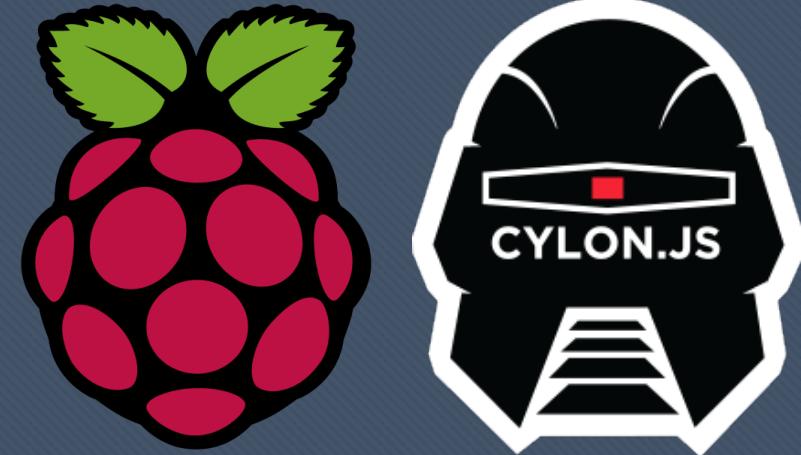


Managing Technical
Debt in Space.

Managing Preventing
Technical Debt in
Space.



Writing Deep Space Exploration Software for Raspberry PI CAT CubeSats

Inspired by Dr.
Sandy Antunes
Project Calliope



What?

Managing Technical Debt in Space

- Brief History of Space Software Development
- Technical Debt
- Old vs. Modern DevOps
- Future Quantum Solutions

/ Tables Text

Who?

Managing Technical Debt in Space

- Those building CubSat and Pico Satellite Software
- Helping ensure your CubSat doesn't go boom because of software
- College Under/Graduates looking to get into the Software & DevOps game
- Anyone sending Arduino, Raspberry Pi, and Cylon.js to space

/ Tables Text

Legacy for the Next Generation

Get girls in STEM.



Sydney
Reader.

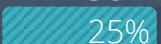
READING



LIKE HER MOTHER



DEAR GOD LIKE ME



Rowan
Tinkerer.

TINKERING



LIKE HER MOTHER



DEAR GOD LIKE ME



?

... work in progress...

???

