project, resources need to be stable and fully tested to assure proper functionality.
- All Servers need to provide constant uptime when missions are deployed
- In case of emergency, tested failovers need to be in place
- All servers need to have Monitoring Agents running at all times to alert team of both immediate issues and potential problems
- Drones need to be examined and tested after every day deployed to ensure they are still functioning properly

FMECA

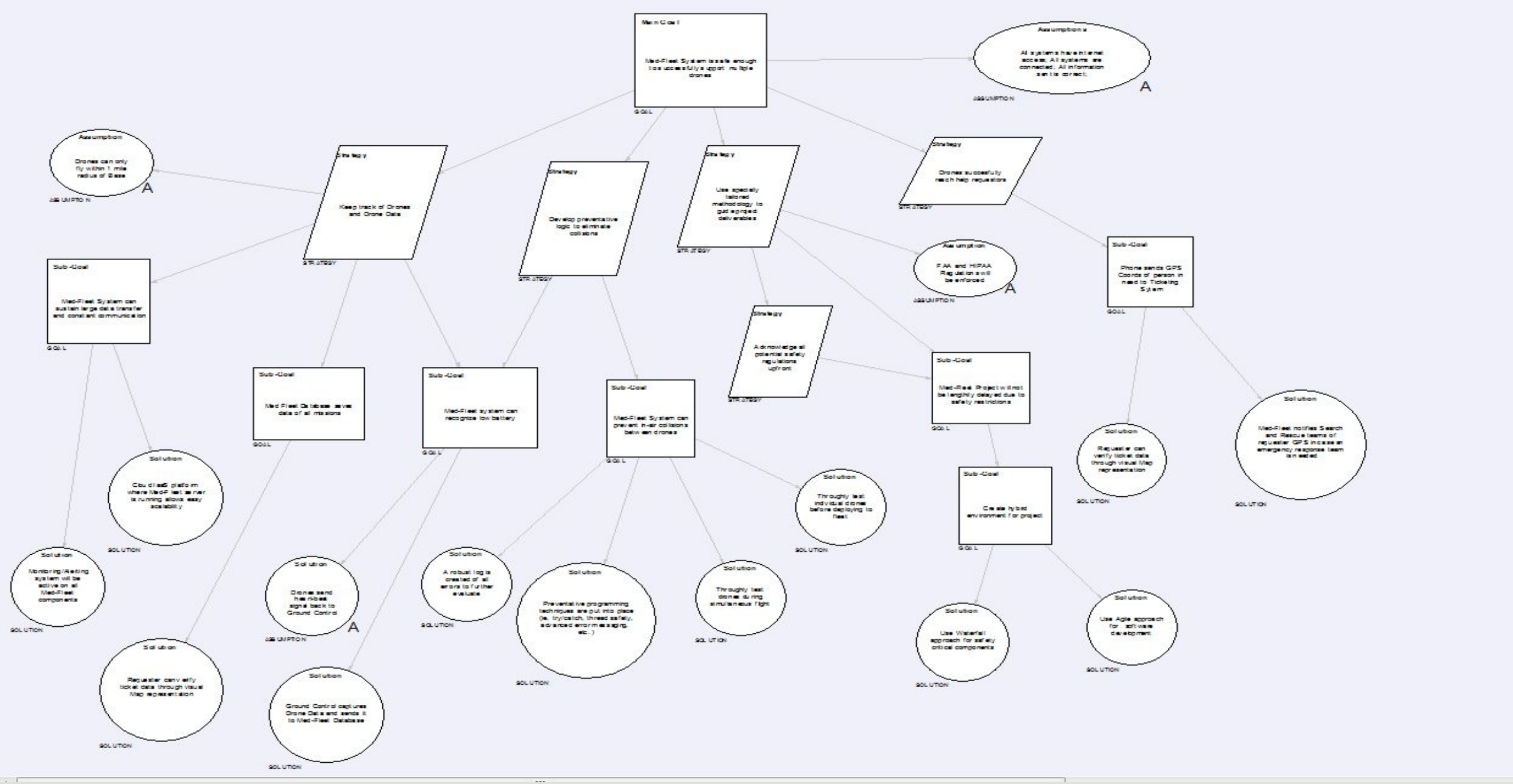
Software Issues

- Software plays a vital role in all aspects of the Med Fleet system.
- Software controls where the drones are deployed to, it is vital that this logic is being properly calculated.
  - Otherwise Drones could crash or get lost and requesters will be without medicine
- Software also handles the communication between all of the Med-Fleet servers, app, website, and drones.
  - The collection of all these components utilizing different technologies and software is what allows the Med-Fleet system to work.
    - With such a dependence on software, proper testing is a necessity!

FMECA

Regulatory Issues

- Very Strict Regulations could hold back progress due to oversight by organizations such as HIPAA and FAA.
- Through proper planning and foresight discovered in FMECA document, project is able to to navigate around such hurdles.
- One of the biggest discoveries was the idea to essentially partition project into two sectors:
  - One part is Regulatory and Planning branch
  - Other part is Development branch
  - These two different branches require different processes to achieve success within their respective domain
  - Regulatory and Planning works better under a more waterfall approach, as it has mandatory approval processes that must be attended to
  - Development Branch works better with an Agile Methodology, once dev work is approved by the proper regulatory committees, a true Dev Sprint can begin.


Main Goal
Med-Fleet System is safe enough to successfully support multiple drones
GOAL
Assumption
All systems have internet access, All systems are connected, All information sent is correct.
