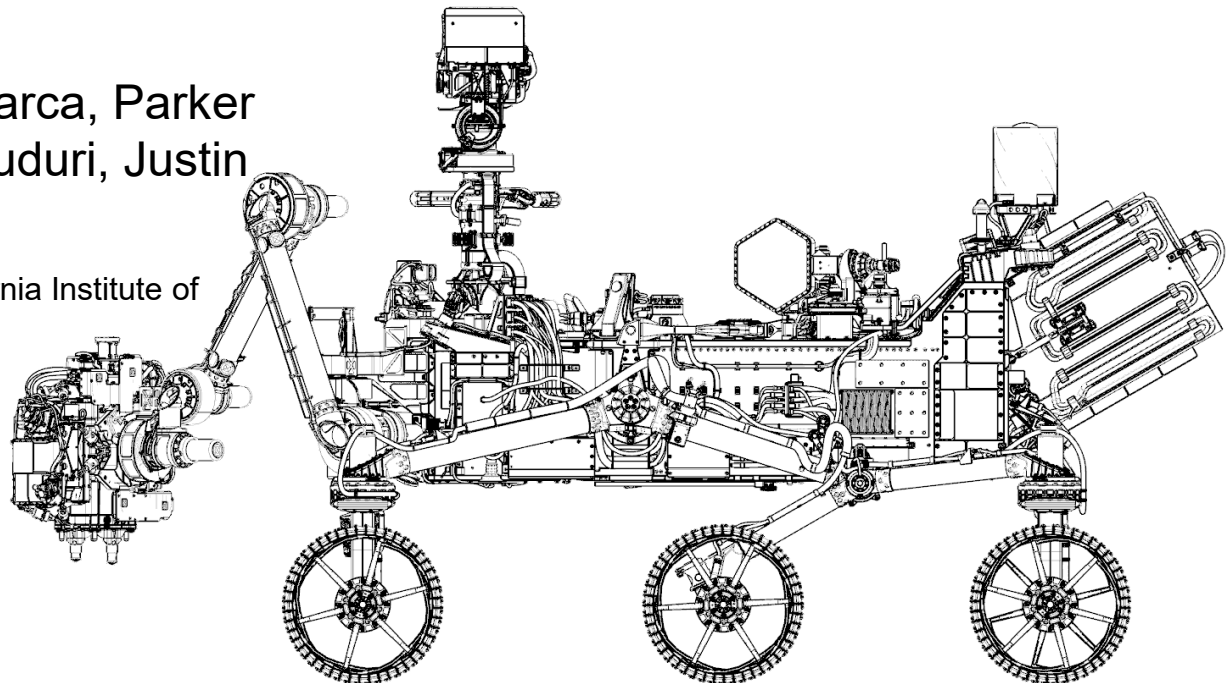


Mars 2020: Ground Data System

Utilizing the Cloud, Collaboration, and Automation to Enable Faster Operations

Guy Pyrzak, Hallie Abarca, Parker Abercrombie, Usha Guduri, Justin Huang

Jet Propulsion Laboratory, California Institute of Technology

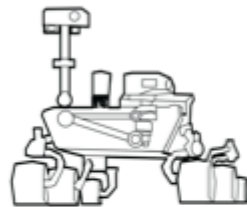


03/05/2020

The Surface Mission Challenge

The Challenge

MSL



MARS YEARS:

1.25

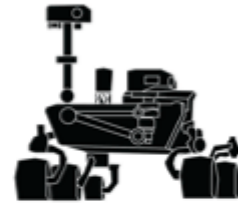
DISTANCE COVERED:

10.6 km

SAMPLES COLLECTED:

**2 scooped
6 drilled samples**

M2020



MARS YEARS:

1.25

DISTANCE TO COVER:

