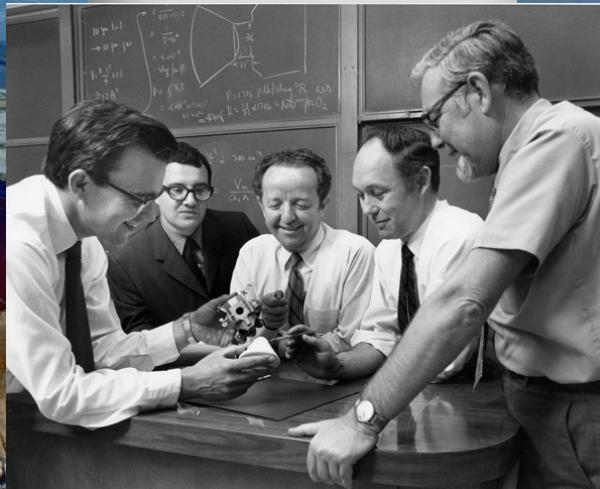


Apollo, the Space Shuttle, and NASA's Institutional Culture



Blame & Groups



I DIDN'T SAY IT WAS YOUR FAULT

I said I was blaming you

Why might
groups be
held morally
blameworthy
apart from
their individual
members?

Group Think

When the desire for harmony or the desire to minimize conflict in a decision-making group overrides a realistic appraisal of alternatives



What is normalized risk?



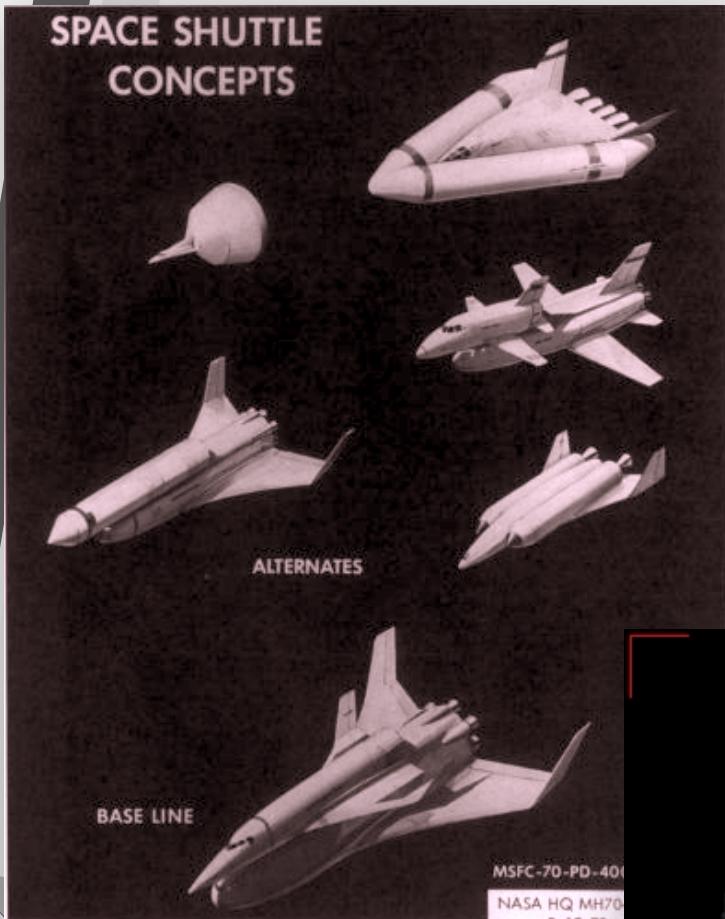
- Recurring problems reinterpreted to be acceptable risk

What is normalized risk?



How did NASA's History Affect the Space Shuttle Program?

- Cold War origins
- Manned mission to Mars:
 - Space station
 - Space shuttle
 - Space tug



