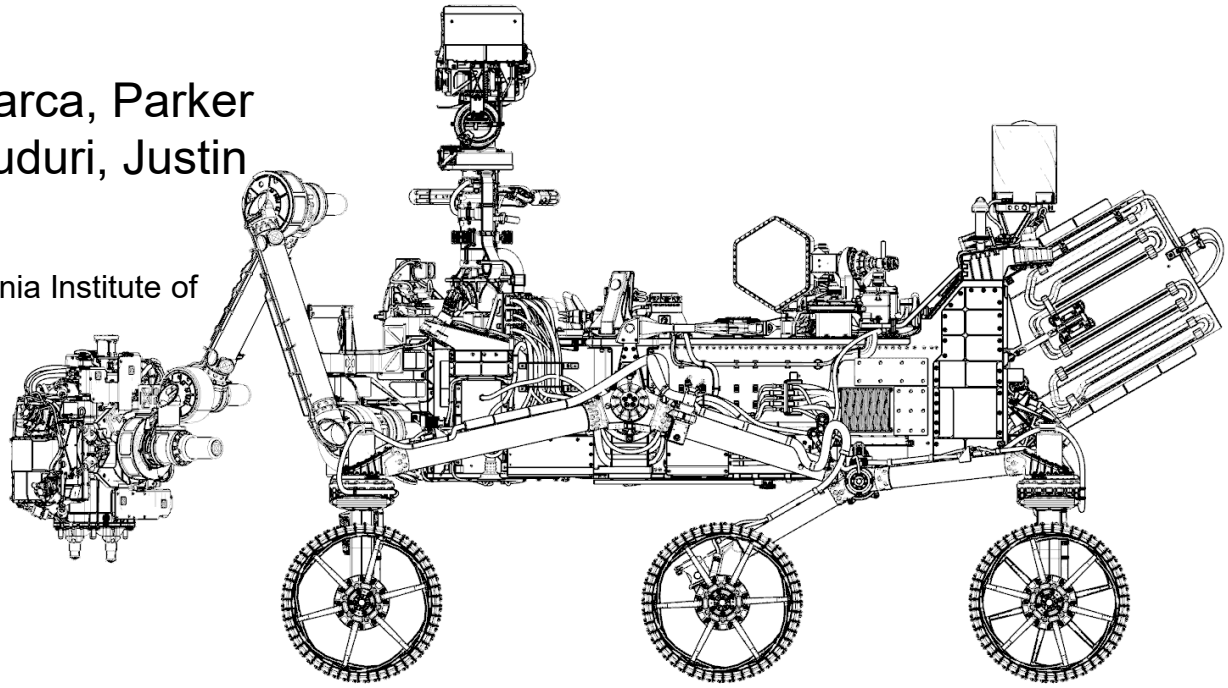
Jet Propulsion Laboratory
California Institute of Technology