15 km

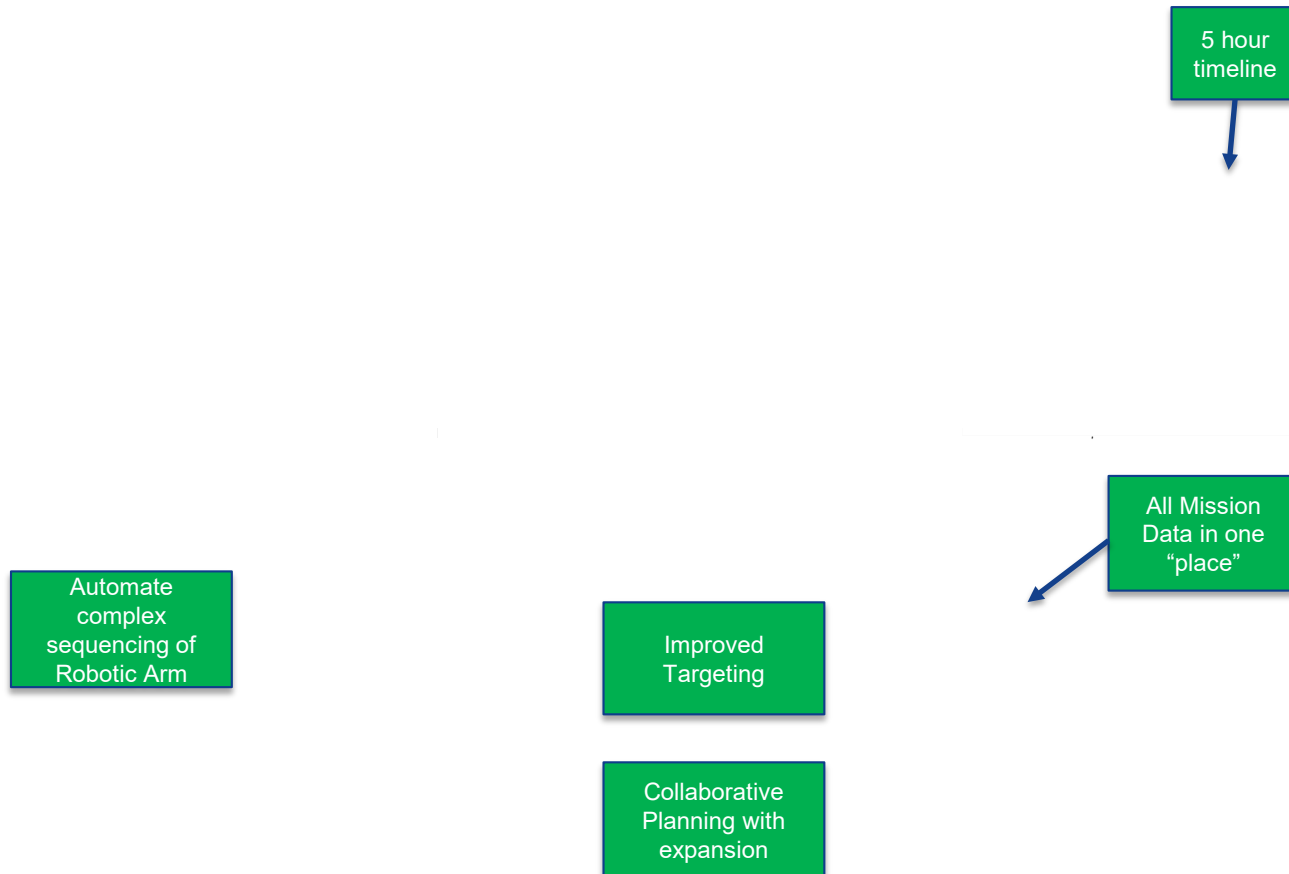
SAMPLES TO COLLECT:

