

### Goals of lunar exploration

#### Vision for space exploration

- is NASA shying away from this vision?
- Office of Exploration is currently looking at how we might get to Mars
- Lack of attention to biological or life sciences studies; would focus primarily on studying the Moon itself
- Examining the technical challenges

#### Why are they going back to using a capsule instead of a shuttle?

- could have something to do with thermal protection upon re-entry (so as to not repeat the Columbia accident)
- may be due to other design decisions; there are a lot of technically good reasons to use a capsule instead of the shuttle
- there's also a sense of "picking up where we left off" with Apollo (because it was successful) and develop an even better capsule
- this also fits into the goal to return to the Moon inexpensively, with already-developed technology
- shuttle was supposed to be cheap and reusable; they didn't realize how expensive it would be to refurbish the shuttles for each new flight; isn't sustainable
- NASA is planning to use a capsule-like entry vehicle for Mars, so it's beneficial both for the experience, and because it's cost-effective, to use a similar vehicle

#### Should we be bothering with the Moon before Mars?

- probably not; it's not practical for a number of reasons (technical; practical; possibility of failure may cause loss of public support for Mars; etc.)
- it could be political; the new moon project is sort of George W's project, so when this administration leaves and the next one comes in, the new administration can choose whether or not to go forward with the moon, and could "own" the Mars project instead of inheriting it

NASA has cut their R&D budget (since they have a flat allowance from the federal budget) since they're just going to use the CEV for the nearest future missions.

#### Wrap-up with students:

How do you see the Apollo program now, differently from how you saw it in Feb?

- changed my knowledge of *why* we went to the Moon (politics, as opposed to science)
- learned more about what actually happened (just the real, basic chronology and events)
- already knew the political aspect; got to see NASA's level of involvement and true interest

- seeing how much interaction really happened between different groups and organizations, and how decisions were jointly made and not just made by one group of administrators
- interesting that decisions could be made so quickly, and how people at the bottom of the hierarchy could easily interact with people at the top
- didn't realize just how large the program was
- usually, you just see the finished product; was interesting to see the process in action, to be reminded of how precarious it was sometimes, that they weren't totally certain that it would even work

Was Apollo managed well, or poorly?

- seemed like it was managed well, but they did get lucky a lot with things coming in on-budget and on-schedule
- seemed like it was managed very well, but there were a number of factors (for example, a small number of stakeholders) outside of the project's management that made Apollo successful

The historical importance of Apollo is changing; it was important at the time because they thought they were just the first of many nations to go the Moon. When no one else did, Apollo is important because it's the *only* time humans went to the Moon. Now that we may be going back soon, its original meaning might come back.

Technological progress is measured differently now than it was then; after 1970, planes stopped getting "bigger, faster, more powerful" but no one would argue that progress has stopped. It has to do with commercial, social, environmental, and other economic factors.

- Apollo was actually when you stopped bragging about how big your computer was, and instead about how small it was
- There are a lot of interesting ways to think about Apollo's place in history, and one is definitely that it was a turning point in our technological "values"

Scientists pride themselves on doing research into the basic truths about the universe; Apollo wasn't done for economical or commercial reasons, and it could be seen as research into fundamental *engineering* principles. It's not really fair to consider it "useless;" the whole point is thinking imaginatively about what is possible.