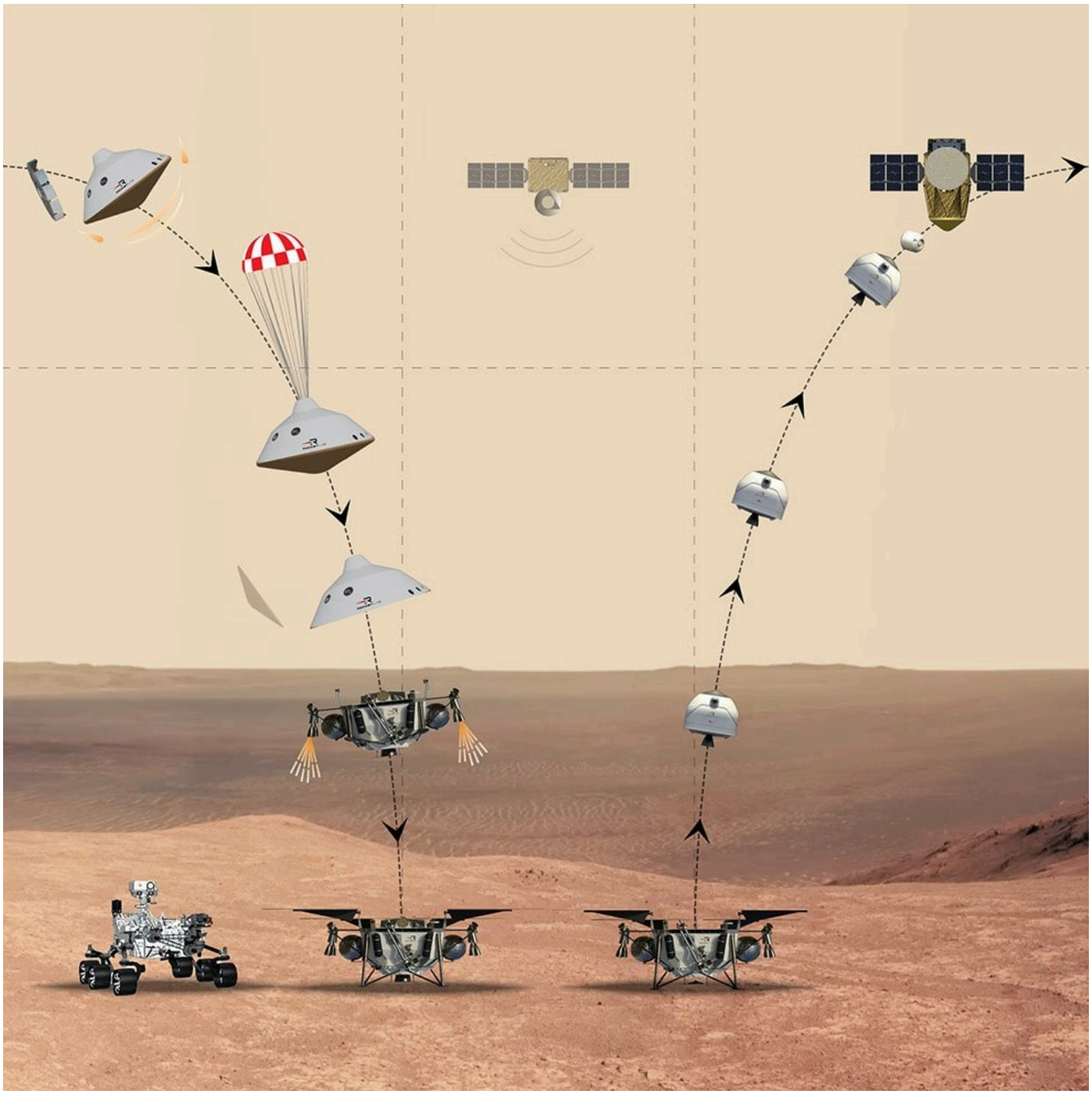
The End State of NASA

Feb 8, 1925 - 1110 words

Christopher Kalitin Blog (https://ckalitin.github.io/posts/nasa-end-state/)



This shows Rocket Lab's Mars Sample Return (MSR) architecture, a look at an extremely ambitious commercial planetary science mission.

