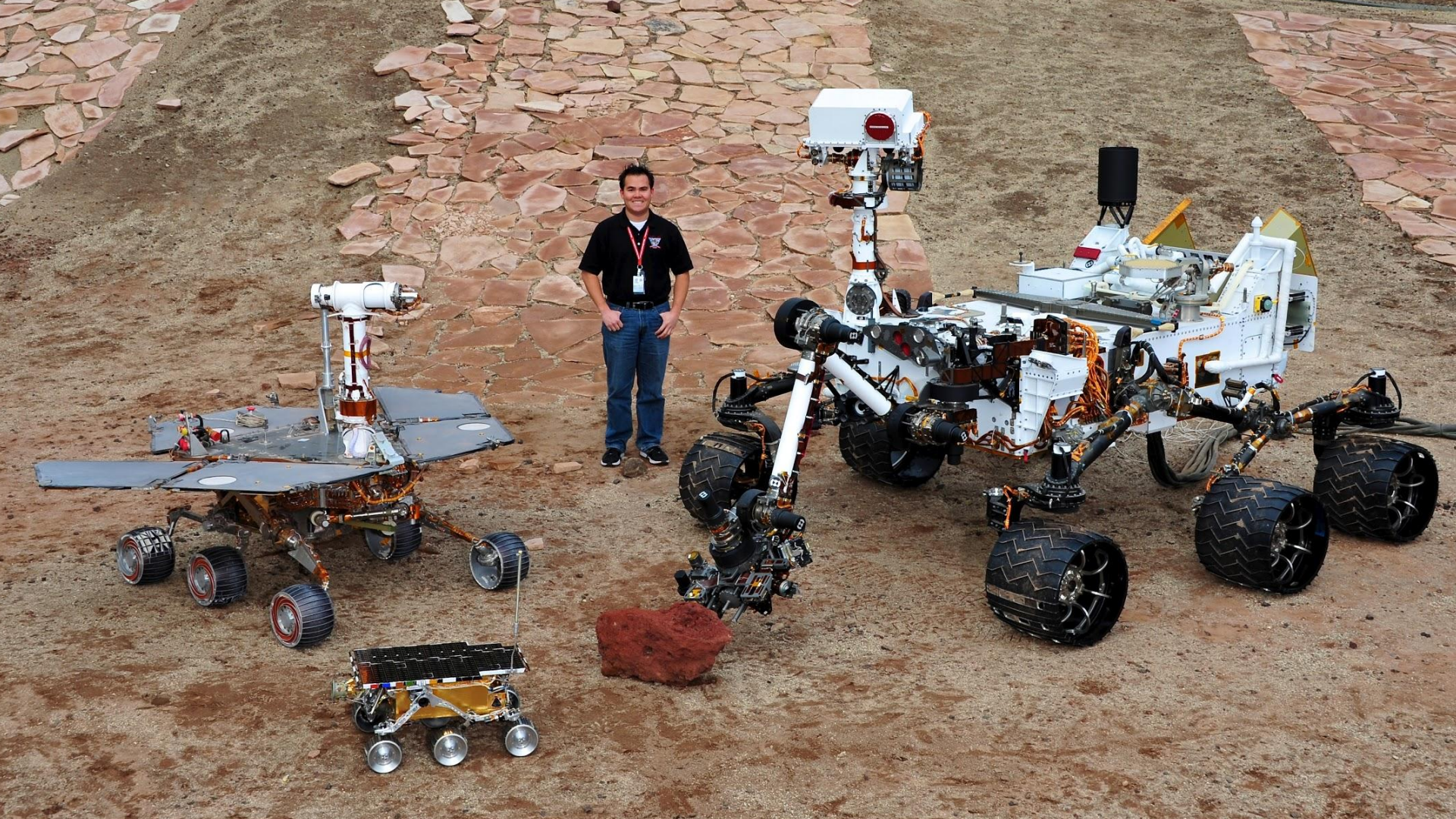
Interplanetary DevOps at NASA JPL

Dan Isla
@danisla
LISA16
Boston 2016

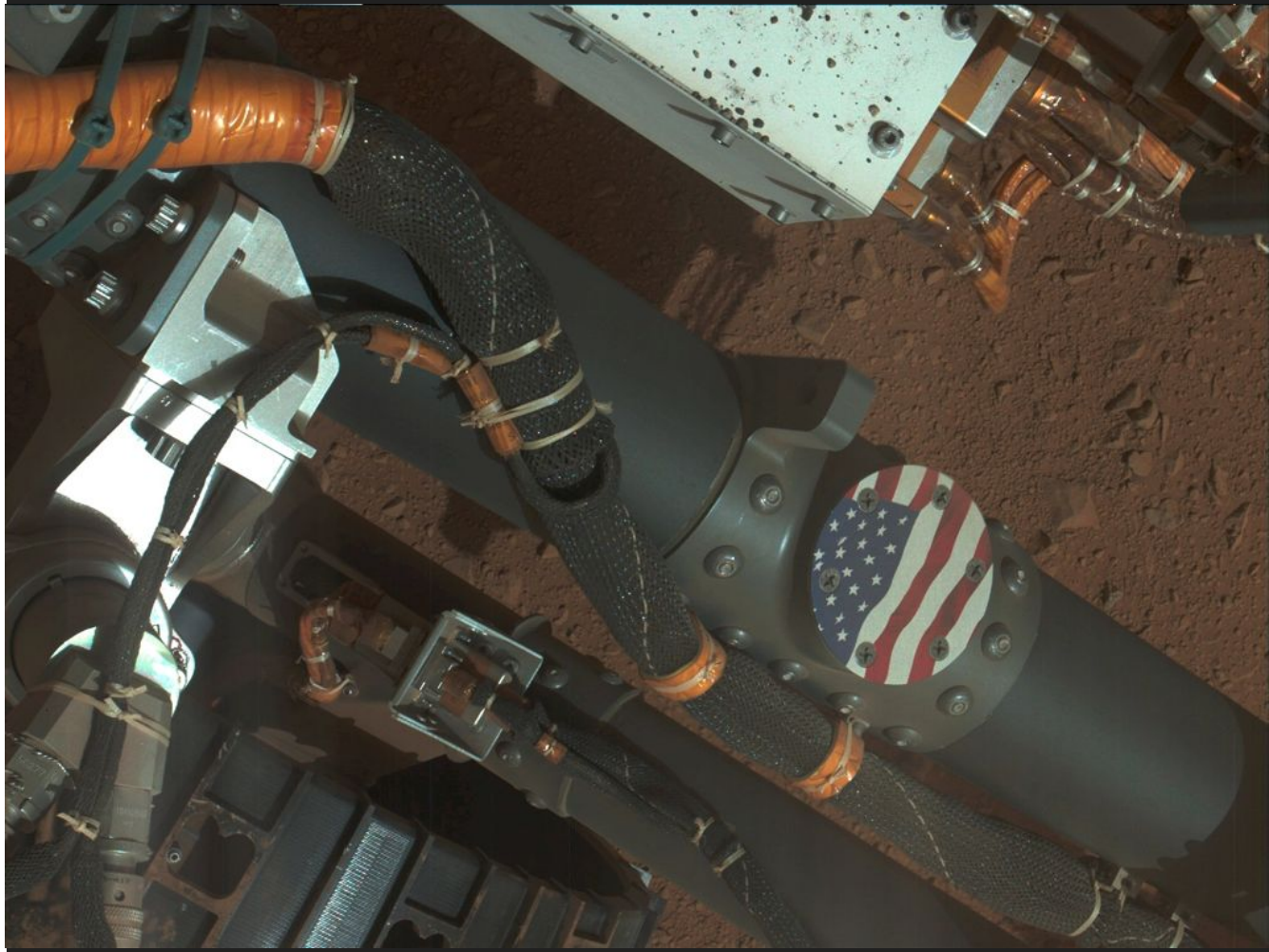
hp invent

Behavior Imaging®

cradlepoint



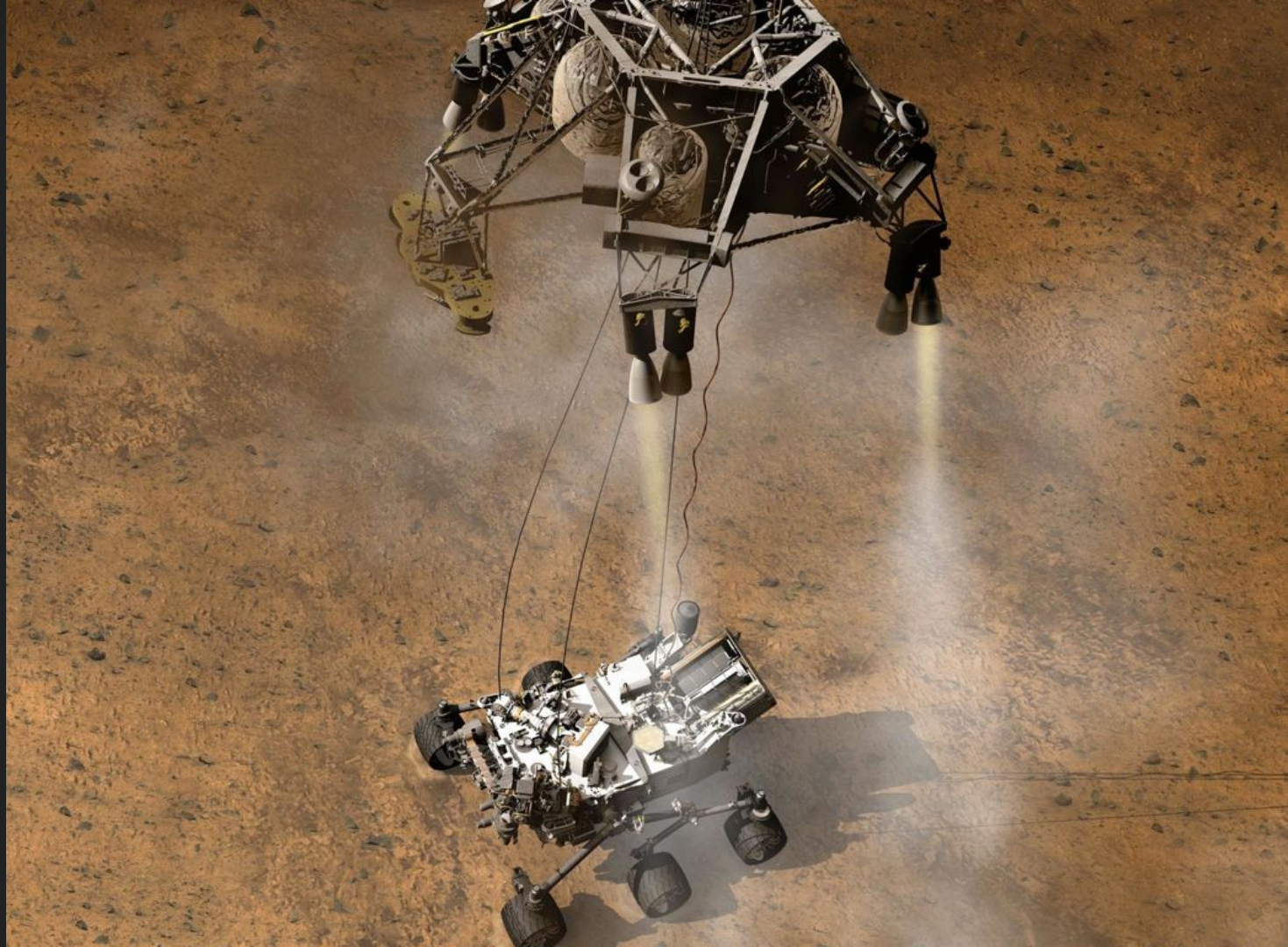
ARBI KARAPETIAN
NEIL LAUGEN



Building
spacecraft

is very
different
than

building
ground software



The Old Way

Legacy SQL Ground System

↓

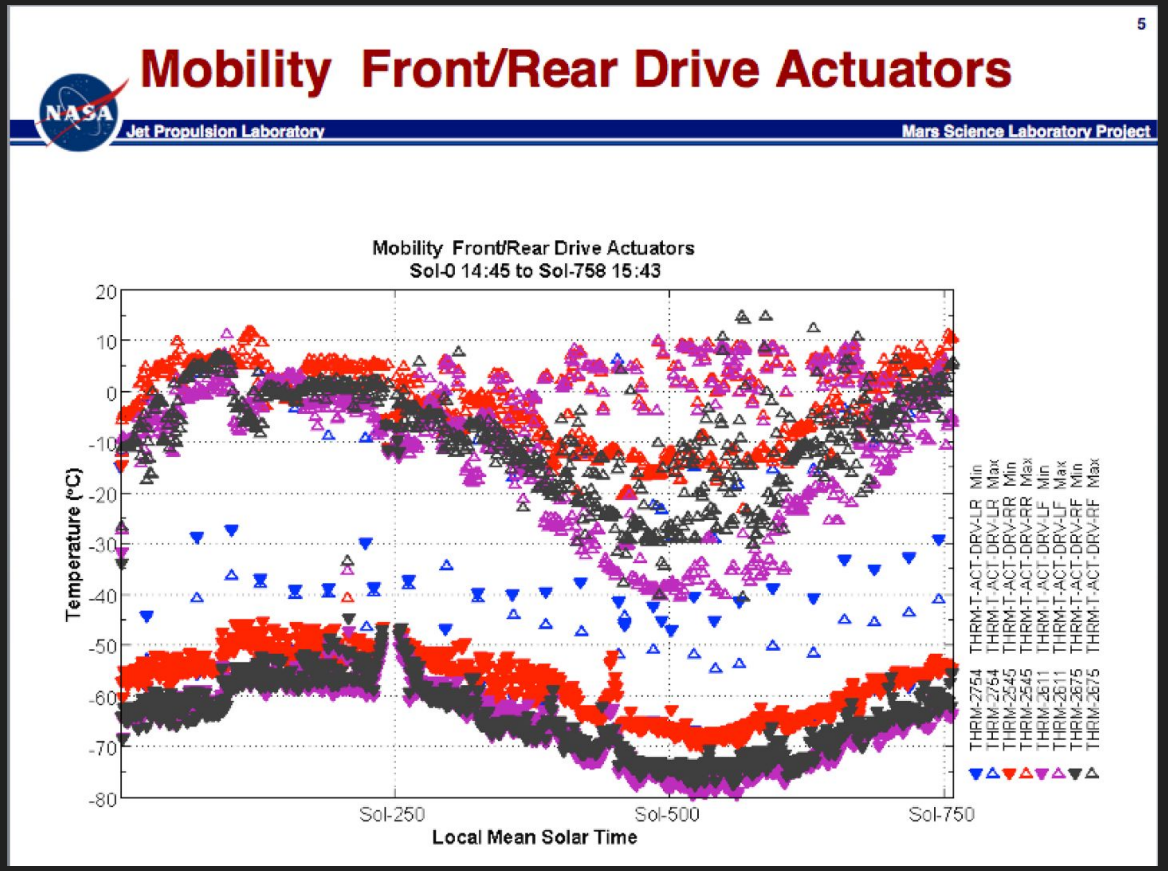
Excel/Matlab