ASSUMPTION
A
Assumption
Drones can only fly within 1 mile radius of Base
ASSUMPTION
A
Strategy
Keep track of Drones and Drone Data
STRATEGY
Strategy
Develop preventative logic to eliminate collisions
STRATEGY
Strategy
Use specially tailored methodology to guide project deliverables
STRATEGY
Strategy
Drones successfully reach help requestors
STRATEGY
Sub-Goal
Med-Fleet System can sustain large data transfer and constant communication
GOAL
Assumption
FAA and HIPAA Regulation will be enforced
ASSUMPTION
A
Sub-Goal
Phone sends GPS Coords of person in need to Ticketing System
GOAL
Strategy
Acknowledge all potential safety regulations upfront
STRATEGY
Sub-Goal
Med Fleet Database saves data of all missions
GOAL
Sub-Goal
Med-Fleet system can recognize low battery
GOAL
Sub-Goal
Med-Fleet System can prevent in-air collisions between drones
GOAL
Sub-Goal
Med-Fleet Project will not be lengthly delayed due to safety restrictions
GOAL
Solution
Cloud IaaS platform where Med-Fleet server is running allows easy scalability
SOLUTION
Solution
Monitoring/Alerting system will be active on all Med-Fleet components
SOLUTION
Solution
Drones send heartbeat signal back to Ground Control
ASSUMPTION
A
Solution
A robust log is created of all errors to further evaluate
SOLUTION
Solution
Preventative programming techniques are put into place (ie. try/catch, thread safety, advanced error messaging, etc.)
SOLUTION
Solution
Throughly test drones during simultaneous flight
SOLUTION
Solution
Throughly test individual drones before deploying to fleet
SOLUTION
Solution
Requester can verify ticket data through visual Map representation
SOLUTION
Solution
Ground Control captures Drone Data and sends it to Med-Fleet Database
SOLUTION
Sub-Goal
Create hybrid environment for project
GOAL
Solution
Requester can verify ticket data through visual Map representation
SOLUTION
Solution
Med-Fleet notifies Search and Rescue teams of requester GPS in case an emergency response team is needed
SOLUTION
Solution
Use Waterfall approach for safety critical components
SOLUTION
Solution
Use Agile approach for software development
SOLUTION

FIN