In my other (https://ckalitin.github.io/space/2024/08/12/extrapolating-demand-firefly.html) blog (https://ckalitin.github.io/space/2024/07/04/small-sat-constellations.html) posts (https://ckalitin.github.io/technology/2024/01/07/analysing-neutron-competitively.html) I've done analysis on the commercial satellite launch market based on data and an understanding of economics and the industry. Now I'll foray into the famously difficult to predict relm of government/politics/bureaucracy.

A more complete proof of the previous blog post

Peter beck MSR article: https://spacenews.com/bringing-mars-to-earth-solving-mars-sample-return/ (https://spacenews.com/bringing-mars-to-earth-solving-mars-sample-return/)

Jared Isaacman thoughts: https://x.com/SciGuySpace/status/1915800015781429444 (https://x.com/SciGuySpace/status/1915800015781429444)

Rereading Notes

Notes from rereading NASA's Fucked:

- Get more (& more concrete) examples of cost plus contracting being a negative
- Find counterexamples of cost plus being a positive
- Artemis is an example of NASA being horrible at systems engineering
- Why was it good at systems engineering during Apollo? What was the management structure and how is it different now?
- Dispersed centers make for more senators fighting on your behalf, and perverting your architecture
- Centralized decision making allowed for more coherent architecture and design choices
- Find counterexamples where government is more efficient than private industry (Probably not in the limit)
- Find correlaries in history of a transition from government architectures to buying rides on commercial architectures

More notes:

- First principles proof for why the end state of NASA is buying commercial capabilities
- What are NASA's responsibilities in the limit? (R&D? Funding early development? Experimental programs? Human exploration? Why even explore with humans?)
  - Essentially, do what is useful and private companies won't do (Find correlaries)

- This is a path-dependent process. Whether NASA has naming rights on the Mars colony is path dependent, can you be useful to SpaceX?
  - Not driving for the end state leads to a diminished role for NASA in the limit
  - Being proactive accelerates the beautiful future
- Consider end-to-end space companies and they're role in providing the full mission architecture to NASA (NASA sets goal, Rocket Lab builds the lander, orbiter, return capsule, etc.)

CLD!

https://arstechnica.com/space/2025/08/as-the-end-of-the-iss-nears-nasa-shakes-up-program-for-commercial-replacements/ (https://arstechnica.com/space/2025/08/as-the-end-of-the-iss-nears-nasa-shakes-up-program-for-commercial-replacements/)

Old NASA CLD model:
Companies supply preliminary design studies (and maybe some hardware if they want) and then choose a contractor or two to build out a station.
Phase 2 would have been firm-fixed price contracts for certification of designs on the ground without hardware in space and "services".

New NASA CLD model:
Multiple participants receive Space Act Agreements.
Formal design, acceptance, and certification will come in a follow-on certification phase, well after the Space Act Agreements phase.
Certification happens after they fly.
25% of milestone funding withheld until a successful in-space crewed demo. Minimum capability NASA is seeking is 4 crew for 1 month.

Benefits of this model:

- Companies incentivized to build hardware and demonstrate their capabilities to continue in the competition.
- Companies can build their own business models and architectures and get NASAs business in a broader sense than a strict design contract (Apollo model was like this too?).

The space companies that will be successful in the future will self-fund their own development programs. They will then sell this capability to NASA and other commercial customers, building a product that is useful to customers before the customers explicitly request it. Eg. SpaceX, Rocket Lab, Vast, Firefly (Lunar reconnaissance), etc.

Anduril too https://x.com/anduriltech/status/1953163828671463557 (https://x.com/anduriltech/status/1953163828671463557)

The reason Vast is using Falcon Heavy's for Haven 2 is the difference in cost between a marginally larger module vs. marginally larger launch vehicle. Cheaper to make a bigger rocket, Handmer.