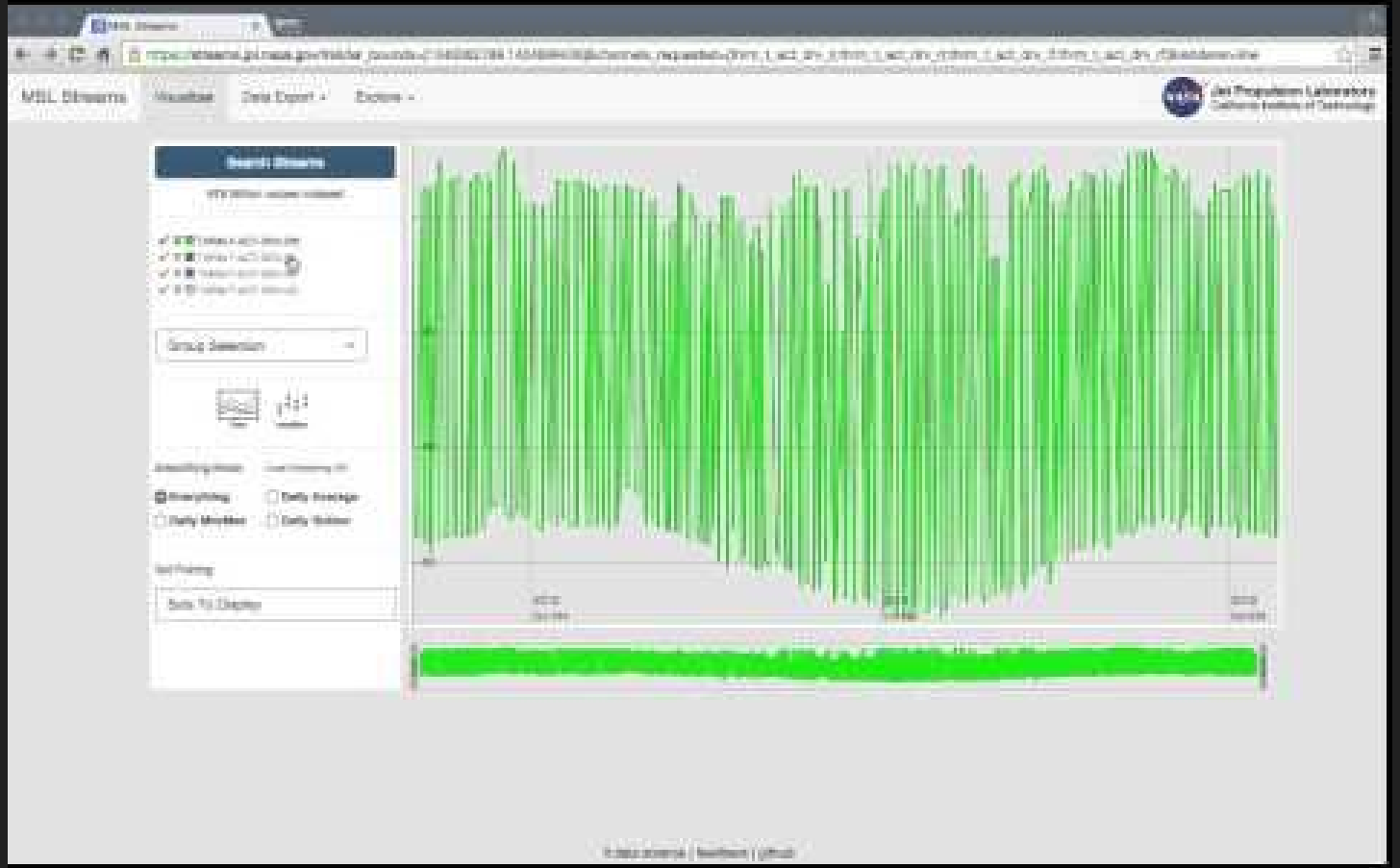
↓

PowerPoint

↓

E-Mail



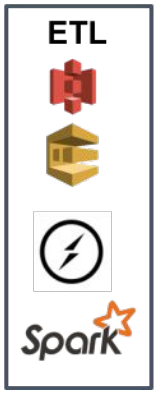

MSL Streams
Visualize
Data Export
Explore
Search Streams
Group Selection

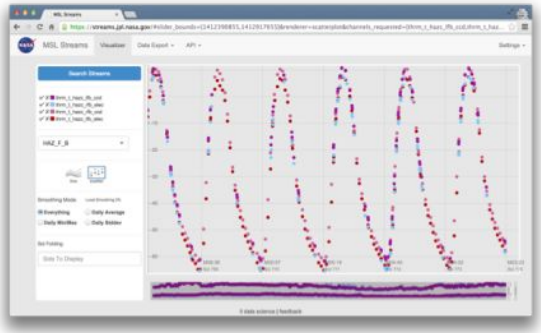
_search

Recipe for greenfield success in enterprise:

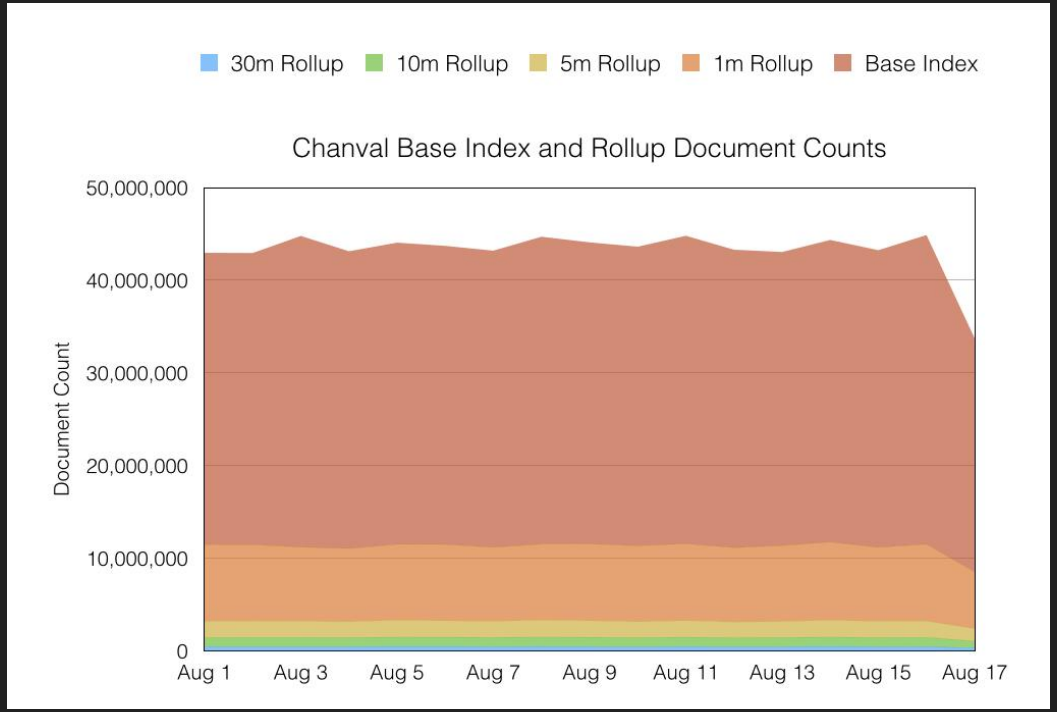
Pair a ***passionate*** end user with a ***passionate*** developer

The New Way





Keeping Queries Fast with Rollups



