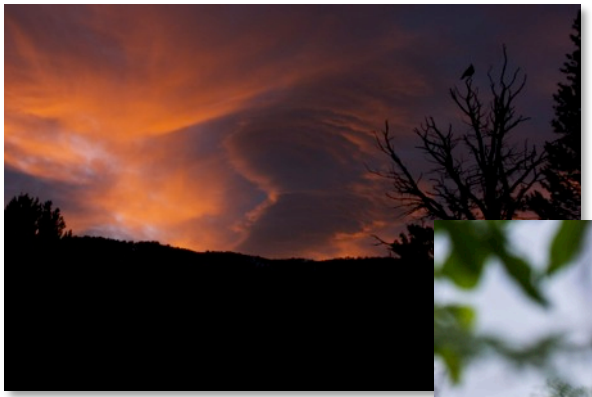
Computing at High End: Fastest, Cheapest, Soonest?

Andy White
Los Alamos National Laboratory,
Retread

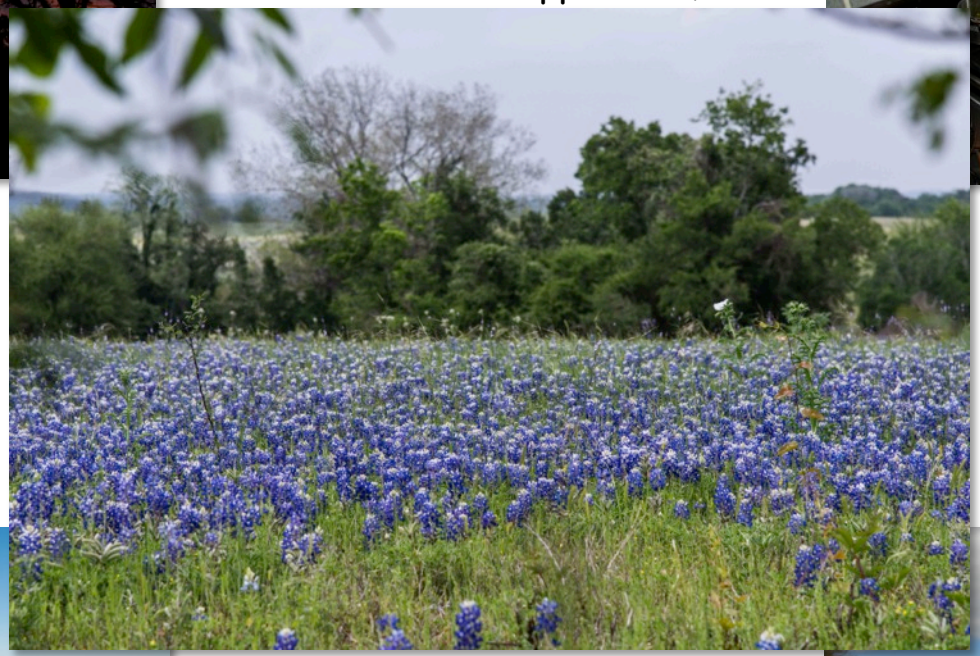
Congratulations
on 30 years of leadership in
Computing
Computing

So, how is retirement?



Up early in CO

Bluebonnets in Chappell Hill, TX



Dirt Candy

Salishan done right

Fishing in MO

So, it's OK.

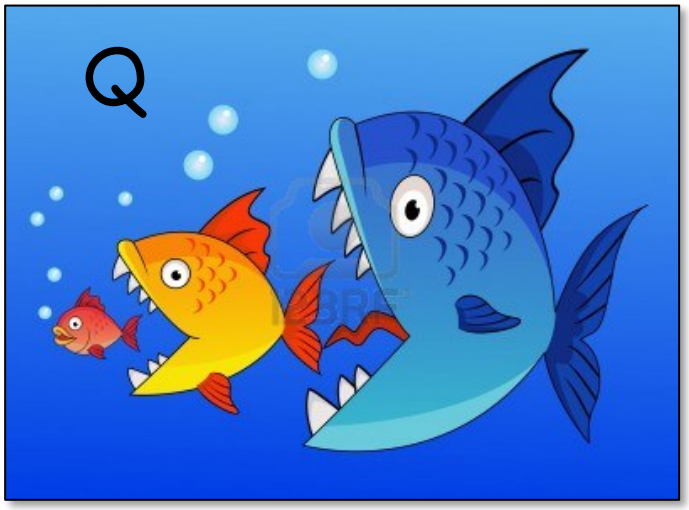
Scope, Schedule *and* Budget?

