

sUAS Innovation Challenge



ASURE What We Do

Applied

- ASURE bridges the gap between actionable research and applied solutions (prototype to production).
- We focus on customer-driven challenges and leverage the vast intellectual resources of ASU using inclusive, cross-functional approaches.

Accelerated

- Innovation challenge pipeline
- Dual track into government missions and commercial markets.
- We advance experimental, adaptive, lean methods.

Innovation

- We define innovation as the positive impact made by ASU solutions.
- We measure value by the opportunity for impact created on behalf of ASU faculty, students and vets. We provide education and training in our unique.
- We measure success by innovations fielded by sponsors, partners, regions and society.

sUAS Innovation Challenge

The Impetus

Global trend toward urbanization and increased impact of disasters on these densely populated urban areas.

The Problem

First responders can face a variety of environments in urban response, can quickly become overwhelmed, and have limited budgets for MAS CAL events.

The sUAS Innovation Challenge

Teams compete for funding (\$3K) to develop a Small Unmanned Aerial System (sUAS) that can support first responders (in an urban area) to enhance and extending their search capability.

sUAS Requirements

Scenario based and vague to foster innovation

- Don't add a burden to the already overburdened
- Lighter, longer flight time, smaller, cheaper are better
- Cool enhancements

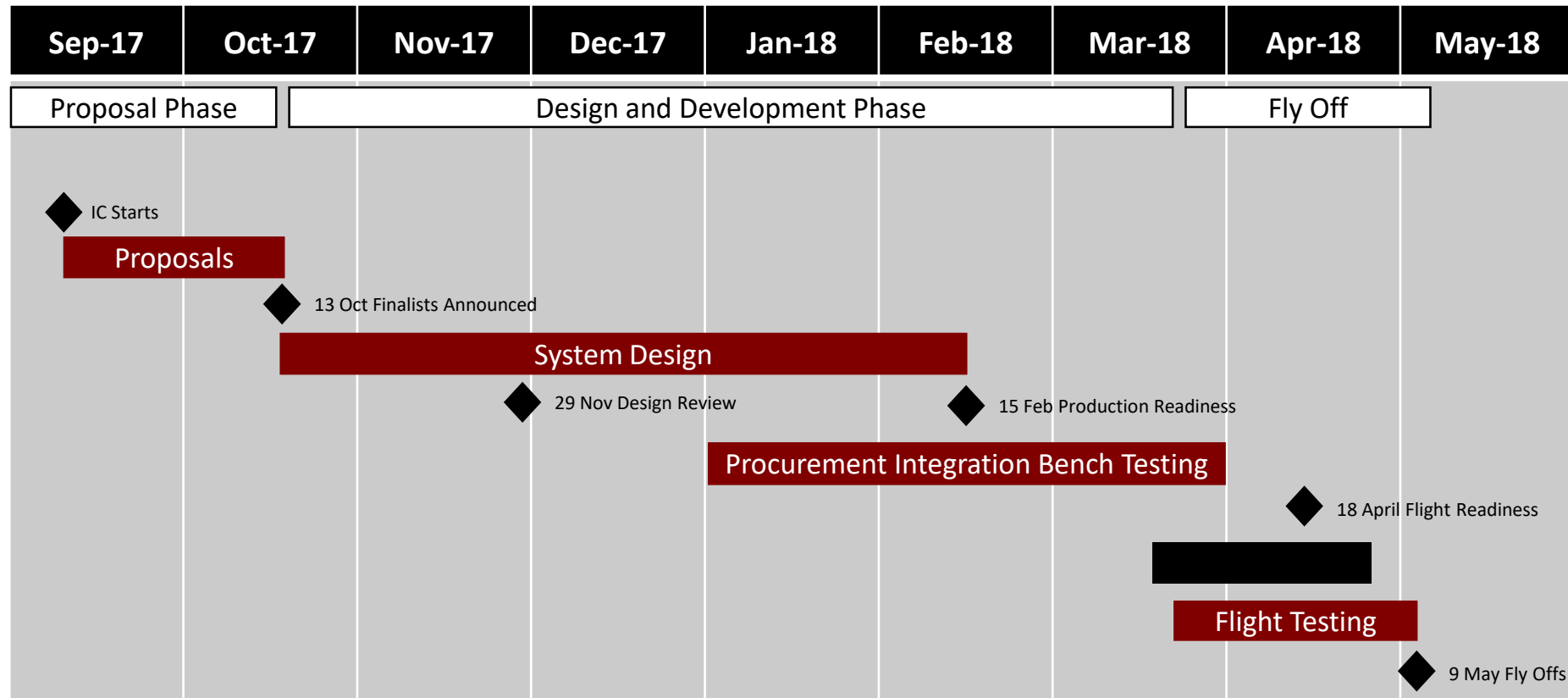


Japan earthquake and tsunami: Before and after the cleanup, LATimes, 7 Mar 2013



Technical Rescue in Storm Drains: Technical Rescue Usar 0, Fire Rescue Magazine, 30 April 2011, Andy Speier

sUAS Innovation Challenge Schedule



Proposal Phase

- Teams submit design and capability proposals
- Review committee selects finalists
- Finalists are selected and announced