LIKE HER MOTHER

DEAR GOD NOT LIKE ME



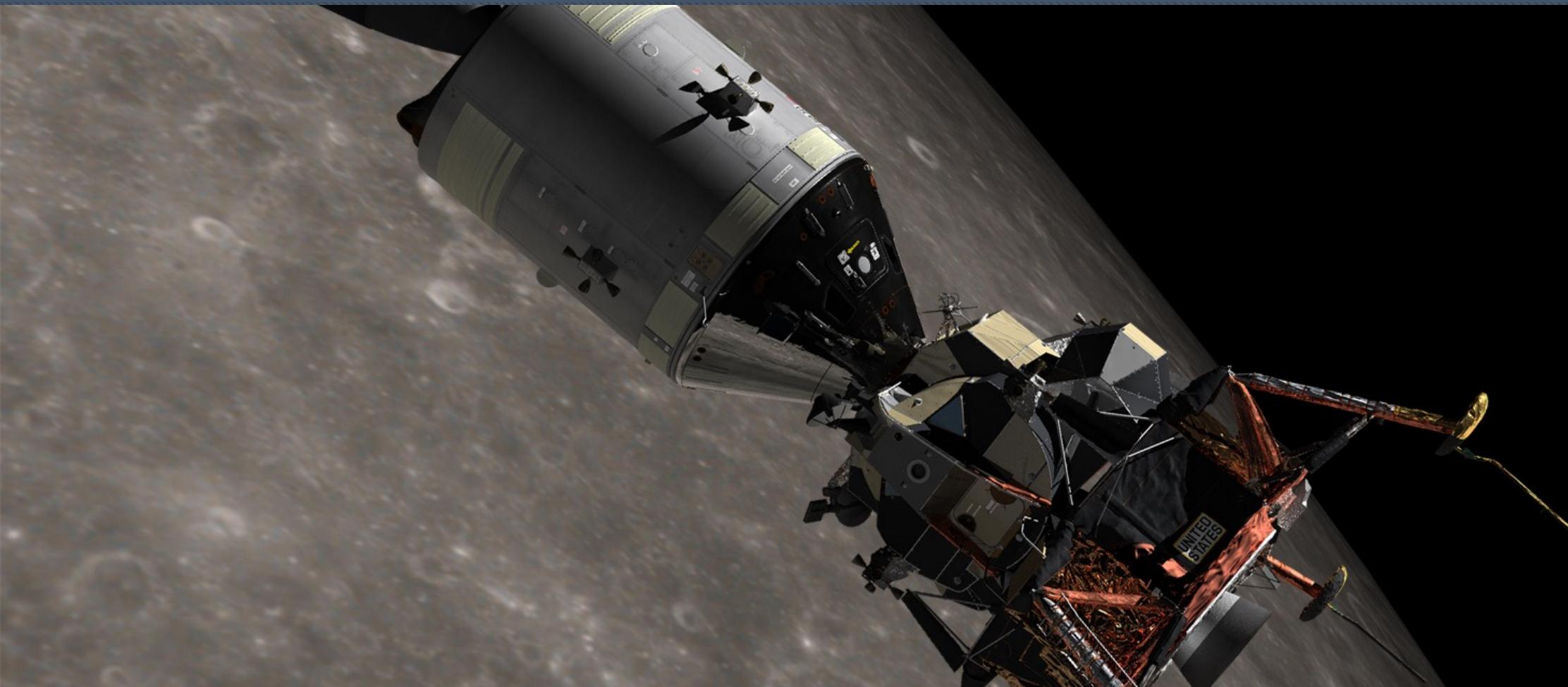


Brief Space Software Dev History

Failures & Successes

Apollo 11

Put first humans on the moon.