Our history of acquisition of high-end computing and advanced technology is replete with examples of constraining *scope, schedule and budget*, leaving open no path to success when things do not go as planned.

"Plans go to hell as soon as the first shot is fired."
Jack Reacher.

"Any sufficiently advanced technology proposal is indistinguishable from the truth."
nee Arthur C. Clarke.

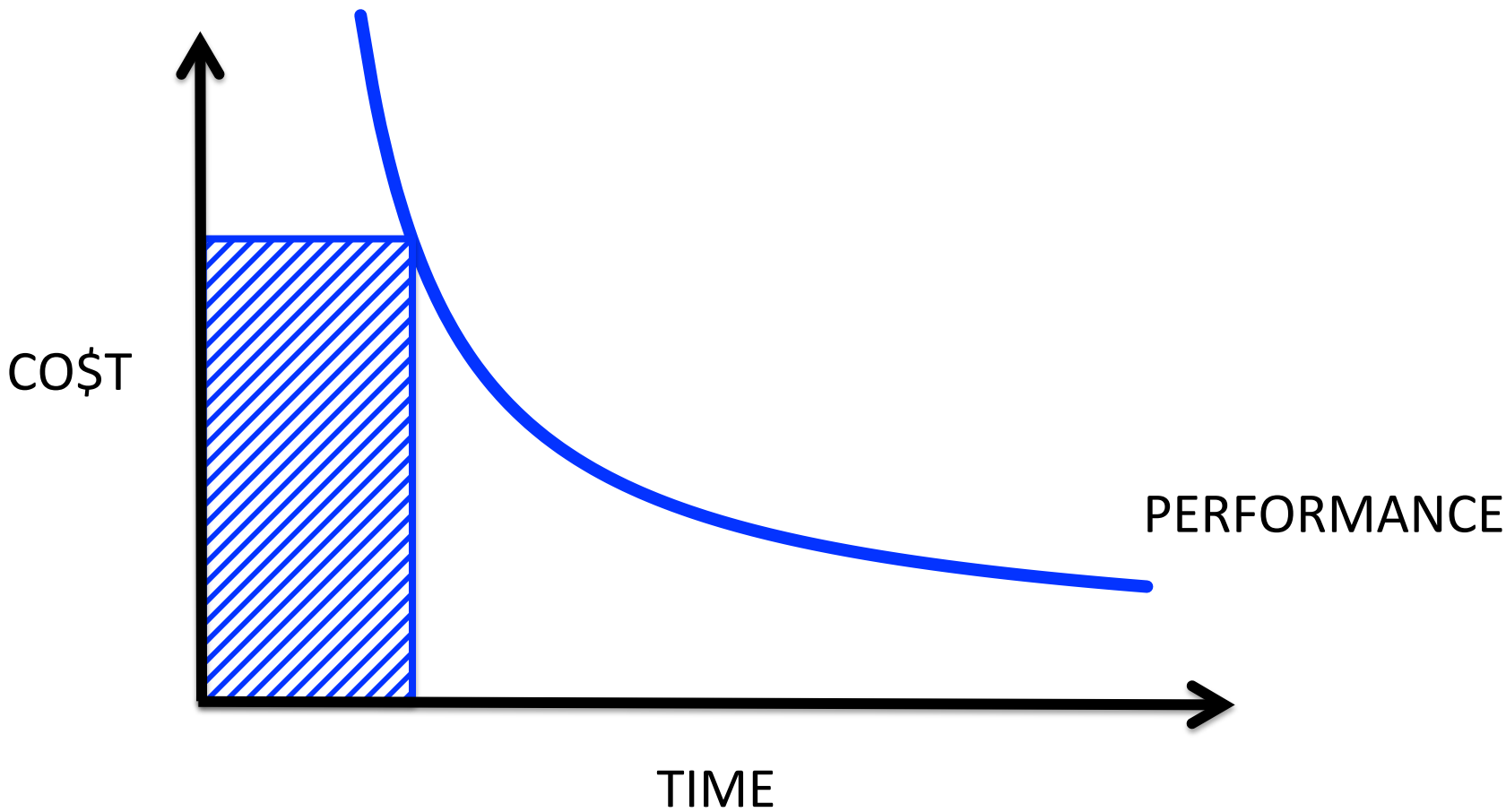
I am sure this has never happened to you