Design and Development Phase

- Finalists receive funding
- Conduct three status reviews
- Dedicated safety review
- Limited testing

Fly Off

- Indoor Flying Facility available for testing
- Course announced 18 April
- Conduct Fly-off (negotiate an obstacle course)

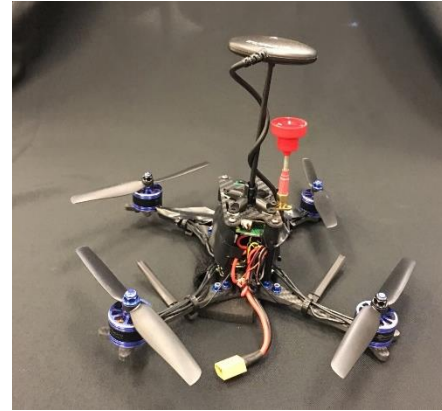
sUAS Challenge Teams

Swift Falcon



Sensor heavy system, thermal camera
Human Recognition

ASU FPV



Low cost, thermal camera,
weatherproof, light bar

Jackdaw



Easy to carry, long loiter time,
Thermal camera

Dragon Flyght



Swarm of autonomous drones, search
and prioritization algorithm

Lift Off



Stable aircraft with higher quality
thermal sensor

Fly Off



Teams had 1 hour to search the four “buildings” sewers orchard and junk piles for 11 victims and survivors
Applied Accelerated Innovation asure.asu.edu

Post Event Lessons Learned

Conclusion: Definition of the need and the documented solution via requirement statements is key to achieving the desired end product – useful data. Successful teams had a clearly defined problem and iterated through a solution through the design, development and testing process.

- Clearly identify the problem that needs solved
- Define the solution
 - Expected end state
 - Iterative process
 - Sketch the operational capability graphically
 - Define specifics
(sensor(s), platform, environment, data, cost)
- Develop or Procure?
- Test, Test, Test
 - Requirements and Performance Testing
 - Operational testing

ASU FPV Conceptual Approach

- sUAS Innovation Challenge Requirements
 - The Innovation Challenge is to design, build, and demonstrate a sUAS capable of supporting a SAR mission.
 - Reduced SWaP, Longer flights better, rapid relaunch times, RTV, autonomous or manual, cheap
- ASU FPV approach a minimum viable capability for SAR teams.
 - Autonomous flying with GPS tracking and programmable safety protocols.
 - Thermal imaging to aid in low light conditions.
 - No latency and high range for both controls and video feed.
 - Speaker system to alert potential victims.
 - Easy and dependable deployment method.



ASU FPV Conceptual Approach

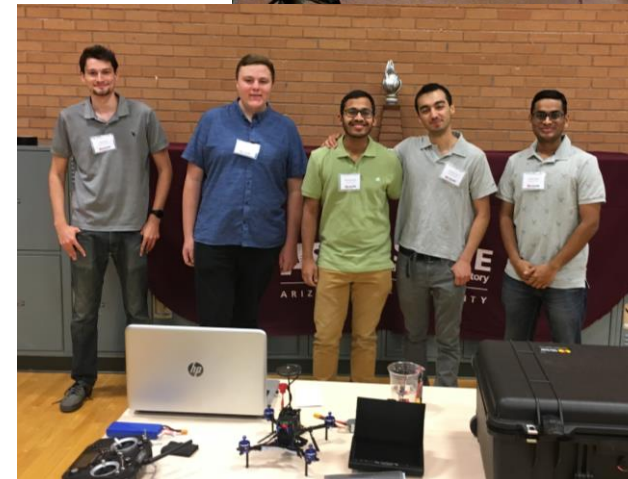
Initial Design met requirements

- Form factor suitable for operating environment.
 - Small and nimble
- Basic search capability.
 - Camera and thermal

Test Environment

- FLIR
 - Suitable for ID, not FPV
 - Light bar
- Small airframe = greater access

Overall design resulted in greater amounts of useful data provided to SAR team





Christian.Fortunato.ASURE@asu.edu