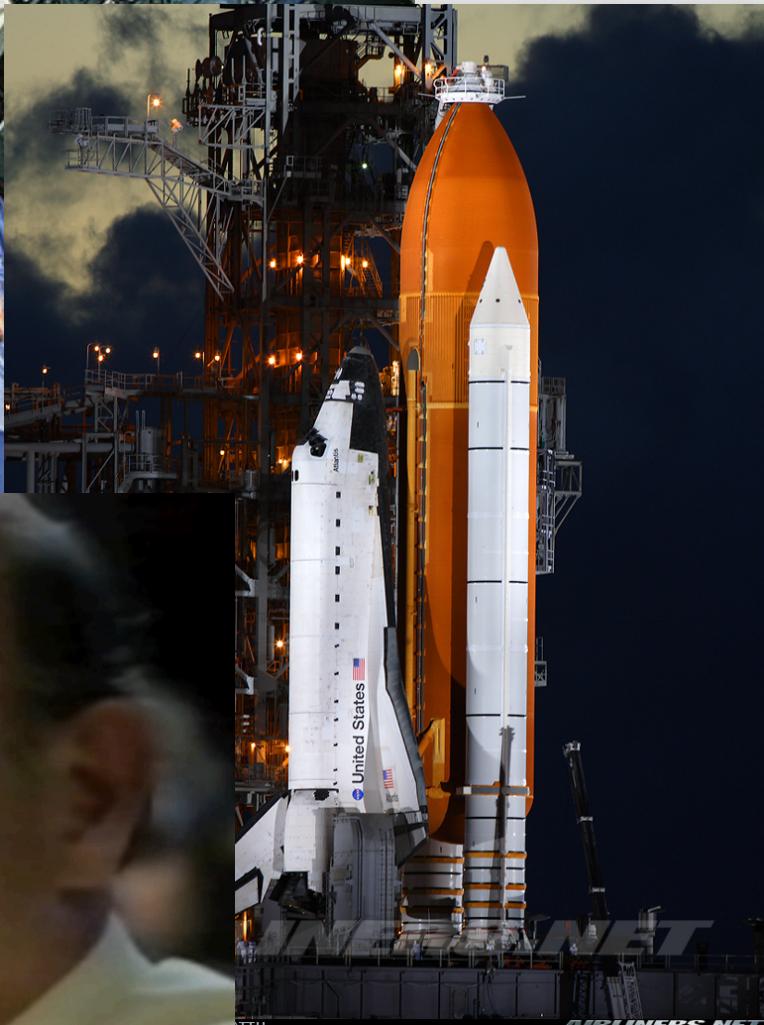
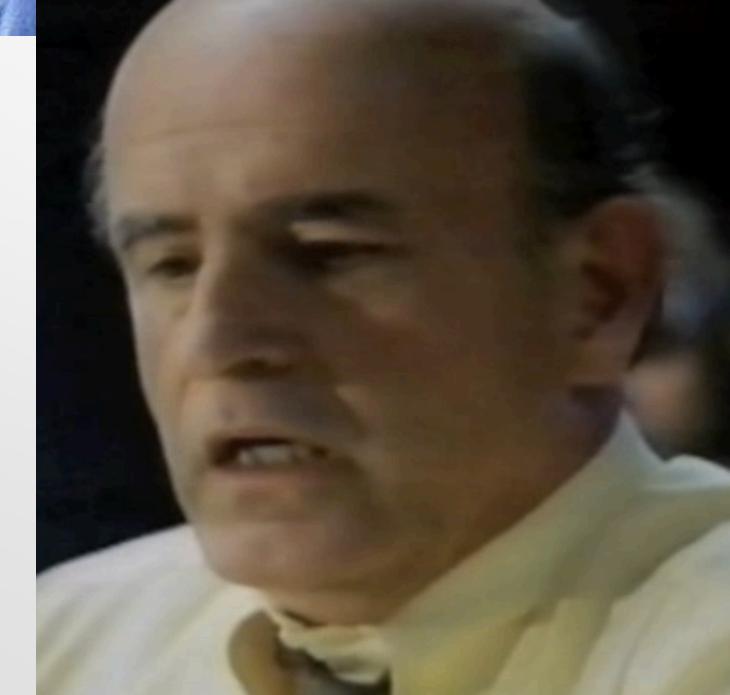
What Limited the Shuttle Program?

- Became space shuttle only
 - flexible, economic, reusable
- Supported by scientific community and DOD
- Hoped to pay its own way through commercial payloads
- Development decisions shaped by budgetary constraints





**Larry Mulloy
Roger Boisjoly**



GroupThink



Group Think

When the desire for harmony or the desire to minimize conflict in a decision-making group overrides a realistic appraisal of alternatives