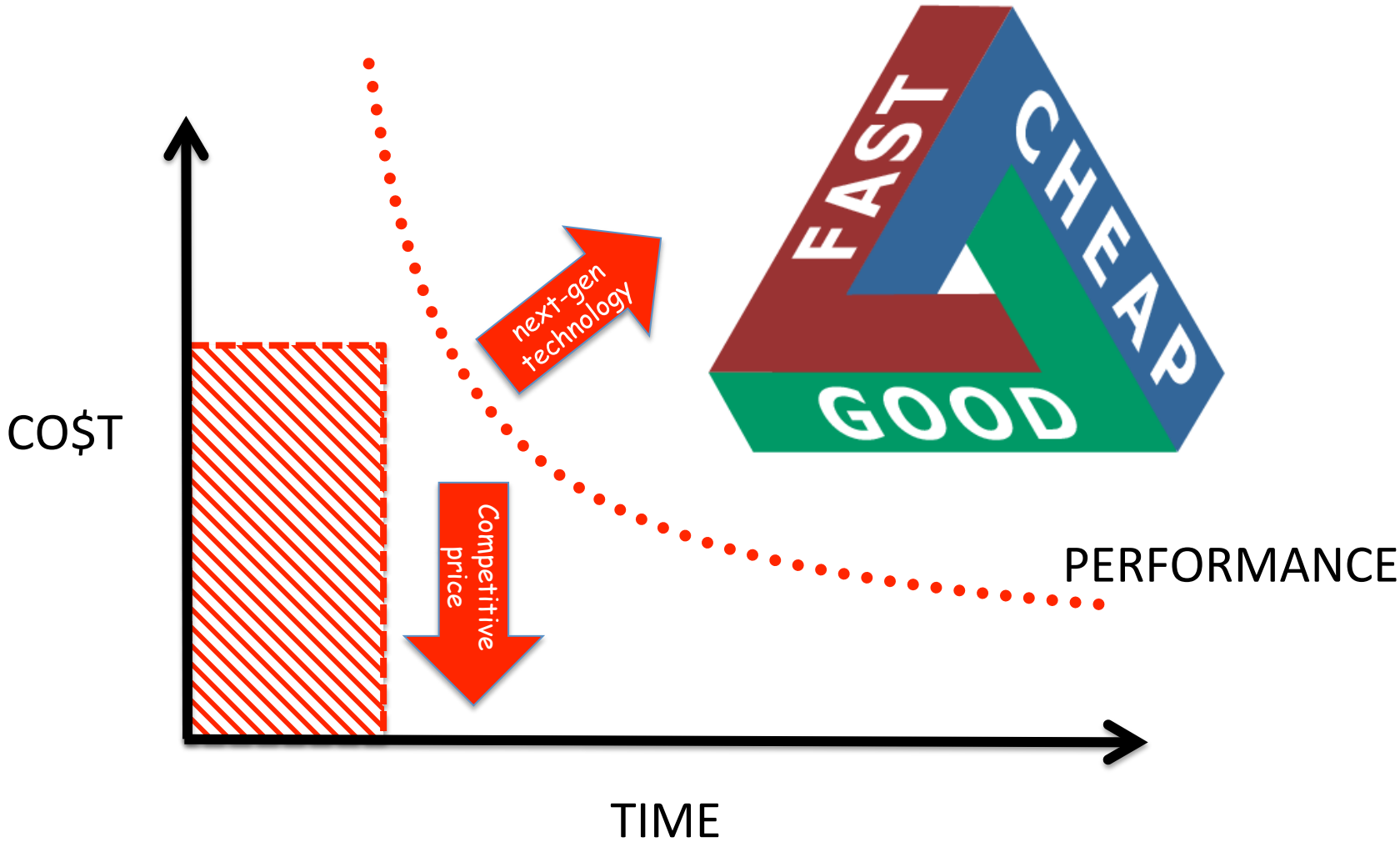
We even tried to exclude next generation technology in procurements