Counter to new CLD strategy: https://payloadspace.com/op-ed-nasas-new-cld-strategy-will-lose-mars-leo-to-china/ (https://payloadspace.com/op-ed-nasas-new-cld-strategy-will-lose-mars-leo-to-china/)

Pam Melroy on CLD

"Acting Administrator Sean Duffy merely issued a directive to change the acquisition strategy for NASA's commercial follow-on to the ISS." As long as he's right, I don't mind!

Claims:

1. This delays final competition for services (Final as in for a full station? This appears correct, with hardware intermediary steps)
2. No requirement for long duration flights (only 4 crew 30 days), correct. Incentivizes must be alligned for a full station in the end.

Emphasis on requirements definition. Yes. Good idea. Constant changes lead to schedule delays and cost overruns.

Medical community wants 100 6-9 month flights before Mars. Guys we're fine, fucking send it.

Crew rotating every 30 days is obviously terrible for cost, more crew launches bad for cost.

Claims giving up continuous presence is bad for commercial station's business model. Whats worse is not having a minimum viable space station and lack of on-ramps to the program. Validate hardware!

Is it clear who will pay for the 4-crew 1-month certification flight of the station to proceed in the competition. If it's like commercial crew and the company pays, then this is fine. NASA can request the capability for 6 month flights, and should make this explicit now!

Focusing on short-term now leads to more transport costs short-term and more costs to upgrade to a full station later. Well, it seems a short duration station is on the critical path to a long duration station. Still, it should be clear that a long duration station is the goal.

Why are we in LEO again? Because the Chinese are? "Research"?

Companies say they need a final competition for funding sources to sign on. Not a bad argument, this strategy may burn more private money in the short term. Also, we want to incentivize private investment through open competition, but want that investment to not be freaked out!

Claims of reducing competition, but does save money up front. Reduce competition because of lack of funding? Minimum viable products guys! This is how we avoid a self-licking ice cream cone!

She was deputy NASA admin under Biden. Fuck we could have had Isaacman

https://spacenews.com/vast-backs-new-nasa-commercial-space-station-strategy/ (https://spacenews.com/vast-backs-new-nasa-commercial-space-station-strategy/)

“Haot disagreed, calling the demo a steppingstone to a permanently crewed station. “If you say, ‘I want permanent presence on day one,’ all you do is you delay when you see that,” he said.”

Astroforge

Jared Isaacman: “cool company”

Private company developing the capability of Asteroid flyby and landing with significant payload capacity.

And hardware rich!

https://x.com/rookisaacman/status/1953958880222097910 (https://x.com/rookisaacman/status/1953958880222097910)

Gialich went to JPL in 2021, could’ve gotten a position there, he saw Europa Clipper and thought this shouldn’t cost $5B. AstroForge should do science!

https://www.youtube.com/watch?v=NuT4p0QbTO4 (https://www.youtube.com/watch?v=NuT4p0QbTO4)

explore, and grow https://x.com/MattGialich/status/1955344699591659962 (https://x.com/MattGialich/status/1955344699591659962)

The goal of NASA:

“However, in abandoning Earth science, NASA would be violating the law that created the agency, the National Aeronautics and Space Act of 1958.

This charter legislation established “the expansion of human knowledge of phenomena in the atmosphere and space” as part of the space agency’s core mission. To meet this mandate, NASA

has typically spent about 10 percent of its budget annually on Earth science, including key missions to observe the planet’s atmosphere, monitor weather, study land use changes, and more.”

https://arstechnica.com/space/2025/08/nasas-acting-chief-calls-for-the-end-of-earth-science-at-the-space-agency/ (https://arstechnica.com/space/2025/08/nasas-acting-chief-calls-for-the-end-of-earth-science-at-the-space-agency/)

Better capital efficiency of private companies, Jared Issacman: https://x.com/rookisaacman/status/1959816251154268412 (https://x.com/rookisaacman/status/1959816251154268412)