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



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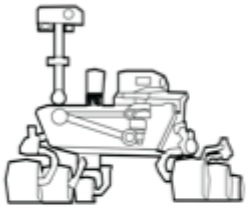
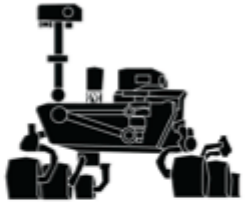
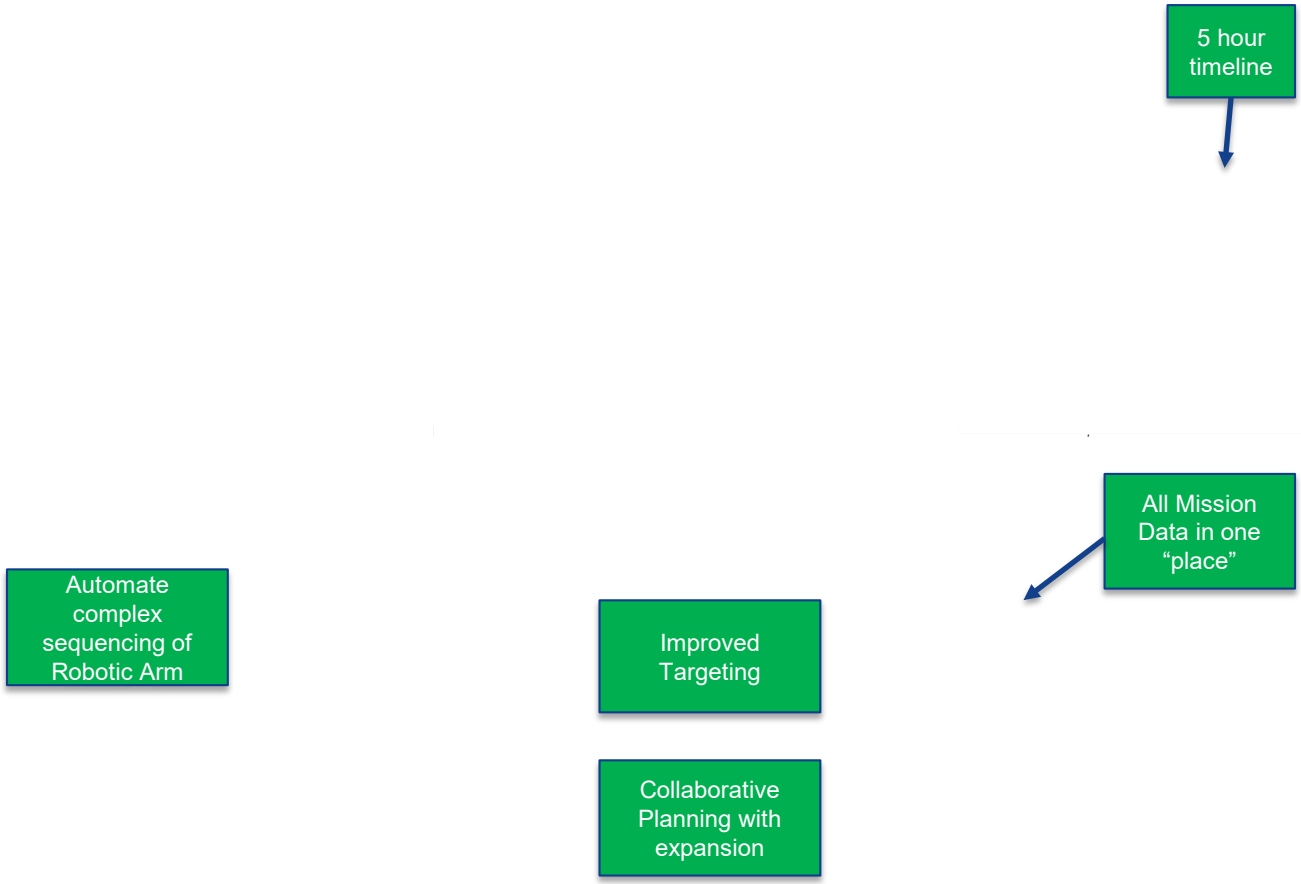
The Surface Mission Challenge

The Challenge

MSL	M2020
	
MARS YEARS: **1.25**	MARS YEARS: **1.25**
DISTANCE COVERED: **10.6 km**	DISTANCE TO COVER: **15 km**
SAMPLES COLLECTED: **2 scooped 6 drilled samples**	SAMPLES TO COLLECT: **20 drilled samples**