Base Index, 1 month

10m Index, 1 year

The API is the **deliverable**

Current Information

LMST: Sol 1346, 12:04:14
LTST: Sol 1346, 12:38:41
Solar Longitude: 155.3°
Gale Season: Early Spring
Heater Table: Ls130

Quick Sync Query Alarms

Maintenance Activities

Activity	Last	Next
HRS Pump Maintenance	1327	1357
Non-prime PAM Characterization	1323	1353

Click for more details.

Alerts

Thermal Hardware Health

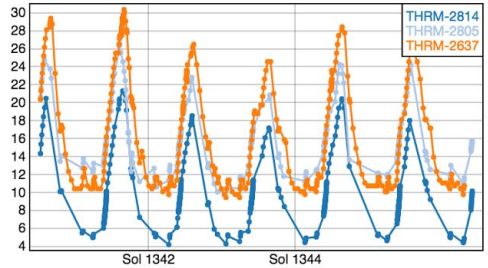
All channels report HEALTHY. 284 / 284 SFP channels reporting

Thermal State Summary

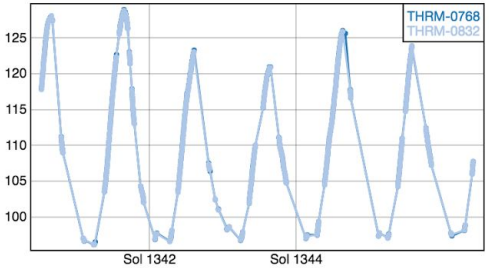
RIPA PRIMENESS	RBAU SURVIVAL	RBAU WARM-UP	CCMU SURVIVAL	CCBU SURVIVAL	RPFA SURVIVAL
A B	ENABLED	DISABLED	ENABLED	ENABLED	DISABLED

WARMUP HEATERS: RSM MCAM NCAM MOB ARM HGA HAZC CHIMRA DRILL DRT IC MAHLI MARDI

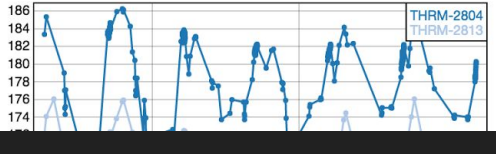
RAMP Temperature (4.2 to 30.4 deg C)