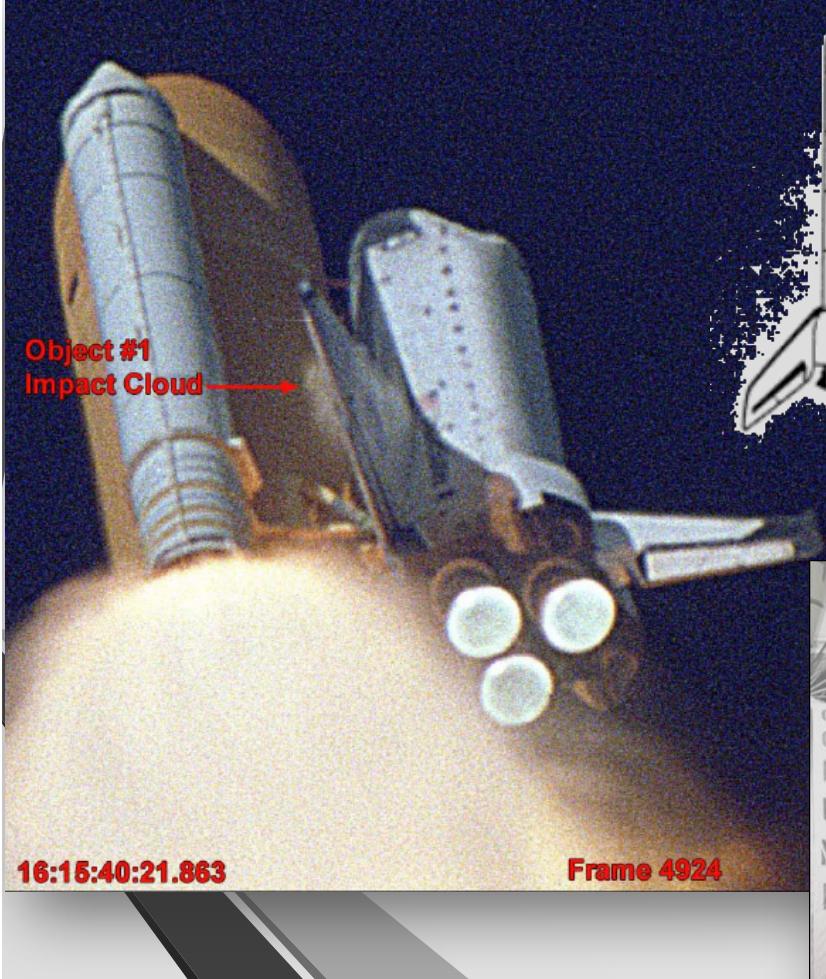
- **TYPE I - Overestimations of the group — its power and morality**
- **ILLUSION OF INVULNERABILITY**
 - *creates excessive optimism, encourages risk-taking*
- **UNQUESTIONED BELIEF IN THE MORALITY OF THE GROUP**
 - *members ignore the consequences of actions*
- **Type II: Closed-mindedness**
- **RATIONALIZING WARNINGS**
 - *risks discounted and assumptions untested that challenge the group's existing assumptions*
- **STEREOTYPING OF PEOPLE OUTSIDE OF GROUP**
 - *outsiders seen as opponents or inferior, weak, or stupid.*

Group Think

When the desire for harmony or the desire to minimize conflict in a decision-making group overrides a realistic appraisal of alternatives

- **Type III: Pressures toward uniformity**
- **SELF-CENSORSHIP**
 - *individual doubts or questions are not expressed*
- **DIRECT PRESSURE TO CONFORM**
 - *dissent is discouraged; insiders who object are “othered,” pressured to conform*
- **SELF-APPOINTED MIND GUARDS**
 - *hide problematic or contradictory knowledge or info from the group*
- **ILLUSION OF UNANIMITY**
 - *assumption that all members share same view, which inhibits dissent; silence is viewed as agreement*

Acceptance of Problems Establishes Precedents



Acceptance of Problems Establishes Precedents



- Accepting rather than eliminating technical deviations
- Anomalies seen as normal and acceptable
- Ignored events that suggested possibility of catastrophic failure

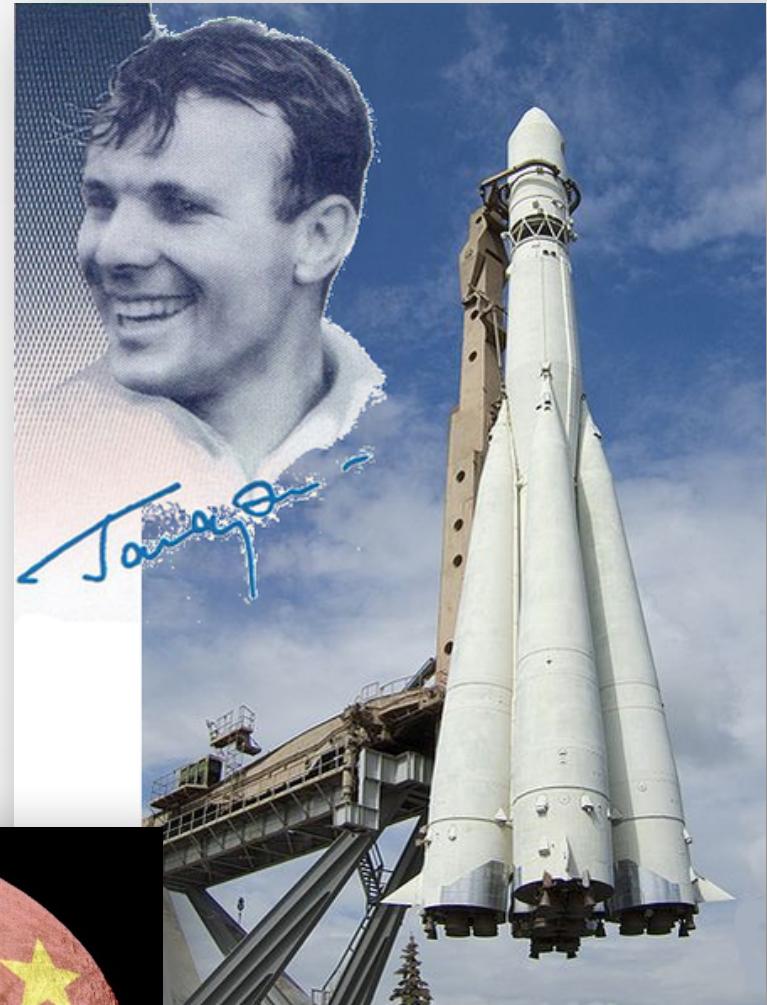
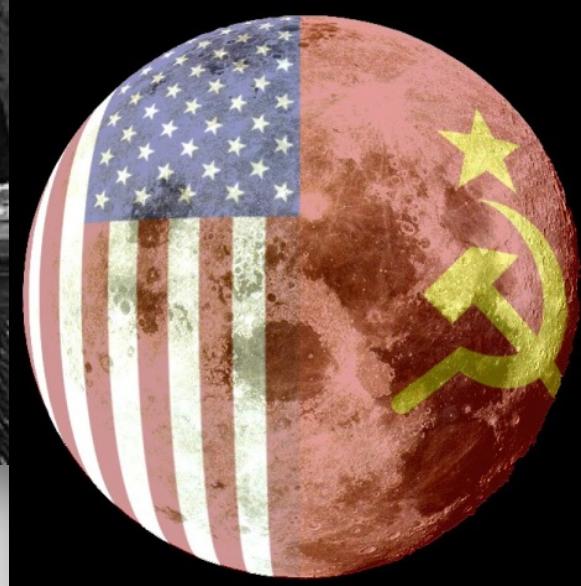
Inconsistent Information leads to 3 possibilities