20 drilled samples



Productivity Guiding Principles

MS Key Developments & Impacts





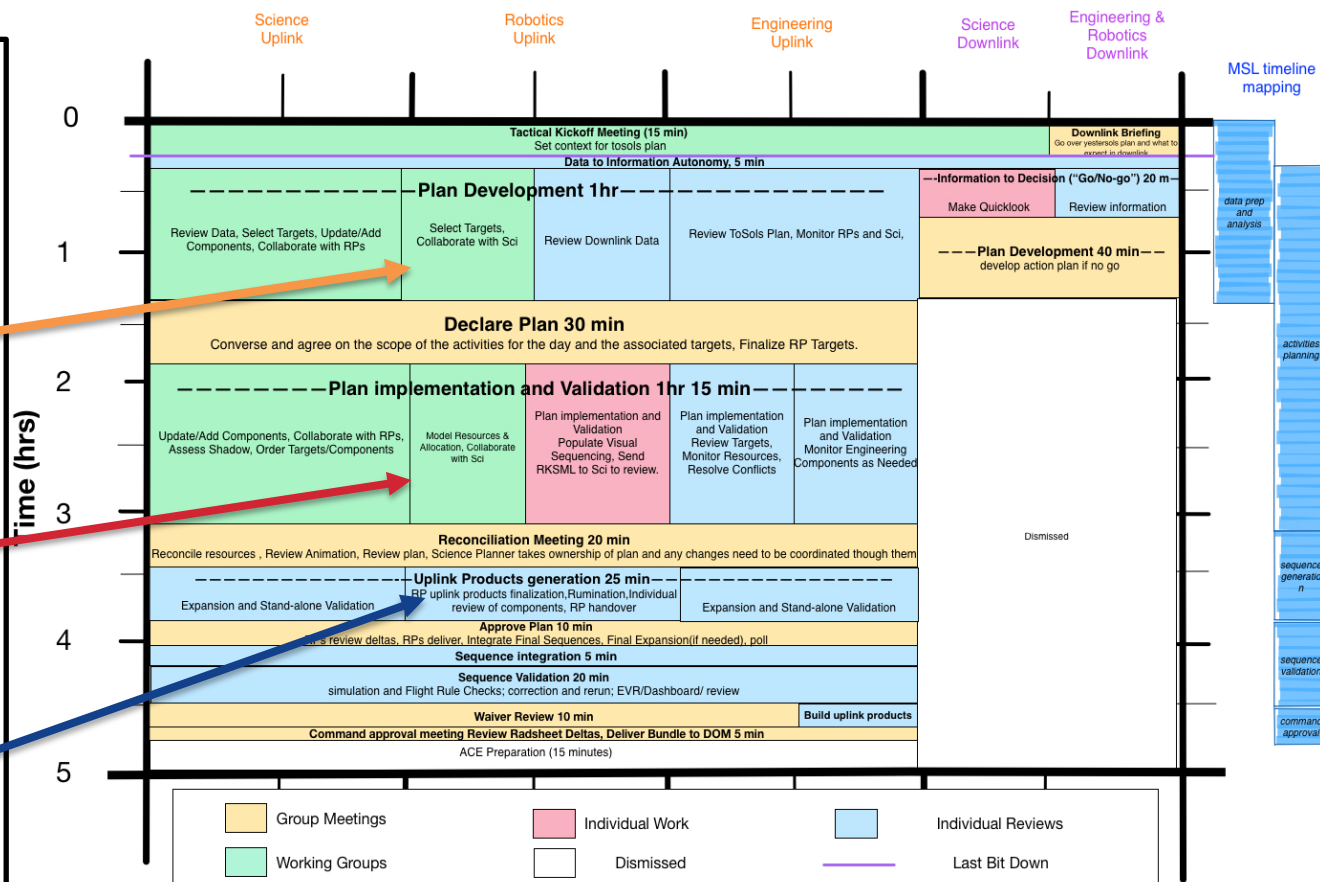
Key MS Design Items

GDS Architecture

ASTTRO:
Improved Targeting

COCPIT:
Collaborative Planning

ArmSketch
Automating Arm Sequencing

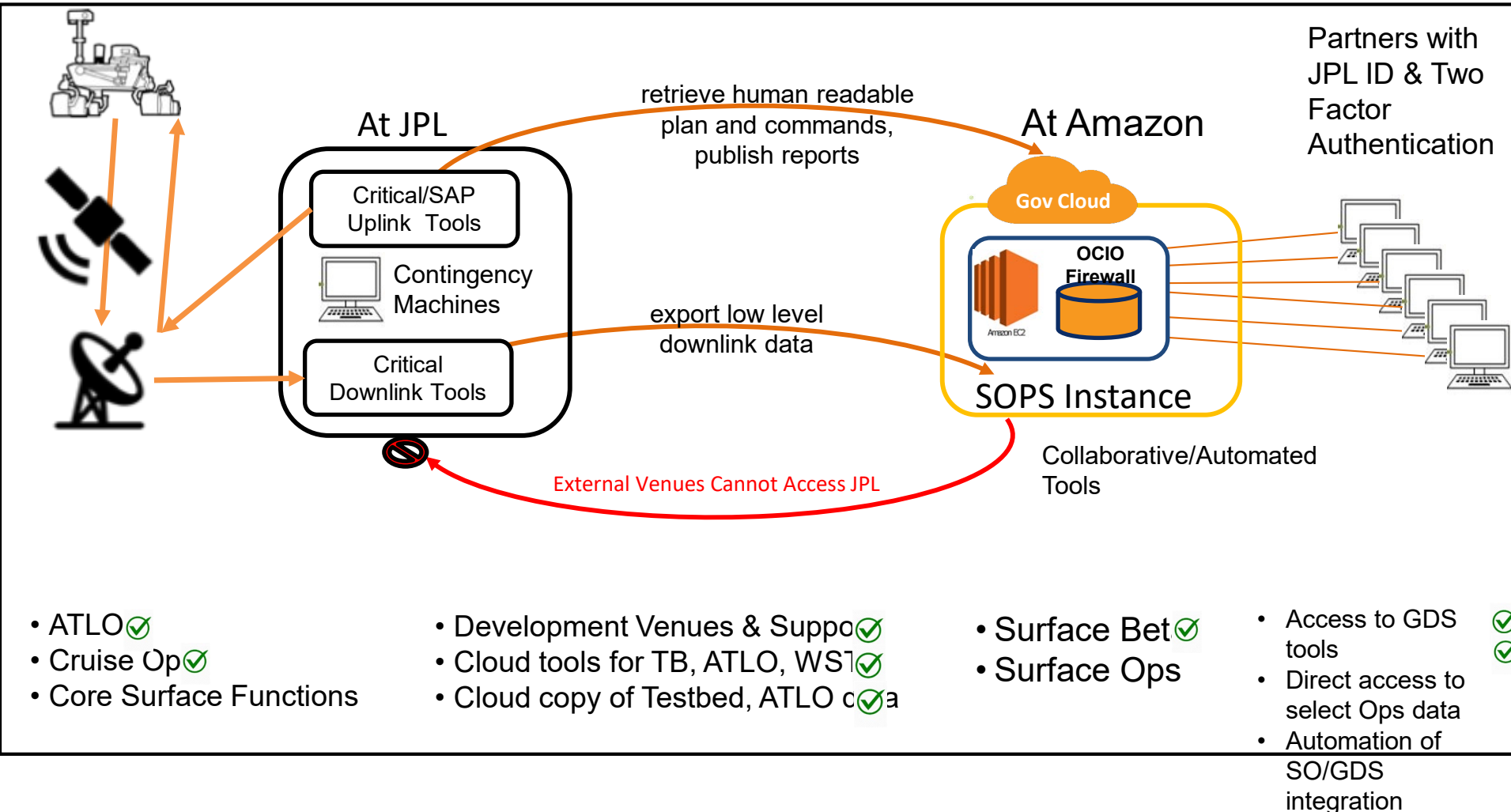


Overview of GDS Architecture