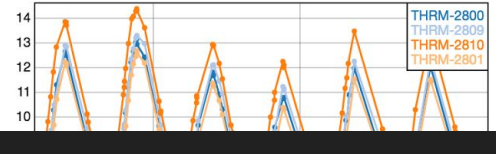
RIPA Pressure (96.1 to 129 psia)



RTG Temperature (159.7 to 186.2 deg C)



RBAU Temperature (4.9 to 14.4 deg C)

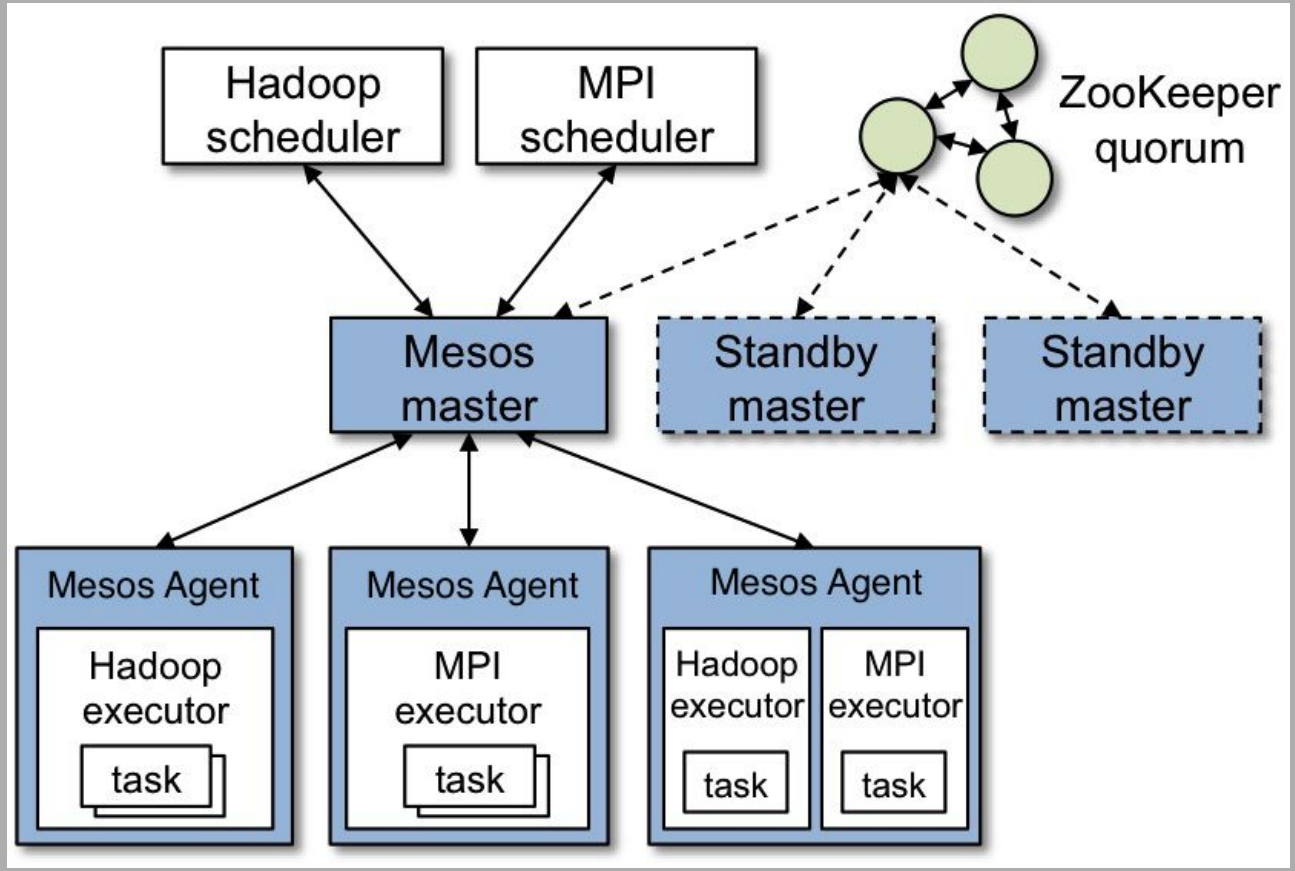


Impactful low-risk greenfield projects

lead to natural evolving DevOps cultures

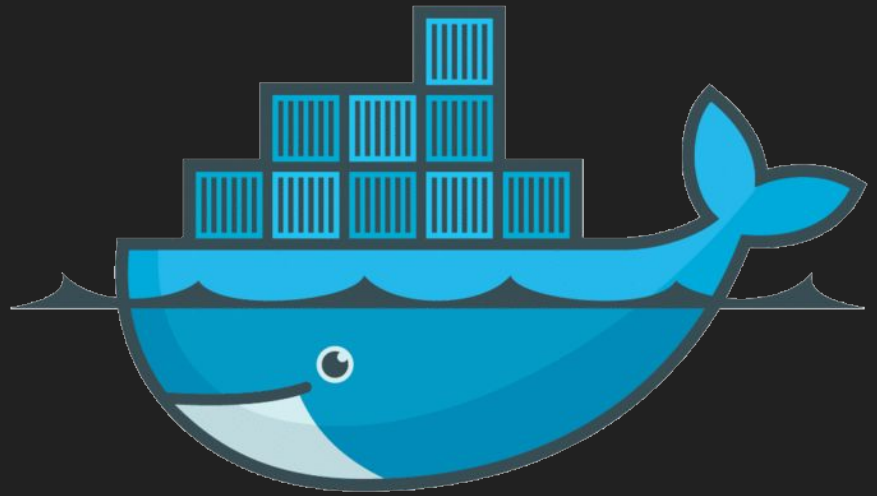
Mesos and Marathon

Pre-Kube days
(winter 2014)