Margaret Hamilton

Director of software programming for Apollo & Skylab

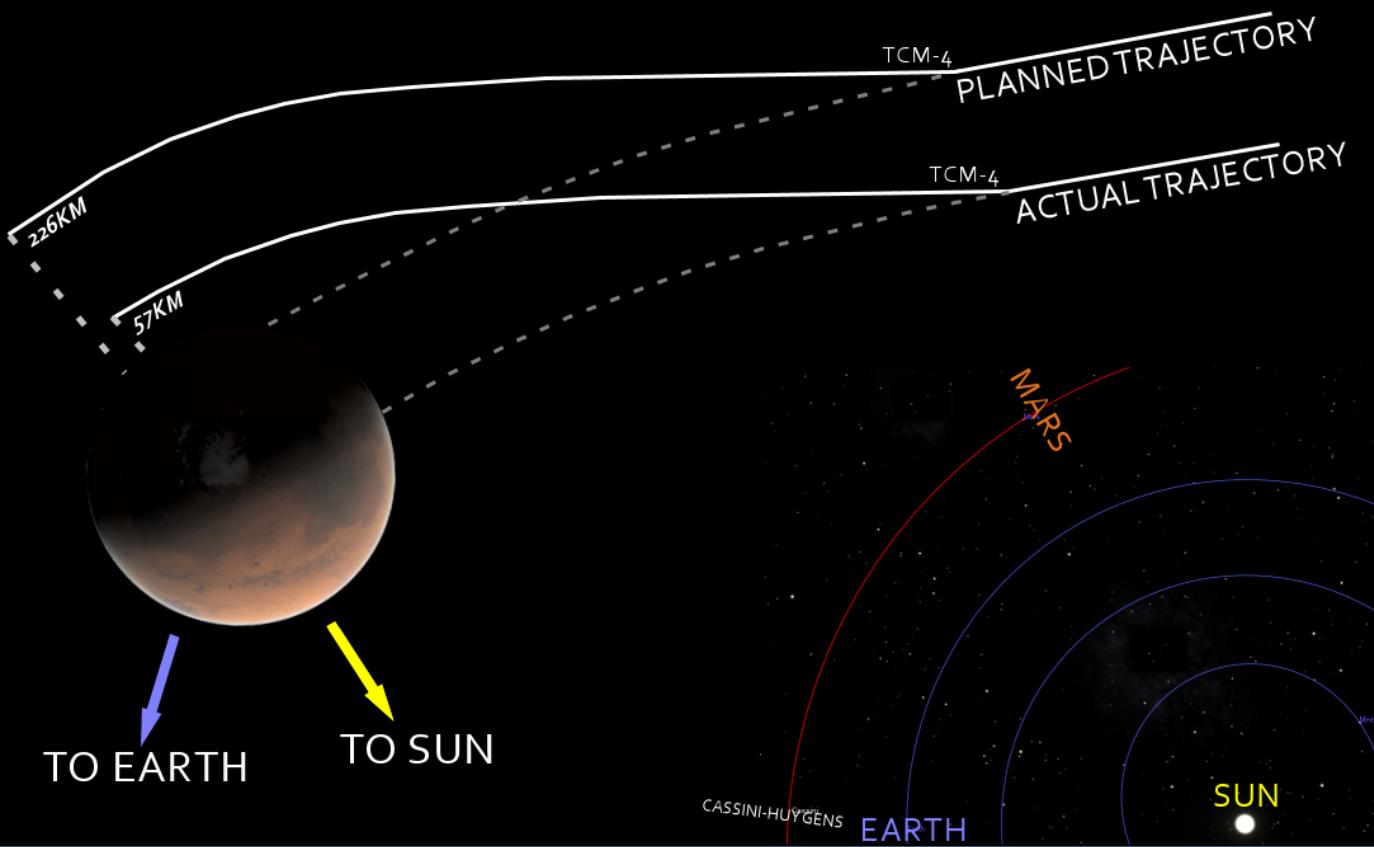
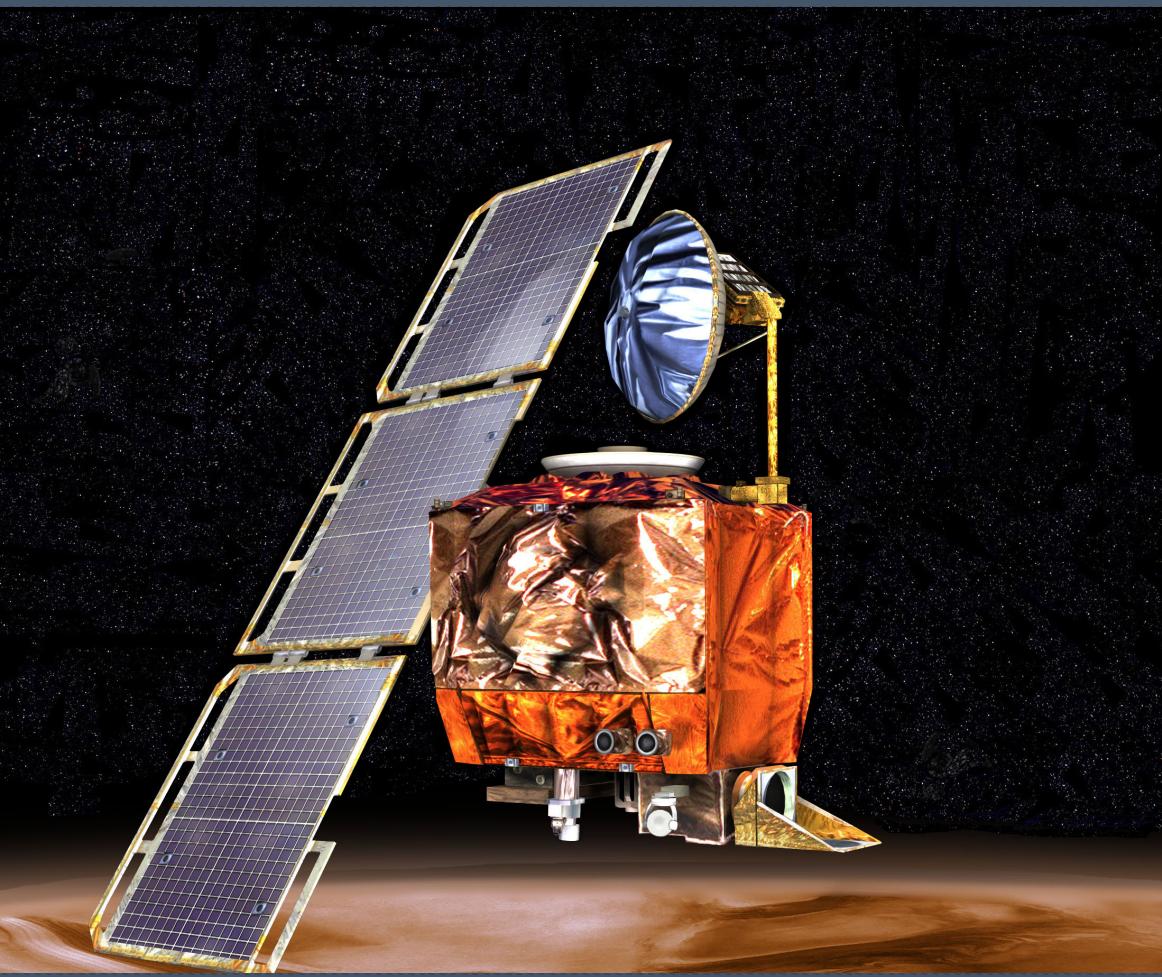


Apollo Guidance Computer



Mars Climate Orbiter

Study Martian climate, atmosphere, and surface.



