Hazard Analysis and Waivers

System Safety presentation
Hazard Analysis Requirements

- Section 437.55 requires experimental permit applicant to identify hazards, including those resulting from human and software errors
- Assess risk of hazards
- Identify elimination or mitigation strategies as appropriate
- Validate and verify mitigations
Hazard Analysis Guidance

• FAA Advisory Circular 437.55-1 provides an approach to perform hazard analysis
• Analysis must address human errors including
  - Decision errors
  - Skill-based errors
SpaceShipTwo Hazard Analysis

- Uncommanded feather operation
- Catastrophic hazard during boost phase
- Included assumptions that flight crew
  - Would be properly trained in simulator
  - Would follow established procedures
SpaceShipTwo Hazard Analysis

- Feather system design determined to be adequate
- No mitigations considered to prevent early feather unlocking
Issuance of Waivers

- May 2013 – FAA granted SS2 experimental permit renewal
- FAA determined SS2 hazard analysis did not meet requirements for human and software errors
- July 2013 – FAA issued waiver from requirements
- Scaled did not request waiver
Waiver Mitigations

• Extracted from Scaled’s experimental permit application

• Not verified or validated

• Inspectors unfamiliar with waiver details

• Provisions needed to ensure implementation of waiver mitigations