1. Anomalous incidents “proved” problems were fixed/cause & effect was understood
2. Weak signals considered “unprecedented; unlikely to repeat”
3. Signals become routine

The Space Race

- International Geophysical Year, 1957-58
- *Sputnik*, 4 October 1957
- Yuri Gagarin, 12 April 1961
- JFK's Decision for the Moon



Apollo 1: 27 January 1967



Apollo 1: 27 January 1967



Dr. Floyd Thompson

Frank Borman

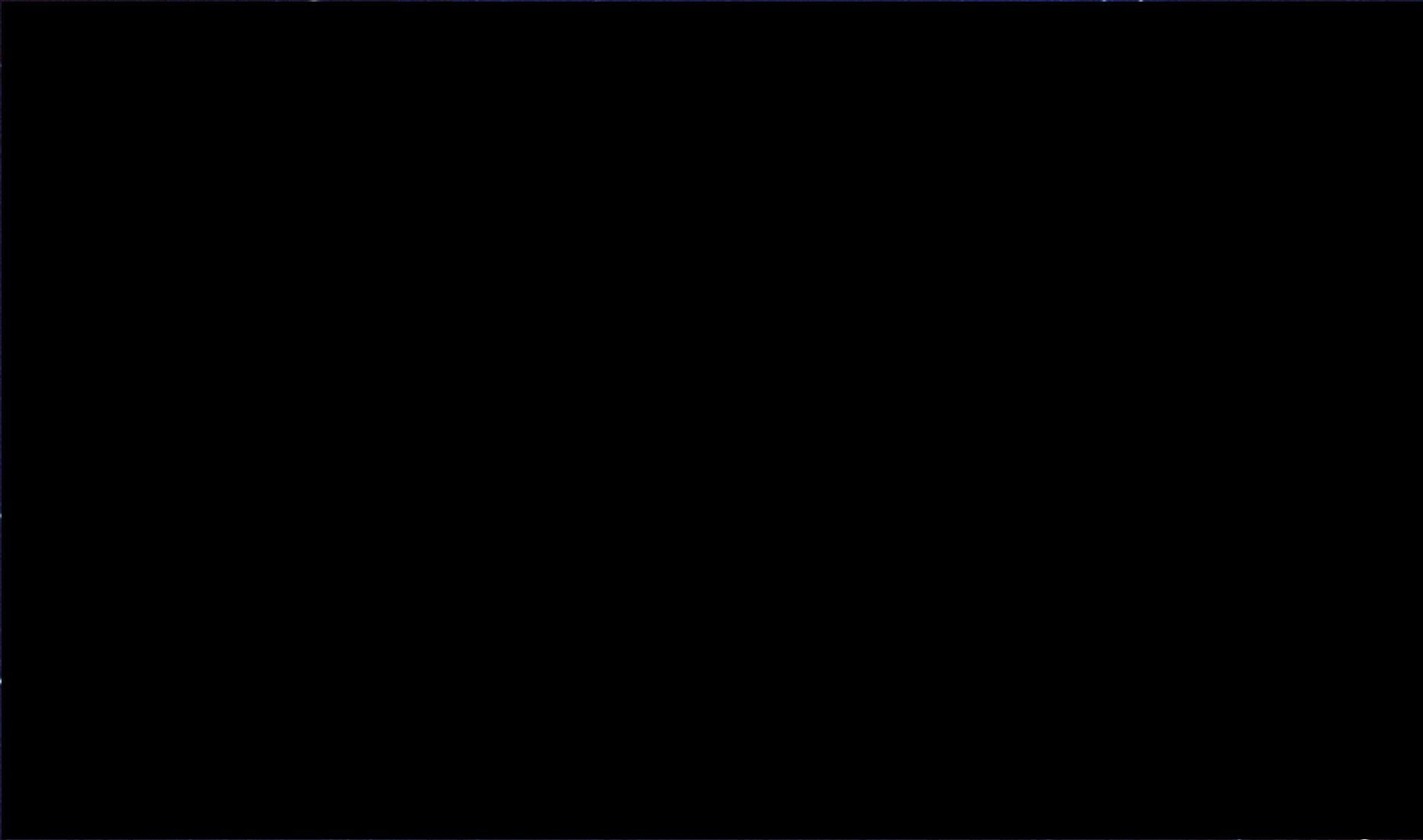
Harrison Storms, Jr.

