Incorporating Redundant Systems to Capture the Kentucky Money Shot

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Goals

National Goals
- Live stream the eclipse from the edge of space across the country

UK Eclipse Team Goals
- Capture Kentucky Money Shot (KMS)
- Successfully stream from two balloons

Redundancy
- Failure risk increases when systems are identical
- Incorporating different (and independent) system designs for redundancy increases probability of success.

Opportunity

Spirit

Viking
Methods: Ground Station

- Montana Ground Station set-up vs. UK Eclipse Day set-up
  - One computer running two programs vs. three computers running three programs
  - Wi-Fi connection vs. Ethernet
- UK system redundancies
  - 3 Computers for streaming and tracking
  - Spare ground stations for quick replacement parts
Methods: Payloads

- Two balloons launching
- Near identical payload strings
  - Two GoPro payloads
  - Two Montana video payloads
  - Two Montana still image payloads
  - Two Iridium tracking payloads
  - Four SPOT traces
  - Two Cut Down systems
  - One H.A.T.S. system
  - One Garmin 360 camera
Methods: People

- Recruiting students
- 10 practice launches
- Mirrored positions for the two balloons
  - Team leaders
  - Payload responsibilities
  - Travel contingency
National Dry Run Results

- Ground Station
  - Maintained connectivity but failed to upload stream
  - Tracking
- Payloads
  - Similar flight strings
  - External power switches
  - Two GoPro payloads
- People
  - Simultaneous balloon fill
  - Simultaneous balloon launch
  - Landed 1.15 miles from each other
Eclipse Results

Ground Station:
- Quickly resolved issues using redundant ground station systems and training
- Live video to Stream (est. 40 minutes) and YouTube (est. 120 minutes including pre-launch)
- YouTube stream viewed from 33 countries

Payloads:
- Overall, most successful flight capturing video
- Flight strings just under 12lb

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Legend:
- Did not fly
- No Success
- Partial Success
- Fully functional for full flight
Eclipse Results

People:

- Smooth timeline progress
- Easy collaboration between balloon groups when issues arose
- Team demographics:
  - 40% women
  - 8 STEM majors represented
  - 50% underclassmen with 96% undergraduate student participation
Summary

- Successfully met both National and Team goals
  - Achieved live-stream up to 14 miles
  - Captured multiple Kentucky Money Shots
  - Achieved simultaneous fill and launch
  - Used redundancy to overcome difficulties
Temple University’s Weather Balloon
Questions?