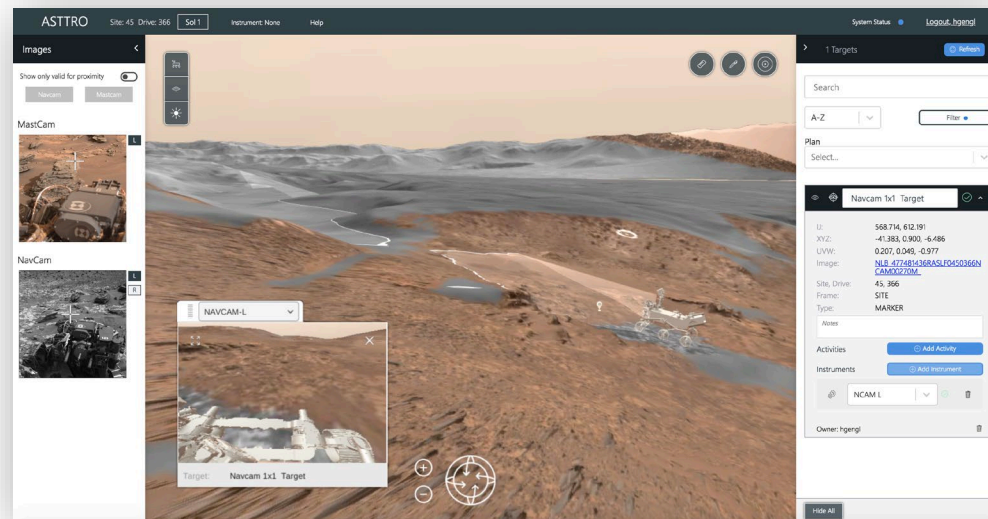
Jet Propulsion Laboratory
California Institute of Technology

Mars 2020 Project



ASTTRO: Advanced Science Targeting Toolkit for Robotic Operations

- Help scientists understand rover context and kinematics.
- Streamline visual communication between Scientists and Rover Planners.
- Quickly create *achievable* science goals.