Productivity Guiding Principles
MS Key Developments & Impacts



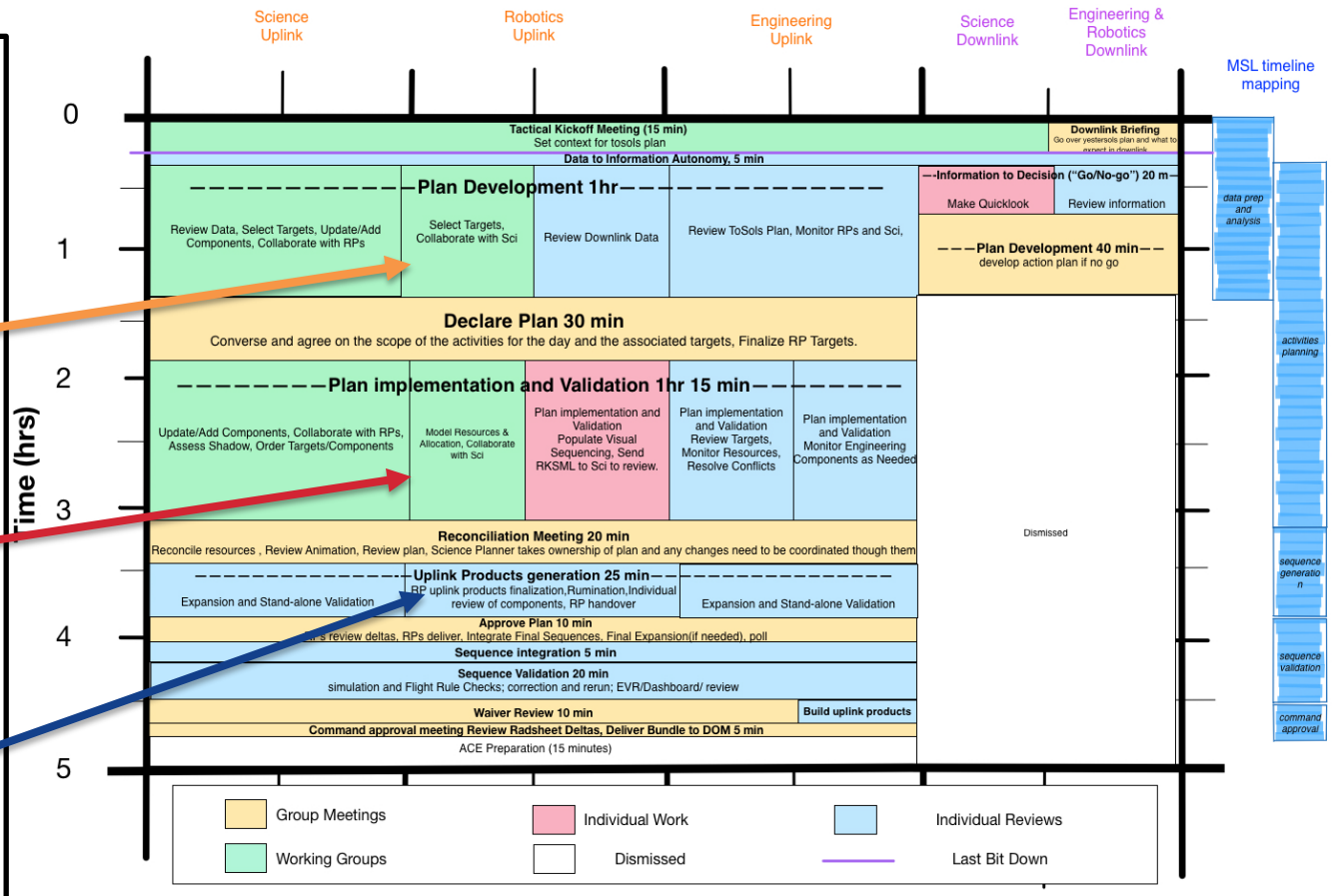
Key MS Design Items

GDS Architecture

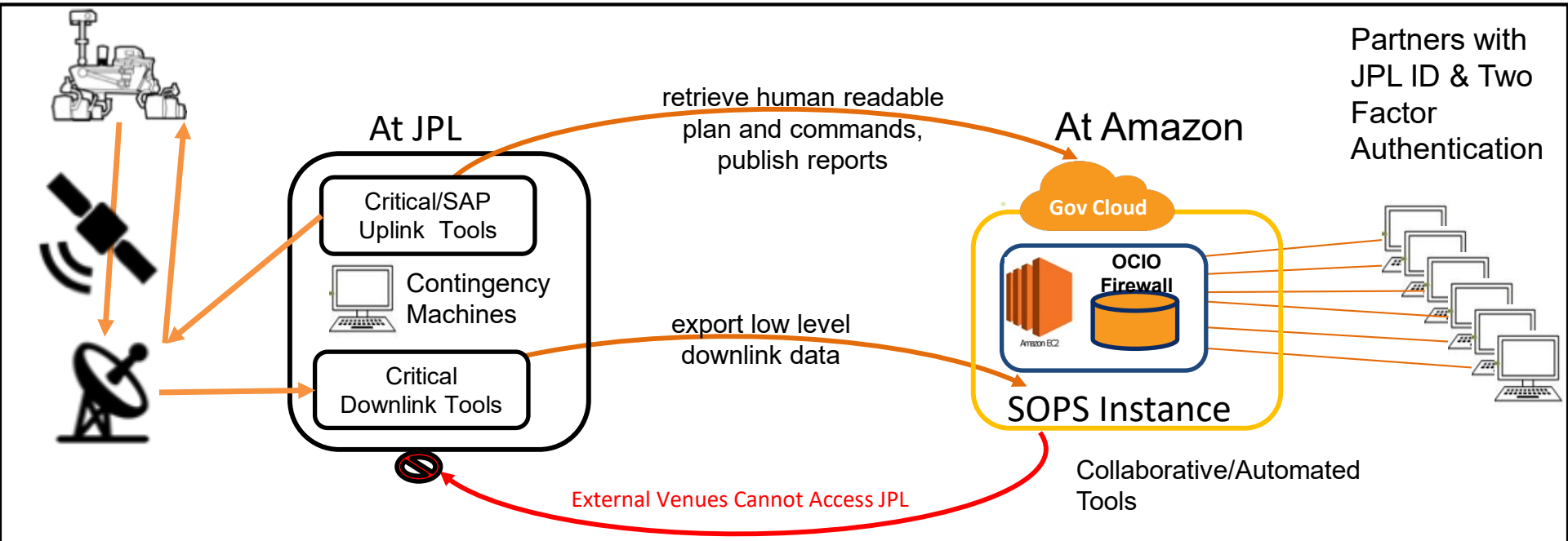
ASTTRO:
Improved Targeting

COCPIT:
Collaborative Planning

