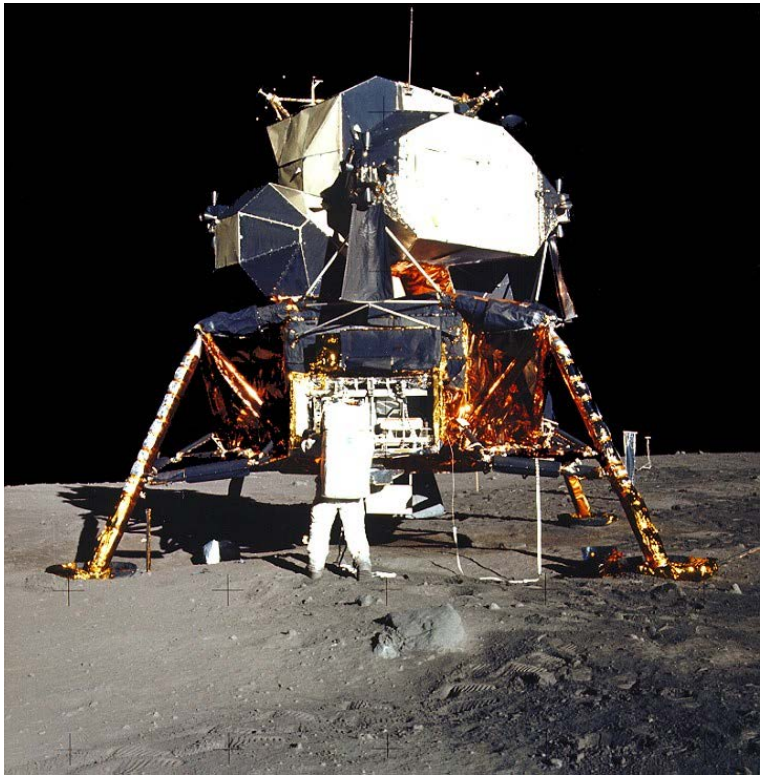
Risk Versus Risk Trades



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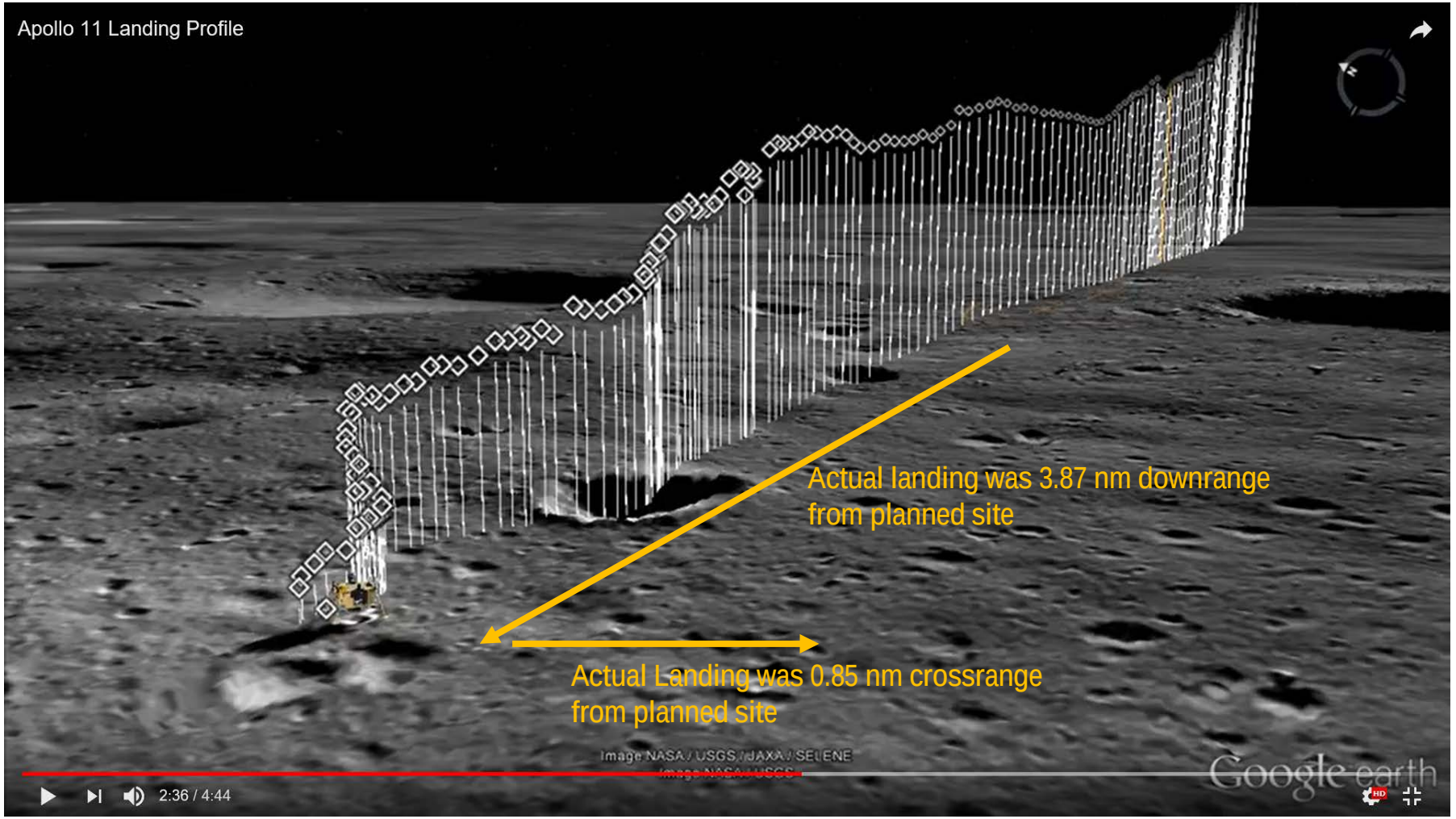
Risk and Risk Trades

