



Columbia Accident Investigation Board

Lest we forget ...



A helicopter crash during the *Columbia* debris search claimed the lives of Jules “Buzz” Mier (in black coat) and Charles Krenek (yellow coat).



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And ...



Amazingly similar deficiencies cost these *Challenger* lives in 1986.



Columbia Accident Investigation Board

The Board

- Columbia Accident Investigation Board (CAIB) chartered through NASA's *Agency Contingency Plan for Space Flight Operations*
- Board chartered to uncover the “facts, as well as the **actual or probable causes** of the Shuttle mishap” and to “recommend preventive and other appropriate actions to **preclude the recurrence** of a similar mishap”

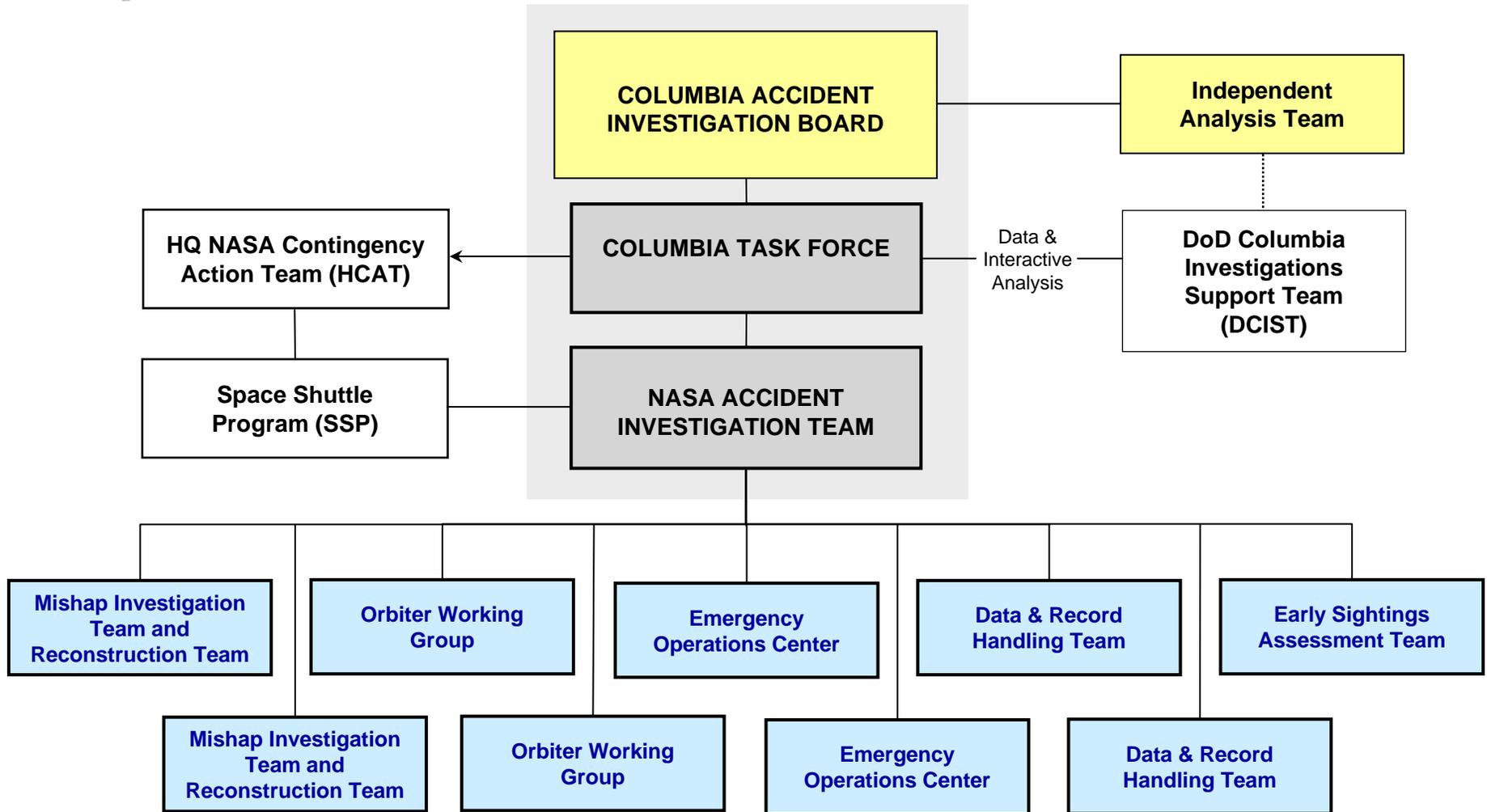


* = Pre-named investigation positions
(post-*Challenger* response)



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Investigation's Organization





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Briefing Overview

- Shuttle, Mission, CAIB
- Mishap Causes
 - Technical
 - Launch and Ascent Debris Strike
 - Re-Entry Sequence
 - Debris Reconstruction and Analysis
 - Areas Not a Factor
 - Organizational
 - History
 - Decision Making at NASA
 - Organization Structure and Culture
 - System Effects
- Lessons Affirmed





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Technical Cause of the STS-107 Mishap

- **TECHNICAL CAUSE:** The physical cause of the loss of *Columbia* and its crew was a breach in the Thermal Protection System on the leading edge of the left wing. The breach was initiated by a piece of insulating foam that separated from the left bipod ramp of the External Tank and struck the wing in the vicinity of the lower half of Reinforced Carbon-Carbon panel 8 at 81.9 seconds after launch. During re-entry, this breach in the Thermal Protection System allowed superheated air to penetrate through the leading-edge insulation and progressively melt the aluminum structure of the left wing, resulting in a weakening of the structure until increasing aerodynamic forces caused loss of control, failure of the wing, and breakup of the Orbiter.



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“The foam did it” ...

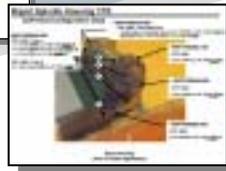
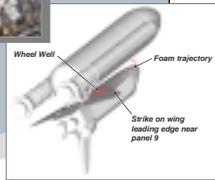
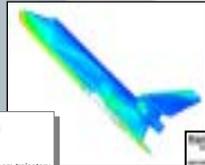
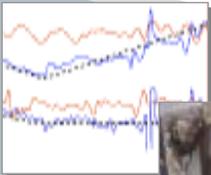


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Scenario Candidate “Tests”

- **For a scenario to be credible, it had to pass a series of “tests”:**
 - Aerodynamic analysis
 - Thermodynamic analysis
 - Timeline (telemetry, digital, voice, MADS)
 - Imagery (still, video, radar, telescopic)
 - Debris evidence & observed shedding sequence
 - Maintenance/modification documentation

. . . and – be grounded in shuttle system facts





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Debunking Myths



MYTH: Ignored photos of Columbia's wing cracks



REALITY: Seams in insulation blanket inside payload bay





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Debunking Myths

MYTH: Top Secret satellite shots of explosion



REALITY: Opening scenes from 1998 movie *Armageddon*