ArmSketch
Automating Arm Sequencing



Overview of GDS Architecture



- ATLO
- Cruise Op
- Core Surface Functions

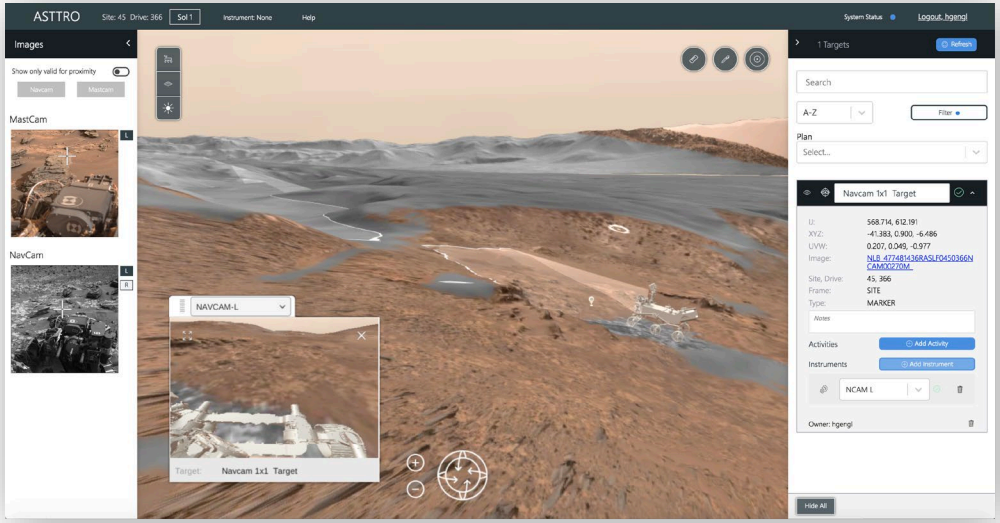
- Development Venues & Suppo
- Cloud tools for TB, ATLO, WS
- Cloud copy of Testbed, ATLO d a