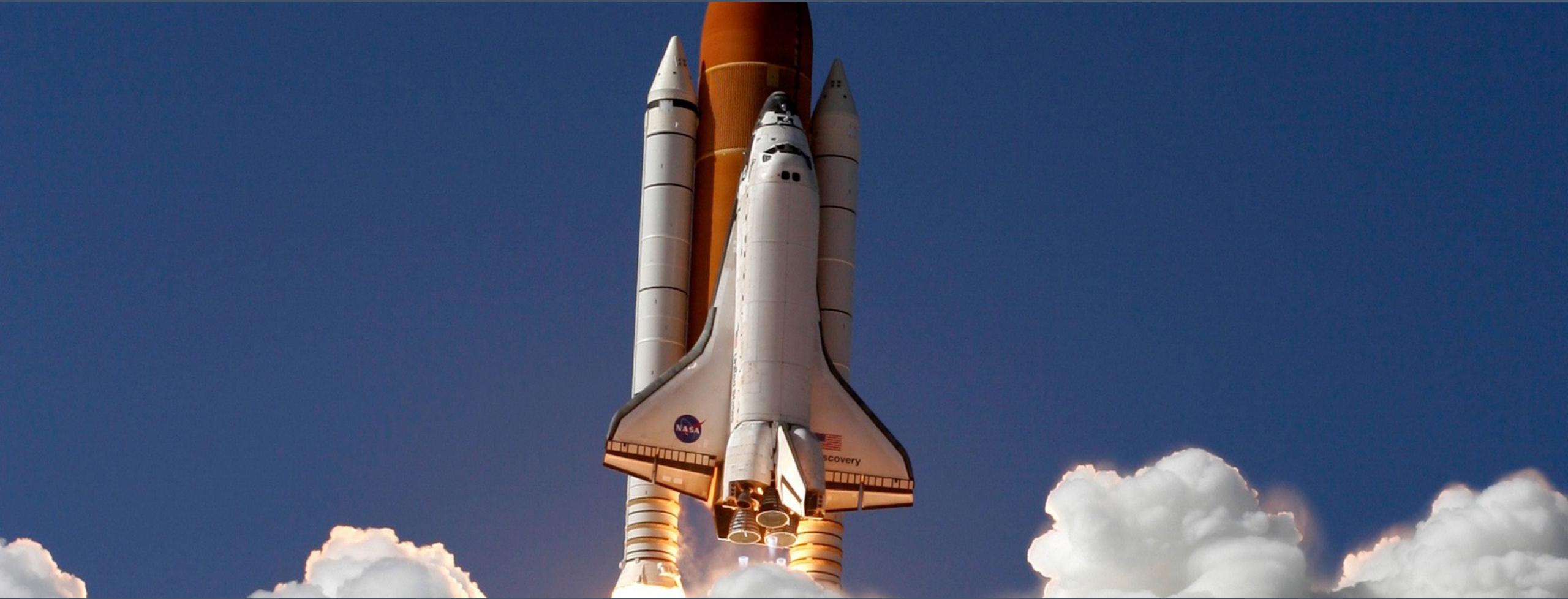
Saturn V



Ariane 4 and 5



Space Shuttle





Technical Debt

<https://medium.com/@joaomilho/festina-lente-e29070811b84#.iuhs8io61>

Debt With Interest

https://en.wikipedia.org/wiki/Ward_Cunningham

● Cowboy

○ Consulting

● Normal



/ Charts Data

Is Debt Bad?

Based on Niall Ferguson's work

"credit drives innovative societies"