- NASA's Human Space Flight endeavors all involve the management of risk, usually described as the potential for loss of the crew or loss of the mission
- Such discussions of risk, and the acceptance of the residual risk after all controls have been put in place, normally happen at a pace that allows for an in-depth, detailed discussion of the options and the risk inherent in each one
- Even the decision to do an Extravehicular Activity (EVA) on the International Space Station to repair a faulty device is reached after a lengthy discussion of the risk of the EVA versus the risk of not performing the repair
- However, not all risk trades allow the decision makers the luxury of extended discussions of options
- Such was the case on July 20, 1969, as the Lunar Module (LM) descended towards it's landing on the surface of the moon

The Trade

- After the LM separated from the Command Module, the crew of the LM began their descent to the lunar surface
- Multiple Program alarms sounded as the landing entered into the critical phase:
  - The “1202” and “1201” Program-level alarms
  - Essentially, too much information coming into the main computer, primarily from range data sensors
  - The 1202 alarm was not instantly familiar to the crewmen
    - “We couldn’t look it up in the book to see what the problem was ‘cause we were watching where we were going!” – Buzz Aldrin
- Houston Flight Controller Steve Bales gave Houston Flight the “go” to continue to landing as long as the alarm was intermittent:
  - “In the middle of landing, it was almost as dangerous to try to abort with a bad computer as it was to carry on with the landing. So balancing the risk versus risk, we decided that the safest thing would be to continue to land.” – Steve Bales
- Contrary to popular belief, several individuals from Bales, to Gene Kranz, to back-room personnel knew exactly what these Program alarms were:
  - Just two weeks earlier, the same personnel were involved in a simulation of such alarms, which had incorrectly resulted in an abort:
    - Led to four additional hours of Program alarm simulations

Lunar Landing Profile



Lessons to Be Learned

- The need to perform risk trades is extremely common in the spaceflight arena
- The element of time available to make the trade drives the need for clear and concise data being available
- In the world of operations, familiarity with the situation through simulations can aid in development of the correct, rapid response
- If rapid decisions have to be made during critical operational phases, ensure that the right information is available to make the risk trades
- Trust the people who know
- Simulate, simulate, simulate!