WHAT I WISH I KNEW THEN

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CI-Compass Workshop
January 2024
Our facility is pretty much 100% CI, instead of it being a small component.

That said, nearly half the money is acquisition of the datacenter – 20MW of power, liquid cooling for 150KW/server rack.

Major components are the physical plant, the compute and storage systems, and people and software.
“UNEXPECTED OUTCOMES” – SURPRISES ALONG THE WAY

- First, technology planning 8+ years in advance is sort of a futile exercise.
  - For instance... I’m not sure “AI” was mentioned in the original proposal (written 2017)
  - Now LCCF is the “Cornerstone of the NSF NAIRR investment” in 2025.
- Every vendor roadmap was completely wrong.
  - Fortunately, we were able to reasonably extrapolate power/cooling requirements.
  - Mostly *not* by believing NVIDIA, Intel or AMD.
  - The “leaders” in the industry are completely different.
    - (Mostly the same people, but they’ve all switched companies. Twice.).
- The trajectory on using the Cloud (or not) has also not really changed – costs continue to shift in favor of building the facility (cloud prices have tripled, effectively, more for AI).
“UNEXPECTED OUTCOMES” – SURPRISES ALONG THE WAY

- The most surprising shift from Conceptual to Preliminary design was datacenter strategy.
  - Moved from an on-campus site built datacenter to a colocation services agreement.
- Serious increases in construction costs and timelines from campus and (monopoly) municipal utilities.
- Fortunate convergence of a datacenter building boom, near to our staff, with timing that allowed us to customize the facilities as they are built to meet our needs.
“UNEXPECTED OUTCOMES” – SURPRISES ALONG THE WAY

- For what started as a Leadership Computing project became a project where I spent a lot of time thinking about the data lifecycle, and added a lot of pieces to the design around that.
  - (BTW, spinning hard drives disappeared from the plan along the way).
- In retrospect, this needed even more attention.
- Along with the data shift, a lot more interactive computing, persistent services, and other “not leadership computing” modes – we designed that in the hardware plans; software/people costs are higher for these modes though (more than anticipated).
- ECSS disappearing from the XSEDE ecosystem is likely something we should have compensated for a little more… but that decision was made 4+ years after planning started.
“BEST PRACTICES”

- As always, the best practice is never to underestimate the demands of the MREFC process.
  - Not sure it is theoretically possible to overestimate this.
- We had a lot of users generating requirements early on.
  - They were mostly wrong... it is important to filter this.
  - E.G., almost none of the people at the initial end user workshop talked about AI.
  - Taking broad trends/directions from this was way more important than trying to deal with the specifics.
    - If we kept to the details, we would have built a great system for three years ago.
LESSONS LEARNED

▶ Pretty much every time I made a major change that made me feel queasy but was to accommodate a panel or government recommendation I regret not pushing back harder on.
  ▶ I have found many of the issues some of the stakeholders cared about 5 years ago they have forgotten about or been supplanted by new more urgent issues.
  ▶ A lot of this is trusting your team’s vision of the future, not what past data supports.
    ▶ For instance, I had no basis in historical data (that I could use for a panel or an auditor) to rationalize a large investment in AI.
    ▶ Yet, duh.
    ▶ Turns out we are the subject matter experts.
WHILE YOU ARE WAITING

- We have lots of systems available now, or bridge systems available shortly.
  - Vista will have 600 NVIDIA Grace-Hoppers, available by April (servers hopefully on one of the ships outside. . .).
  - New Intel and NVIDIA systems this year, new AMD last year.
  - Archive and online data systems available now.
  - Frontera still has half a million CPU cores.