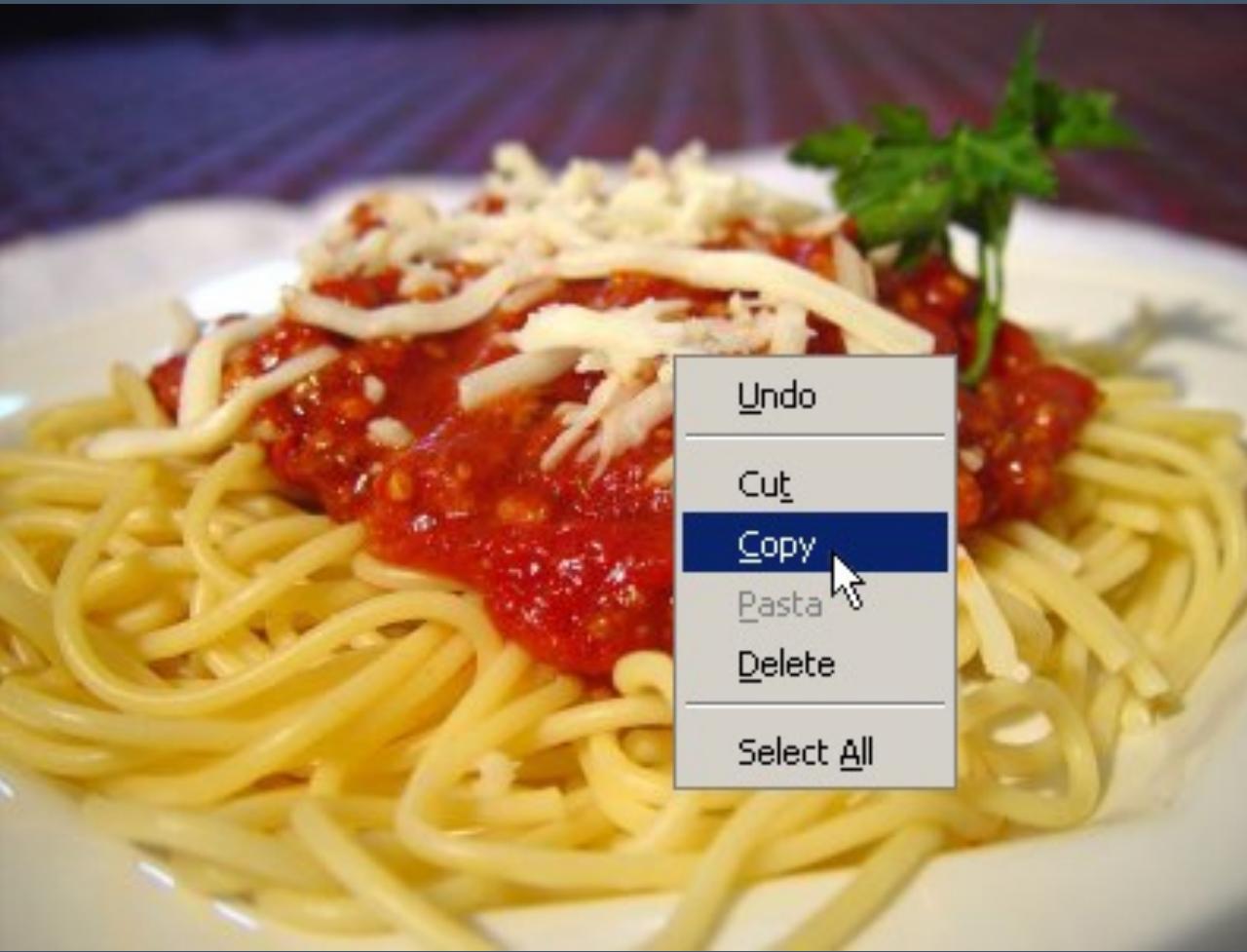
No trust & economical institutions in place

== stagnation



Metaphor for Non-Technical Managers

(picture of copy pasta & Brazil Favelas)

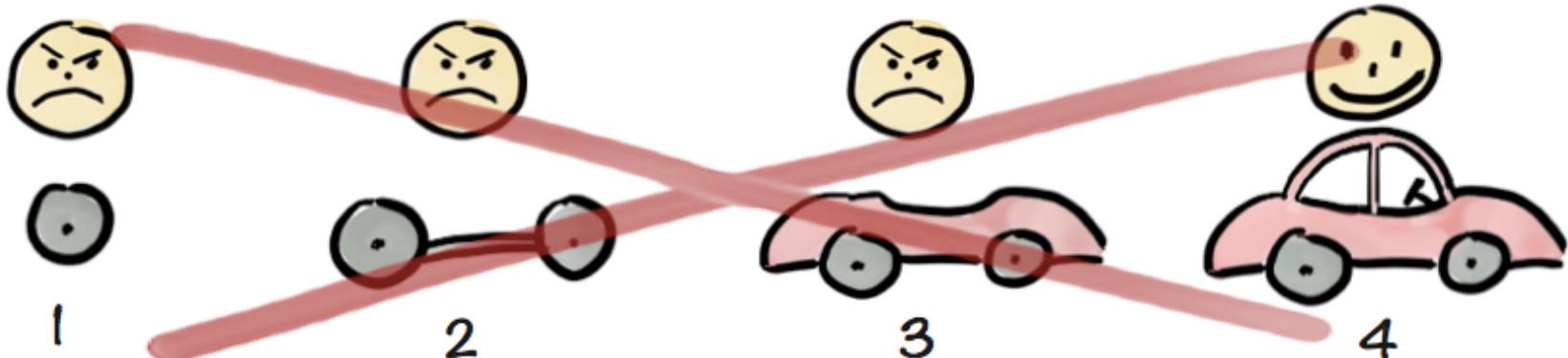


Why? It's A Strategy.