Joe Shea

James Webb



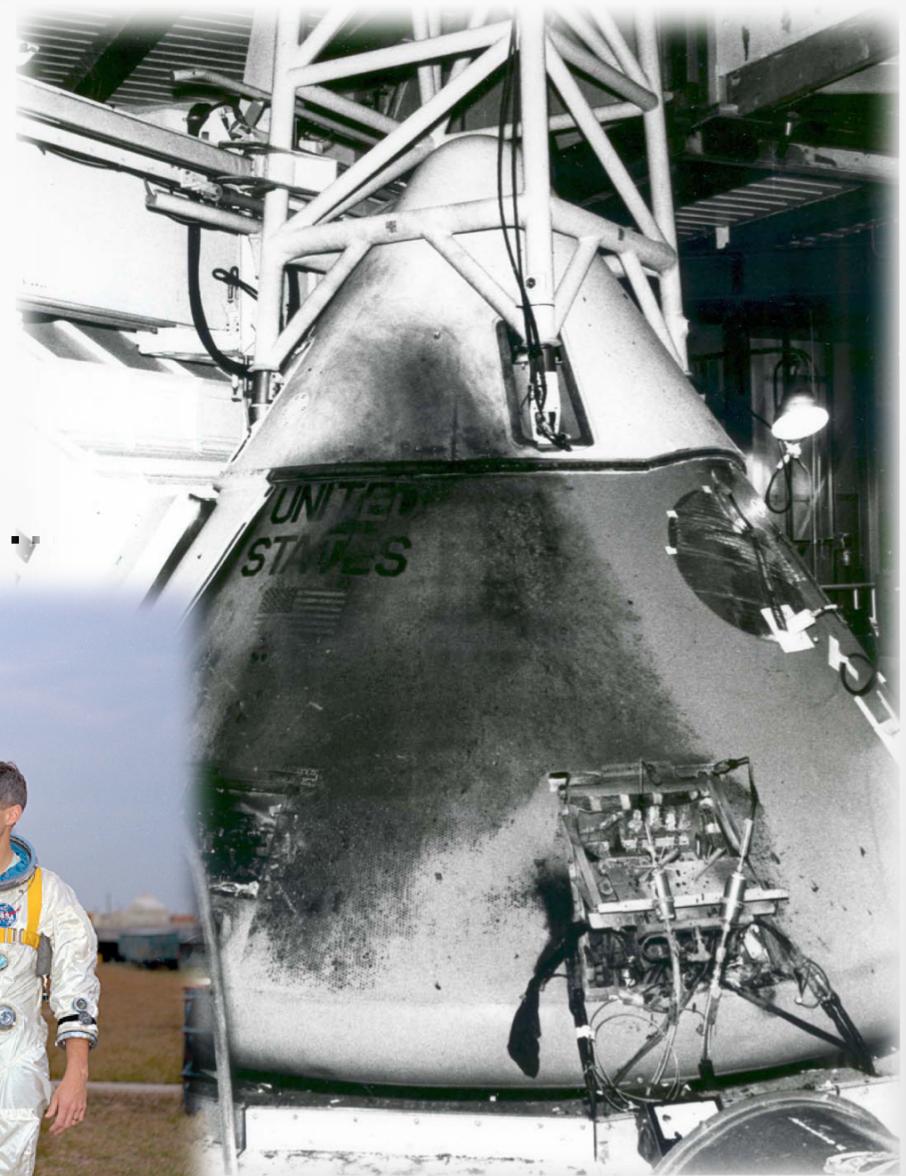
From the Earth to the Moon: "Apollo 1"



Apollo 1: 27 January 1967

Who is to Blame?

- North American?
- NASA?
- “A failure of imagination.