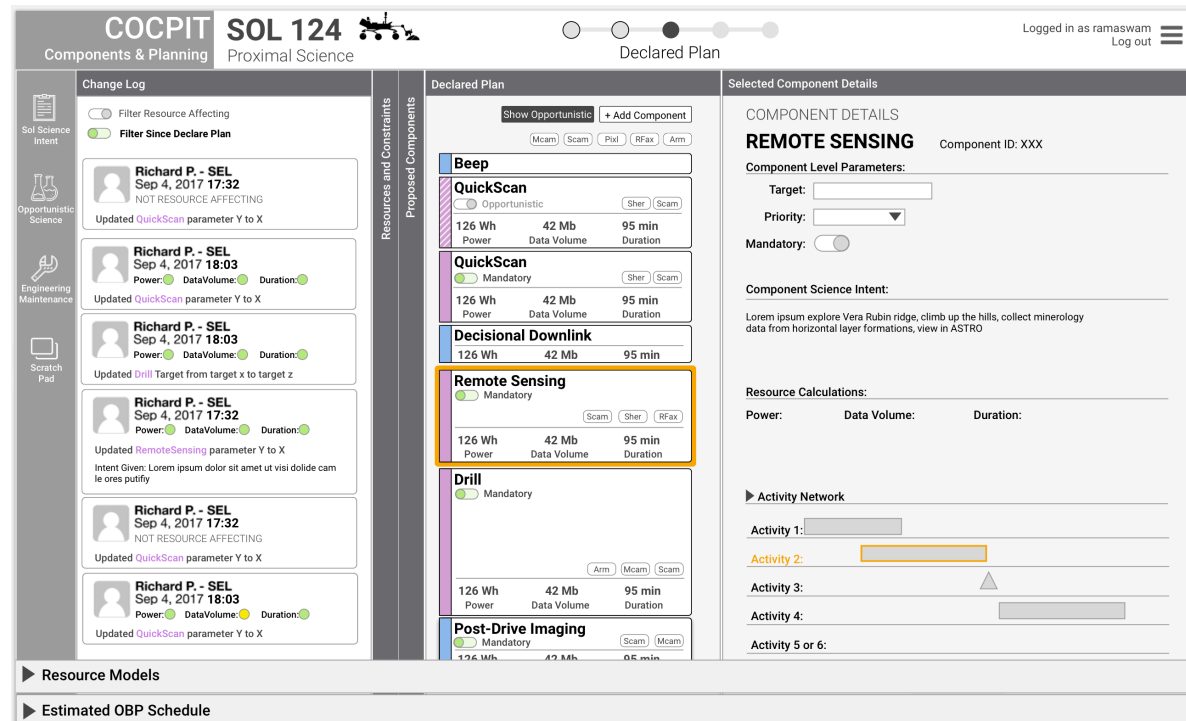




COCPIT

Web-based real-time collaborative environment for planning

- Component based Campaign Planning, Implementation and Tactical
 - *CM'ed grouping of activities and their constraints that satisfy a science objective*
- Collaboration with AMES
- Google Docs paradigm



The screenshot displays the COCPIT web interface for SOL 124 (Proximal Science). The interface is divided into several sections:

- Left Sidebar:** Contains navigation icons for Sol Science Intent, Opportunistic Science, Engineering Maintenance, and Scratch Pad.
- Change Log:** A list of updates for 'Richard P. - SEL' on Sep 4, 2017, including updates to 'QuickScan' parameters and 'Drill' targets.
- Declared Plan:** A central section showing a list of activities with their resource requirements (Power, Data Volume, Duration). Activities include 'Beep', 'QuickScan' (Opportunistic and Mandatory), 'Decisional Downlink', 'Remote Sensing' (Mandatory), 'Drill' (Mandatory), and 'Post-Drive Imaging'.
- Right Sidebar:** Displays 'Component Details' for 'REMOTE SENSING' (Component ID: XXX). It includes fields for Target, Priority, and Mandatory status, as well as 'Component Science Intent' and 'Resource Calculations'.



ArmSketch

Automated sequencing of low-level arm motions from high-level activity goals

ArmSketch ingests the plan and automatically outputs a command sequence, helping with:

- Choosing the order of activities to minimize arm motion
- Planning collision-free arm trajectories
- Conforming to flight rules