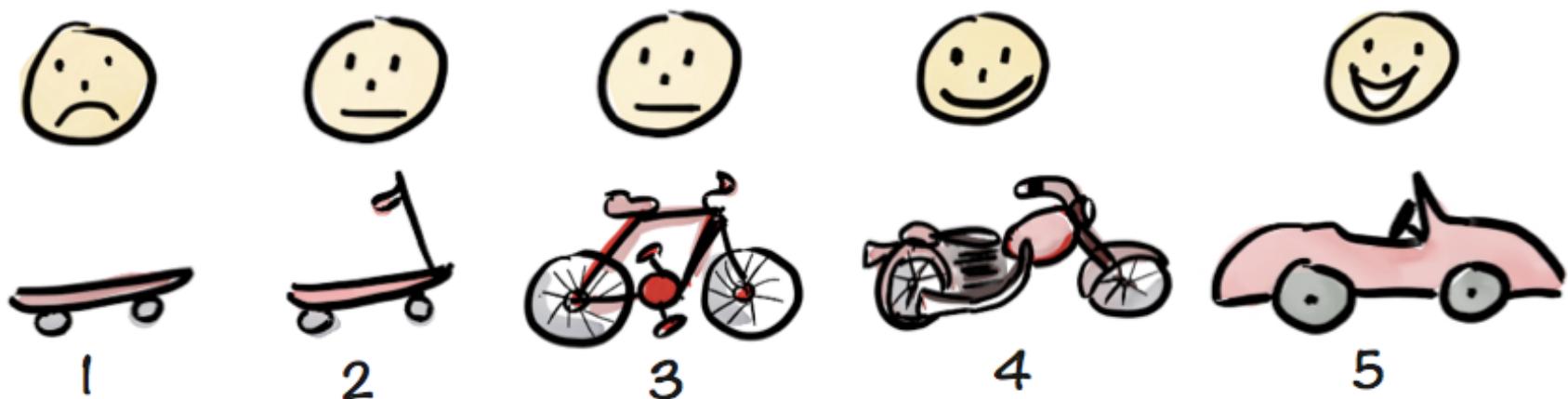
Patton: "Any fool can make rash decisions; take calculated risks."



Not like this....



Like this!



by Henrik Kniberg

The "Negotiation"

Start



How long will it
take to finish?



6 weeks.





Can't you work any faster!? Be creative...



Um...



If you don't finish in 2, we won't sign new customers, and we'll be out of money.



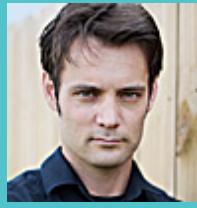
Ok, 2 weeks.



Great!



... pain awaits.



End

Rewrite

- False Dream
- Less Time to dev original product? No.
- Keep all features? No.
- Fix original behavior & knowledge lack that got us there? No.
- New Features Halted? No.

