Lecture 4   Systems Engineering and Atlas

Terms in Launius:
Mythology: stories that have a cultural significance; this term does not necessarily mean that something that is a hoax or a lie.
Master Narrative: academic way historians use to describe taking a messy, complicated thing and, over time, boiling it down into its essential, "important" parts.

Primary sources vs. secondary sources: primary sources are people who were involved in the event itself, or materials created right at the time of the event, etc. Secondary sources are interviews of those people, or newspaper reports at the time about the event, or a review of written source materials, etc.

"Systems"
Physiological systems (circulatory system or nervous system)
Systems of philosophy (coherent sets of ideas)
Dynamic systems, like the solar system

System diagramming was an intellectually important development in engineering because it's an abstraction; a way to represent many different problems in a similar way.
       -   corresponding hardware is an analog computer

Analog computer – switches close or open based on holes in the paper tape. Someone at MIT (who later went to Bell Labs) made the analogy between open/closed switch states with 0/1 (0 – open, 1 – closed). Called this "digital" computing.

Sometimes, treating something as a giant predictable system doesn't really work (McNamara's Pentagon during Vietnam – numbers (body counts) and computer simulations of the war didn't predict the local conditions which produced the actual results).

In Apollo and other major projects, there was tension between the systems engineers and the manufacturers based on the differences in perceived intellect required for their jobs, differing pay scales, etc. The MIT group (Draper) fit somewhere in the middle of the various extreme ends.

The organization and trade-offs between groups of people is its own dynamic system.

(Shea left due to blaming himself for the Apollo 1 fire; practically had a psychological breakdown.)

Software guys ended up being overwhelmed because everyone wanted to model everything; wanted new simulations to try to solve various practical problems.

Black boxes simplify problems to make larger-scale modeling easier. Joe Shea was a fan of the white box system as opposed to black box; white box systems allow you to see all the minute levels of detail.

All of the Apollo accidents happened due to unexpected interactions between the major pieces of the system. The people who designed the system were only a phone call away.