Apollo 8: 1968



Robert Gilruth

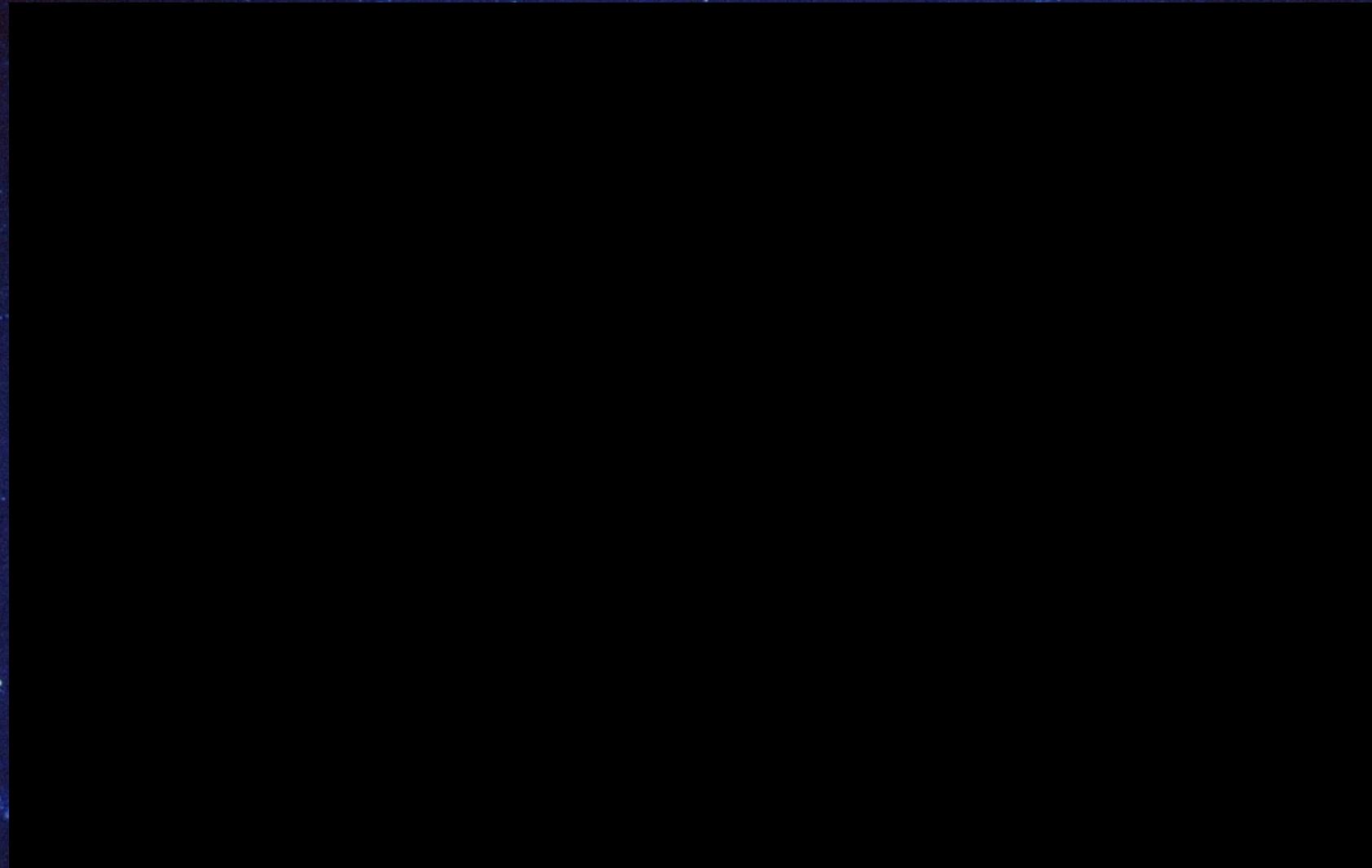
Thomas Paine

Wernher von Braun

George Low

Chris Kraft

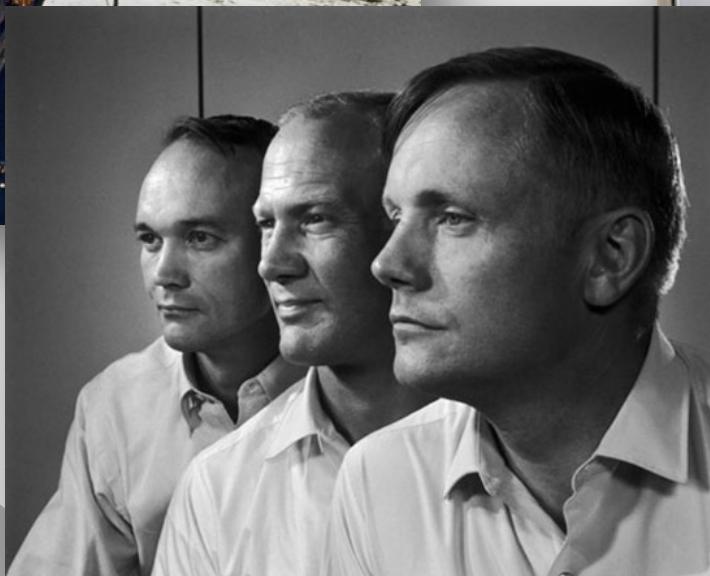
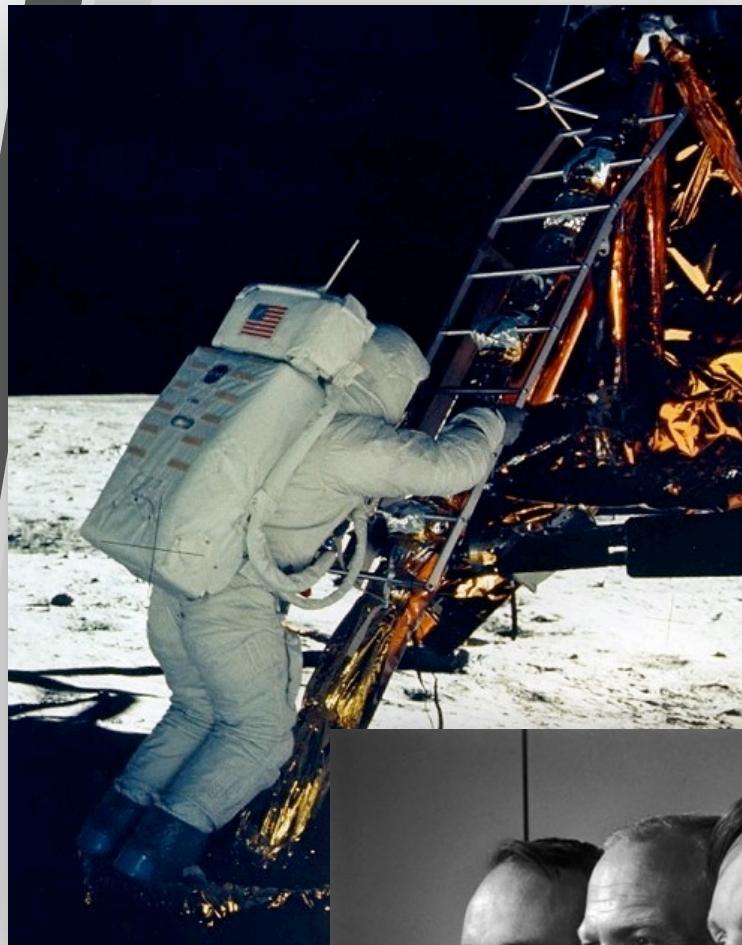
From the Earth to the Moon: “Apollo 8”



Apollo 8: Groupthink?

- TYPE I - Overestimations of the group — its power and morality
- ILLUSION OF INVULNERABILITY
- UNQUESTIONED BELIEF IN THE MORALITY OF THE GROUP
- Type II: Closed-mindedness
- RATIONALIZING WARNINGS
- STEREOTYPING OF PEOPLE OUTSIDE OF GROUP
- Type III: Pressures toward uniformity
- SELF-CENSORSHIP
- DIRECT PRESSURE TO CONFORM
- SELF-APPOINTED MIND GUARDS
- ILLUSION OF UNANIMITY