Modern DevOps & Lean Engineering

Prevent TD & Keep It In Check

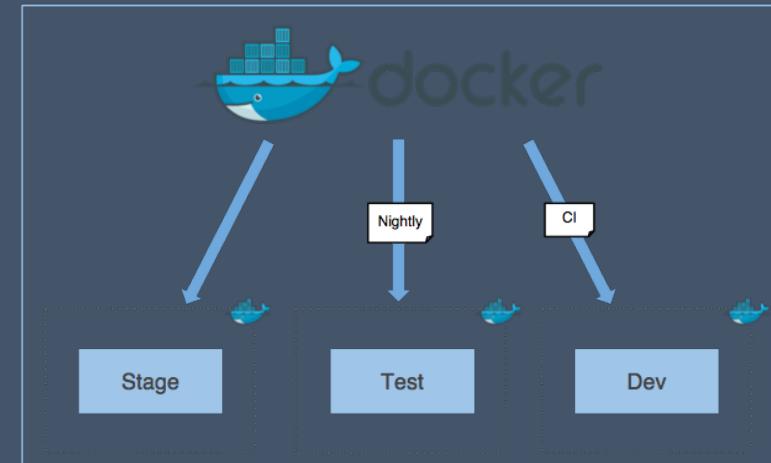
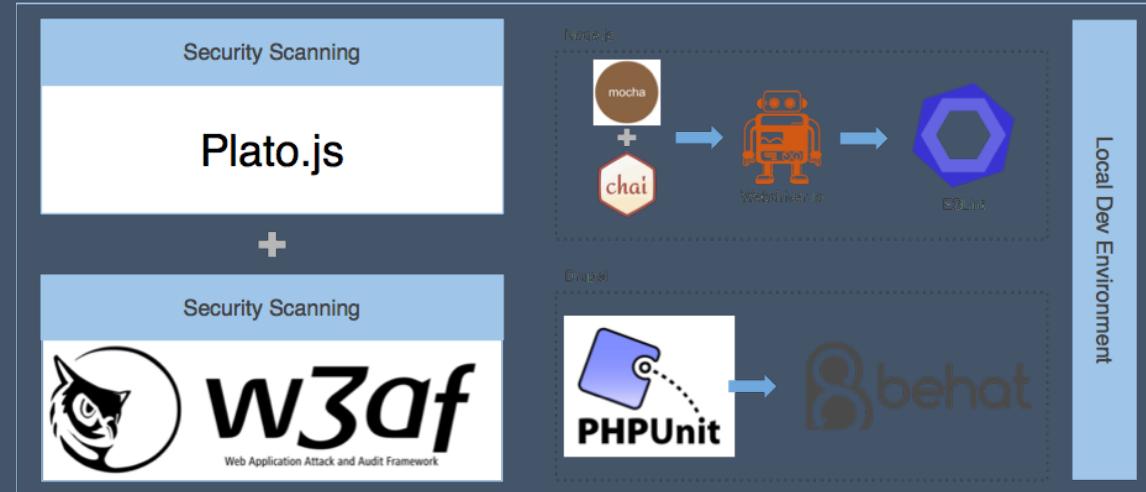
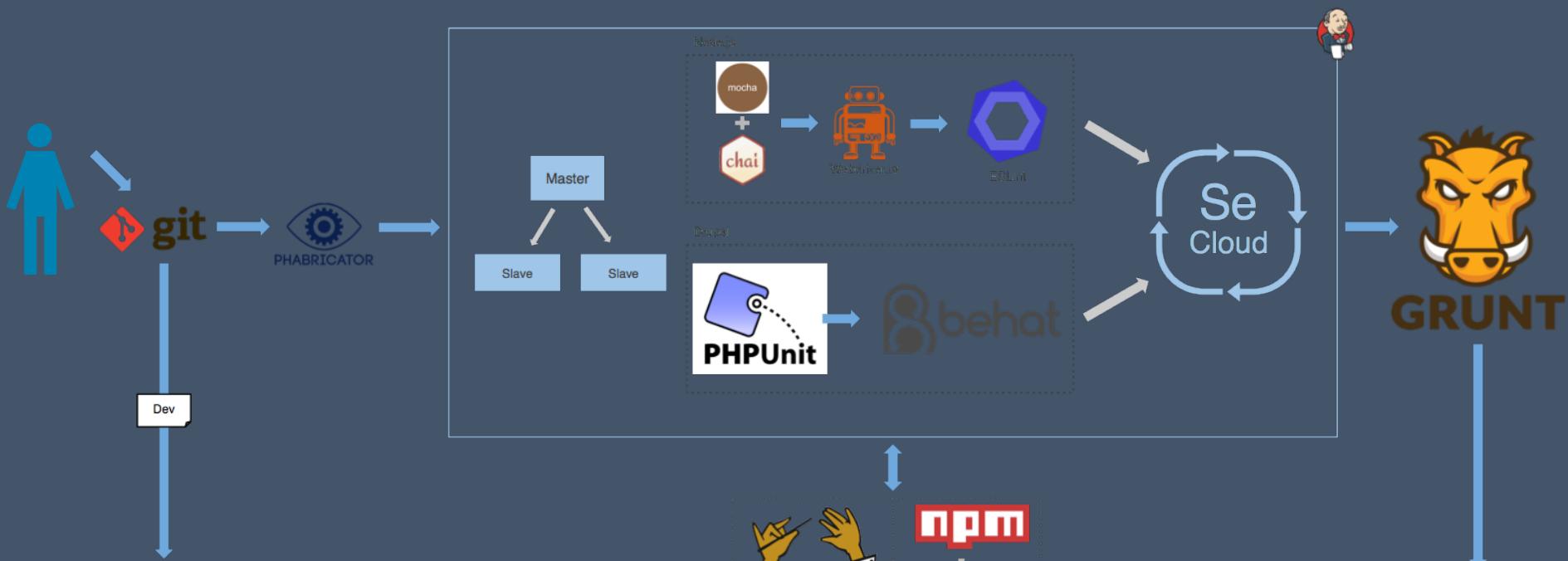
- Lean Engineering
- DevOps