"The preeminent requirement of this new system is the minimization of implementation risk to Los Alamos. The Conejo cluster must be delivered with proven technology that has been previously deployed by the proposer in similarly large systems that LANL can verify. <u>We value tested technology over the most recent technology.</u>"

Thinking Process



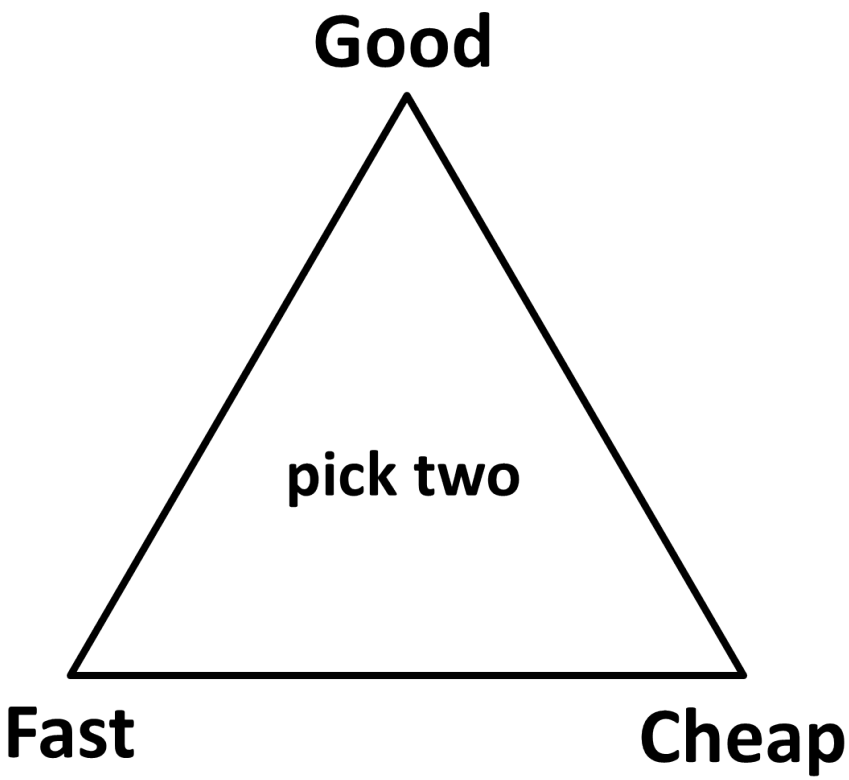
Competitive (or Fantasy) Process



Then we select the *best-value* fantasy and write a contract.

The question on the table is, 'Can we squeeze scope, schedule and budget and expect success?'