A breath of fresh air

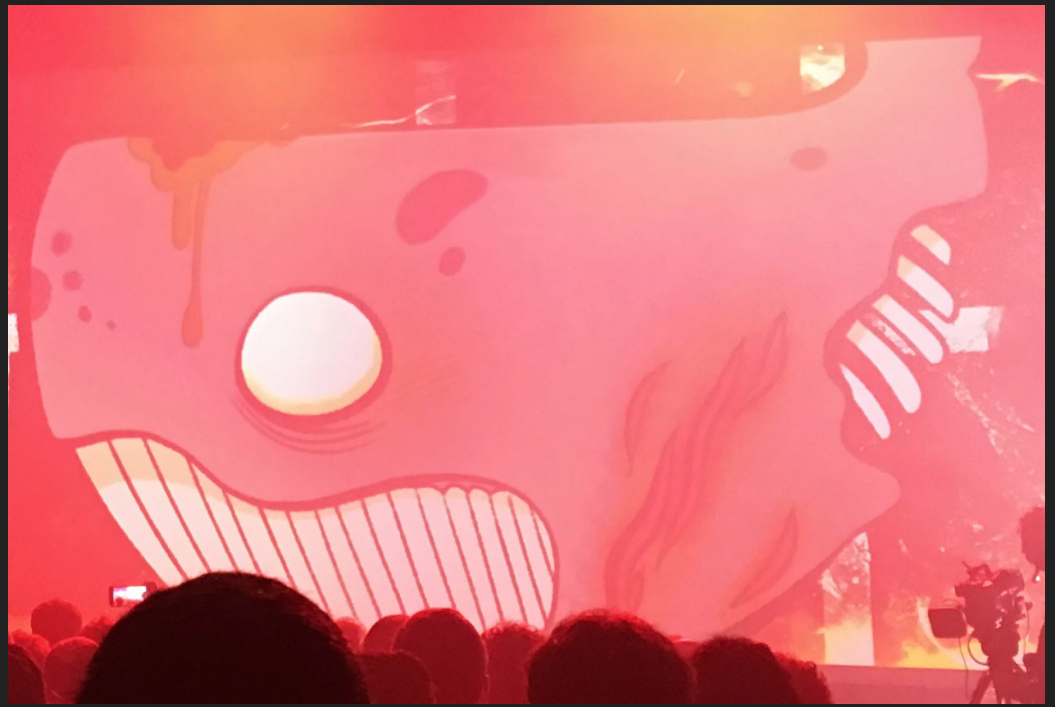
For Developers



docker

A nightmare

for traditional Ops



Me: You need Twelve-Factor Apps

My Org: No way, what do *you* know about stateless apps?

Big Time Consultant: You need Twelve-Factor Apps

My Org: Great idea!

Sometimes you just need external validation

“Failure is not an option!”