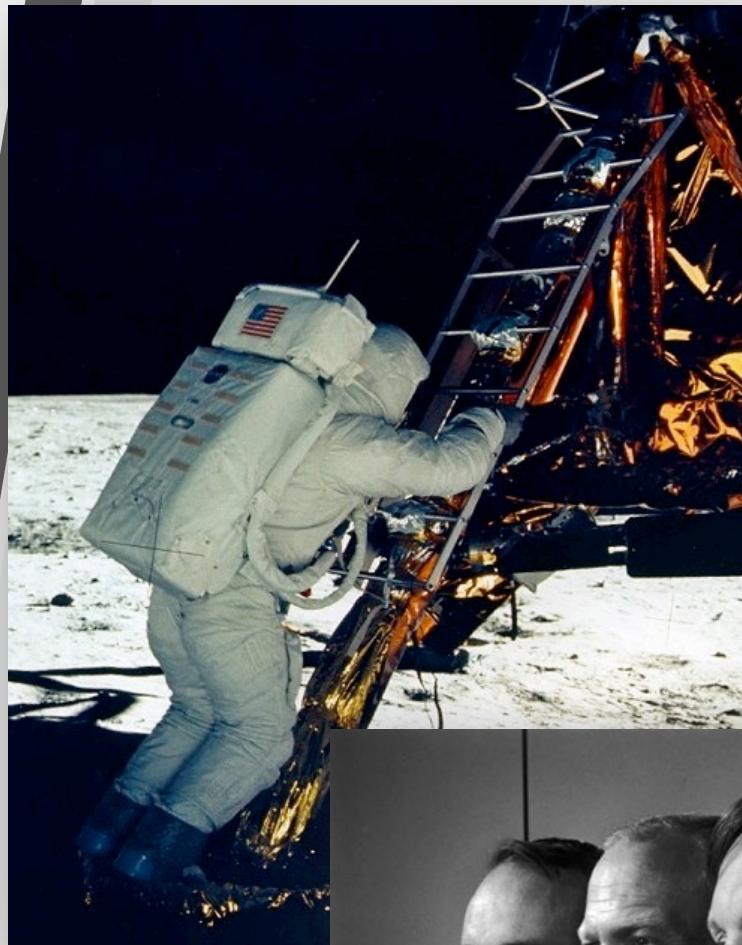
Apollo 11



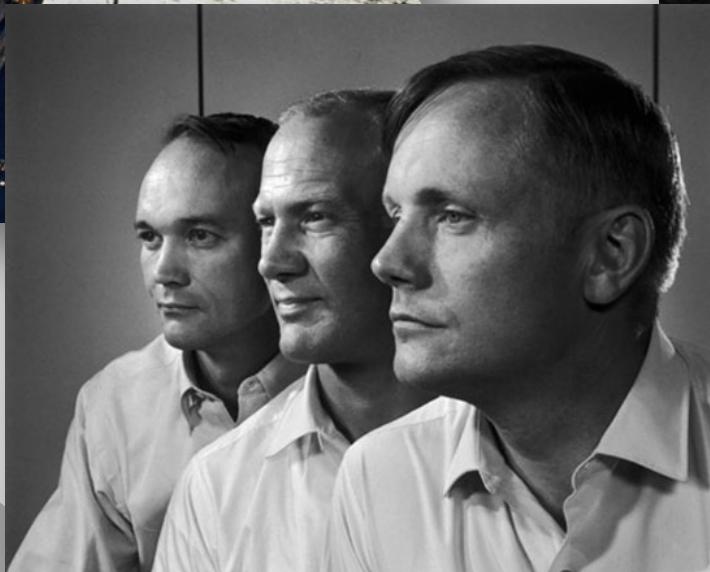
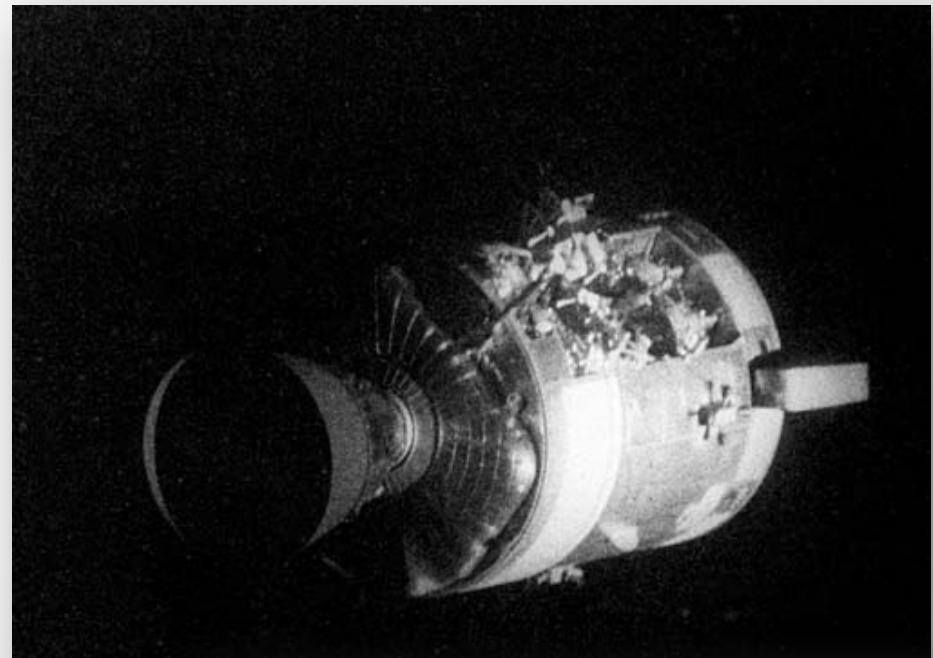
Apollo Guidance Computer

- 32Kbytes RAM
- Operation $\cong 1$ MHz

Apollo 11



Apollo 13



Solutions for Group Think

- Leader avoids stating preferences or expectations at the outset
- Leader assigns everyone role of critic
- One articulate member assigned role of devil's advocate
- Outsiders encouraged to question actions and assumptions

A composite image featuring two distinct scenes. The upper scene depicts a comet with a large, luminous, multi-colored tail (yellow, orange, red, and purple) crashing into the Earth. The impact point is obscured by a massive, billowing plume of white and grey smoke and debris. The lower scene is a photograph taken from the Moon's surface, showing an astronaut in a white spacesuit with an American flag patch on the shoulder. The astronaut is standing next to a piece of scientific equipment, possibly a seismometer or a similar lunar lander instrument. The background shows the dark void of space and the curved horizon of the Earth.

**WELL,
SHIT**