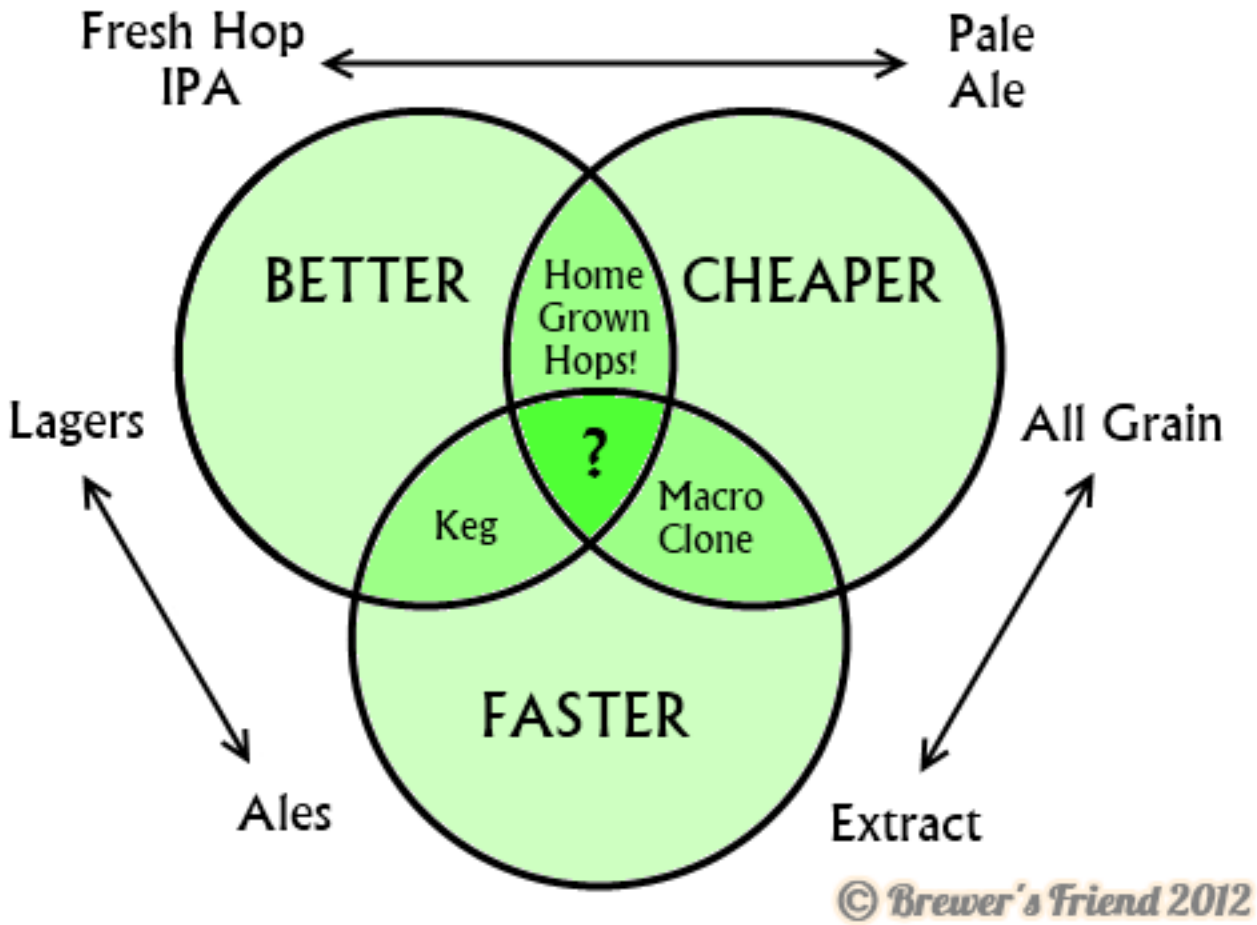
Conventional engineering *wisdom*



"No"

"Rarely"

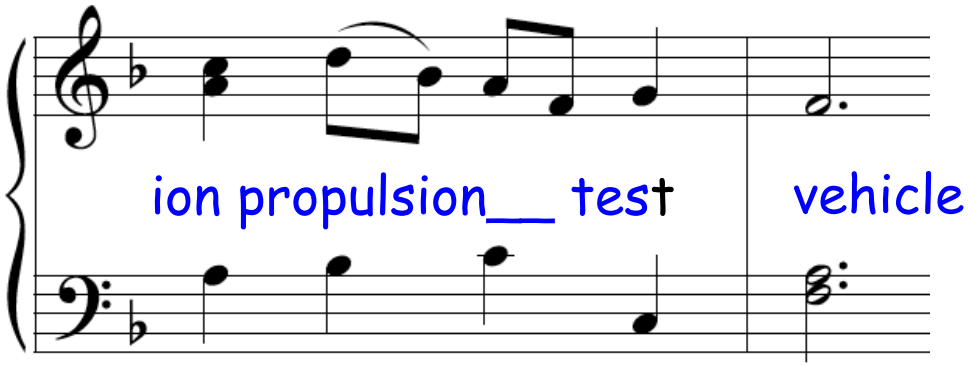
Conventional brewing *wisdom*



"Wanna beer?"