- Gene Kranz, NASA Flight Director
- No DevOps Engineer ever

-Innovation-

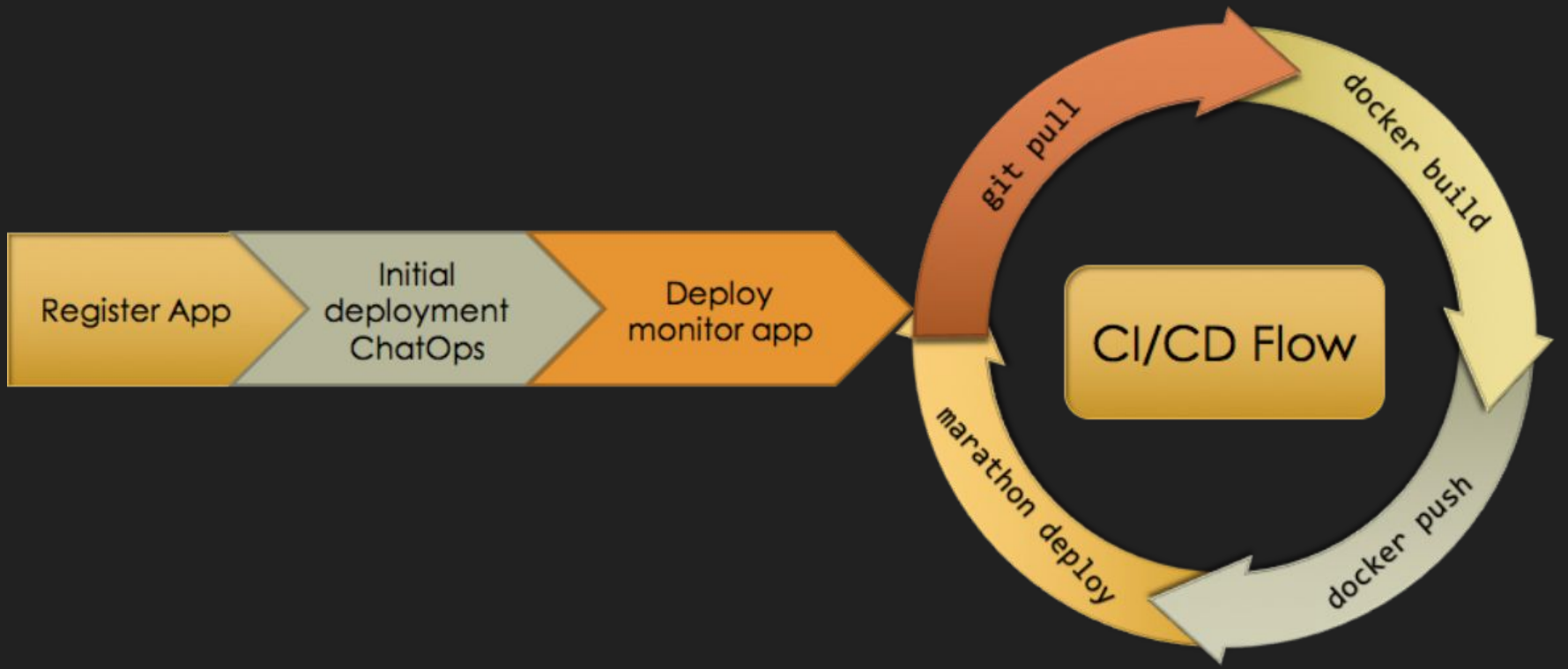
FAIL **FASTER**

FAIL **OFTEN**

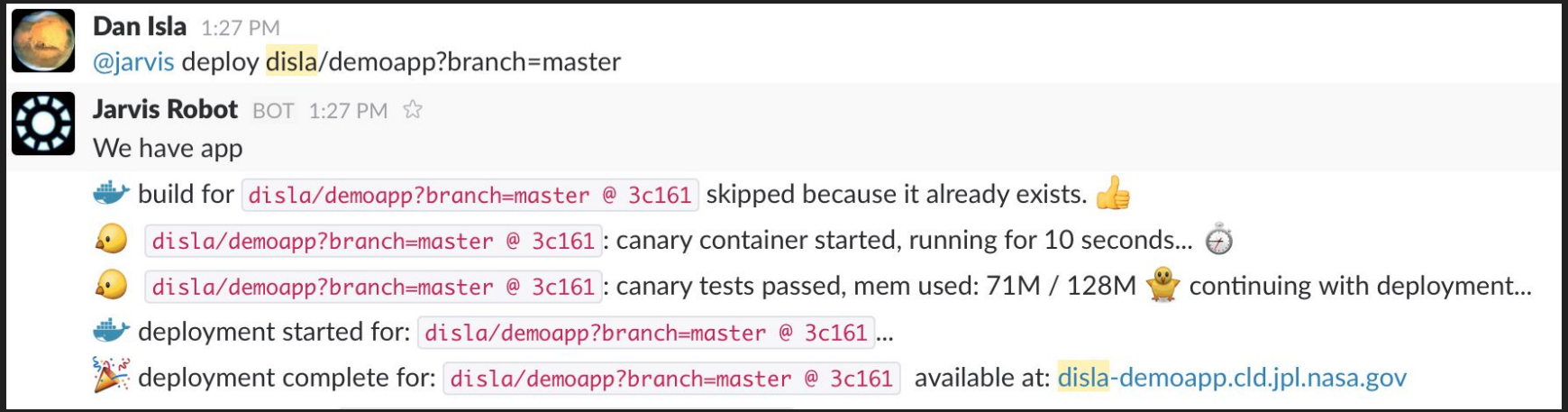
Immutable Infrastructure

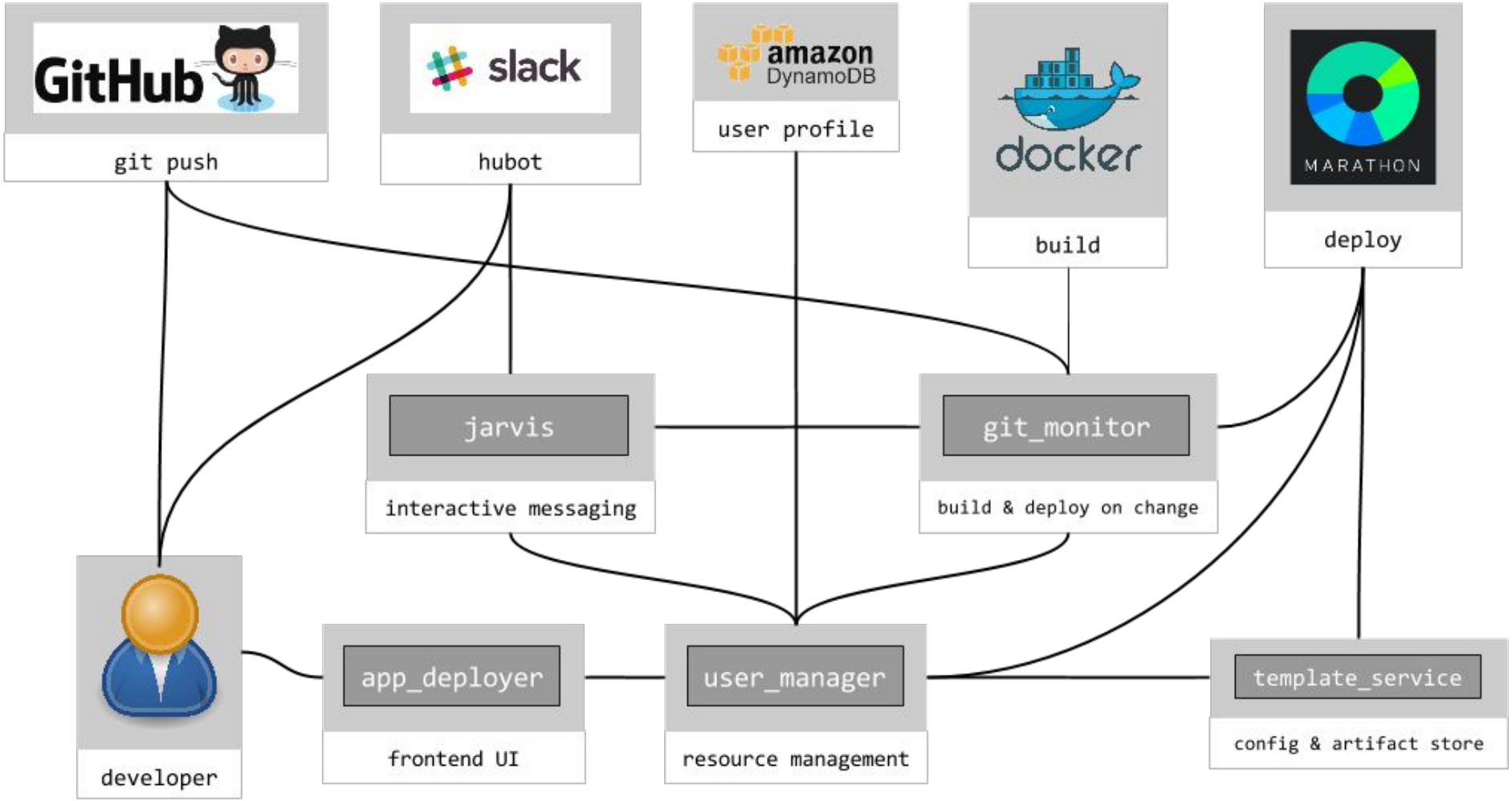
Establishes the premise for agile recovery