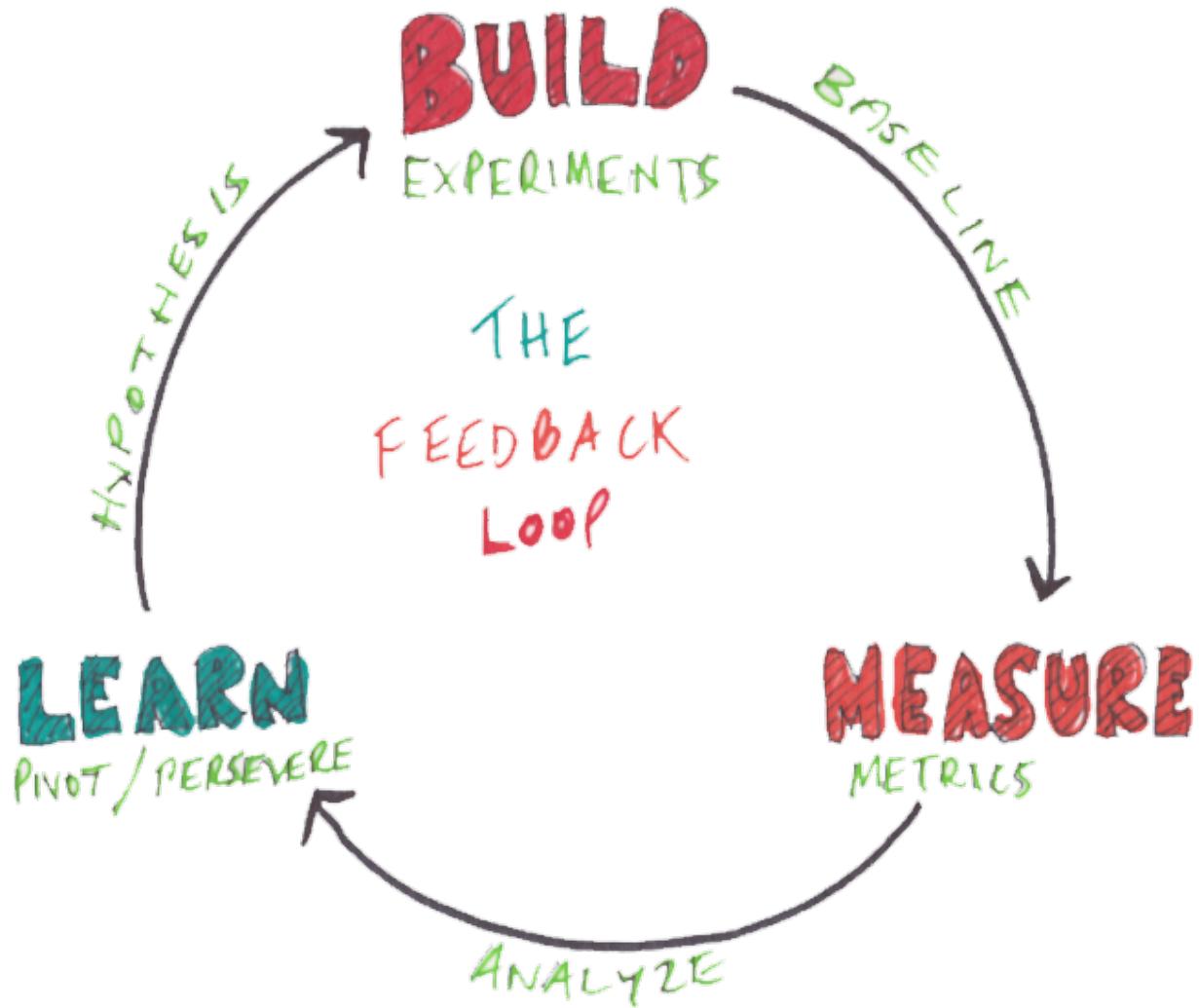
DevOps

Prevent TD & Keep It In Check

- Merging IT Operations with Development
- Day 1 Activity
- Environment setup for development, testing, and staging as necessary
- Setup and configure DevOps tooling (SCM, CI, Code Review system, etc)
- Dry run of end to end process to ensure complete flow and control points







Going Quantum

... not all the way.

- We want AI, but don't need it
- In the meantime...
- Deep Learning, Blue Brain
- Moaarr Data (als NEW data)
- Quantum Processing (Faster Concurrency)
- Instant, Long Range Communication via entanglement (Lasers are cool, but...)



Thanks for your time! Questions?

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