Faster, Better, Cheaper (FBC)

- Dan Goldin instituted "Faster, Better, Cheaper" in 1992 as NASA's new business model
- There were 16 missions from 1992 to 1999
  - Five missions to Mars
  - Four Earth orbiting satellites
  - Three space telescopes
  - Two comet and asteroid rendevous
  - One mission to the moon
  - And an



Are NASA's experiences sociologically relevant to DOE Labs

- Centers want a long term, stable funding environment
- Centers should guard against a shift from basic research to development
- Centers have a reluctance to projectize
- Centers are stand-alone and protective in times of reduced budgets

Report cards on FBC

- 9/10 Missions successful in first generation of FBC
- 5/6 Missions failed in second generation
  - MCO lost upon arrival at Mars
    - ground-based subroutine used Imperial rather than metric units to calculate small_forces
  - MPL lost upon arrival at Mars
    - most plausible cause was early shutdown of descent engines due to faulty on-board software detection of touchdown

1. *Mars Climate Orbiter Mishap Investigation Board (1999)*
2. *Report on project management in NASA (2000)*
3. *Report on the loss of the Mars Polar Lander and Deep Space 2 Missions (2000)*
4. *NASA FBC Task final report (2000)*

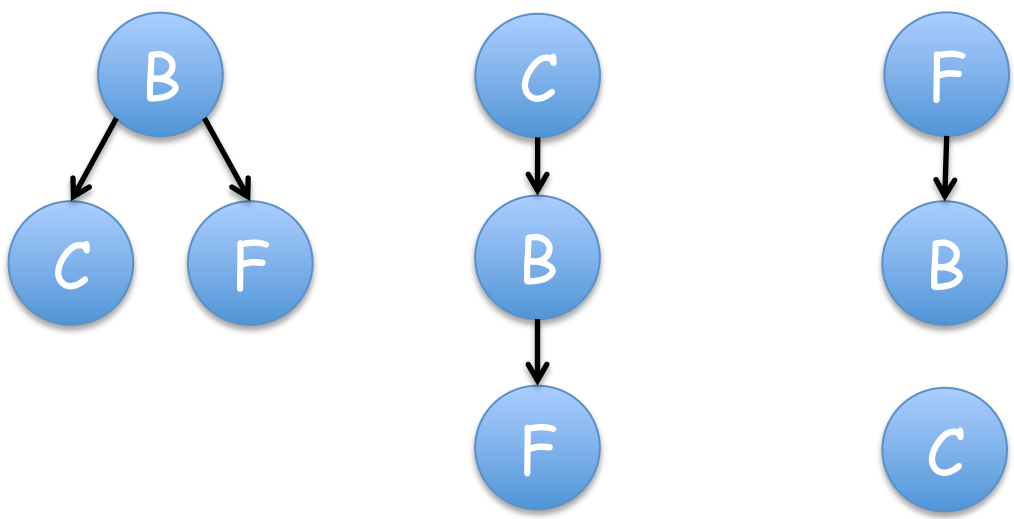
5. *The lost art of program management in the intelligence community (2006)*
6. *Can we build software faster and better and cheaper? (2009)*
7. *Faster, better, cheaper revisited. Program management lessons from NASA (2010)*

and now, the rest of the story.

- *Faster, Better, Cheaper* was successful as a motto for cultural change at NASA
  - "sociological and cultural – not procedural"
  - Amazon produced 5,127 matches to "Books/FBC"
    - Making marriage work in retirement
    - Faster, better, cheaper and sexier
- "The challenge bar was raised too high for some of the second-generation Missions. The cost cap challenges were too great, along with … escalating requirements."
  - And in the case of the Mars Missions, a constrained schedule

and the answer is ???

- Different motivational phrases
  - "Mission success first"
  - "Slow down"
  - "Back to basics"
- Partial orderings of FBC



The details confirm some things we have known all along

- Contingency
  - Project and program should hold adequate contingency reserves to assure that missions success is achievable
- Scope
  - Make sure that scope fits within constraints
- Staff
  - Absolutely key ingredients are qualified staff and an environment that makes them want to come to work
- Partnership
  - Must be communication and partnership among contractors, centers and HQ

Happy Iodine Anniversary