You will be replaced by a self-service CI/CD Pipeline

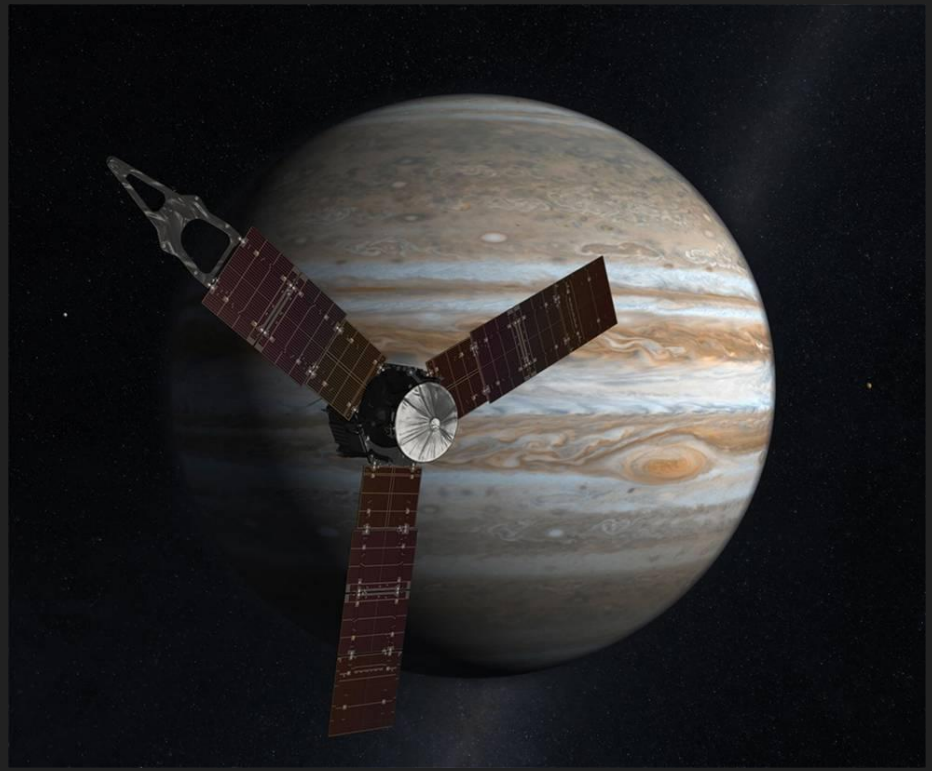


MOCCI Demo


Dan Isla 1:27 PM
@jarvis deploy disla/demoapp?branch=master
Jarvis Robot BOT 1:27 PM
We have app
build for disla/demoapp?branch=master @ 3c161 skipped because it already exists.
disla/demoapp?branch=master @ 3c161: canary container started, running for 10 seconds...
disla/demoapp?branch=master @ 3c161: canary tests passed, mem used: 71M / 128M continuing with deployment...
deployment started for: disla/demoapp?branch=master @ 3c161...
deployment complete for: disla/demoapp?branch=master @ 3c161 available at: disla-demoapp.cld.jpl.nasa.gov


GitHub
git push
slack
hubot
amazon
DynamoDB
user profile
docker
build
MARATHON
deploy
jarvis
interactive messaging
git_monitor
build & deploy on change
developer
app_deployer
frontend UI
user_manager
resource management
template_service
config & artifact store

Level up your Dev and Ops Skills



Staying up to date

Conferences

Meet ups

Twitter

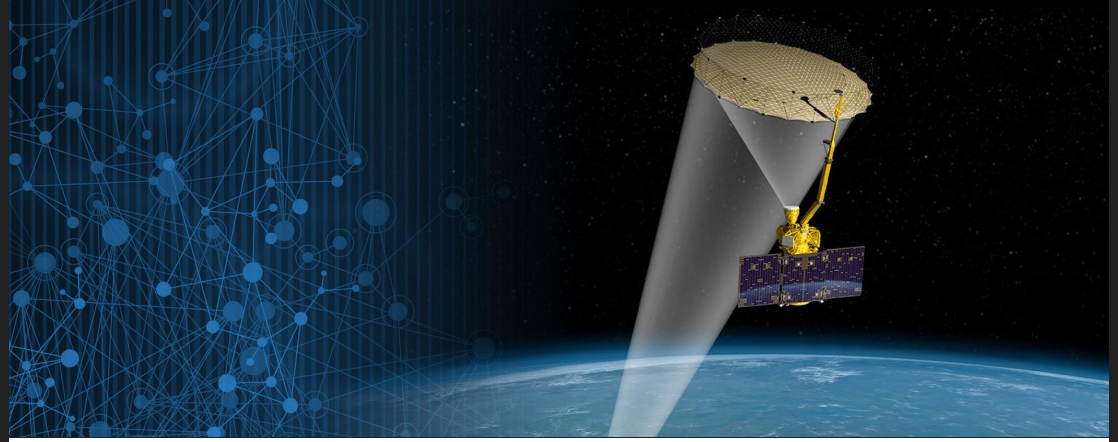
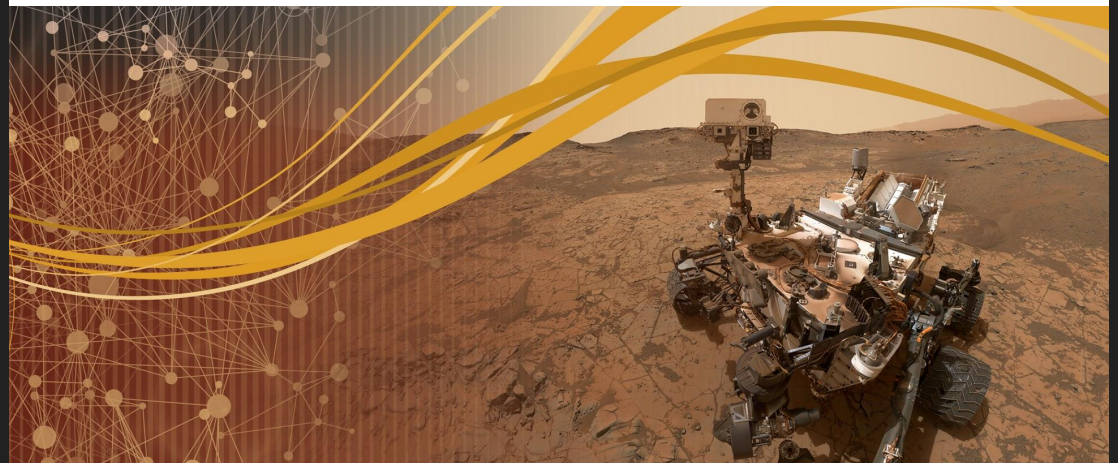
Medium

Hacker news

Read the Changelog!

DevOps is not Rocket Science

It’s all about the people you work with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