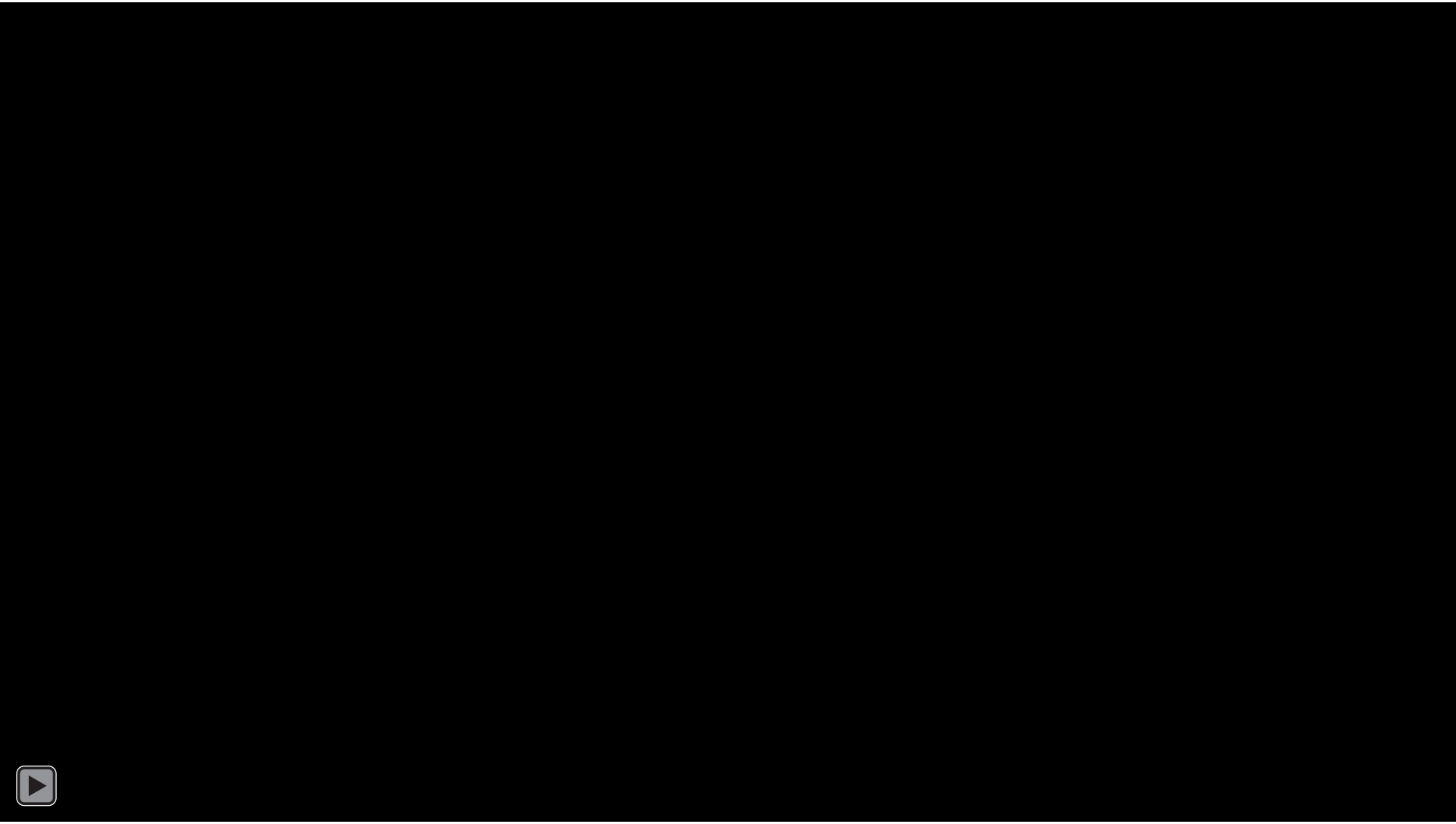
- Surface Bet
- Surface Ops

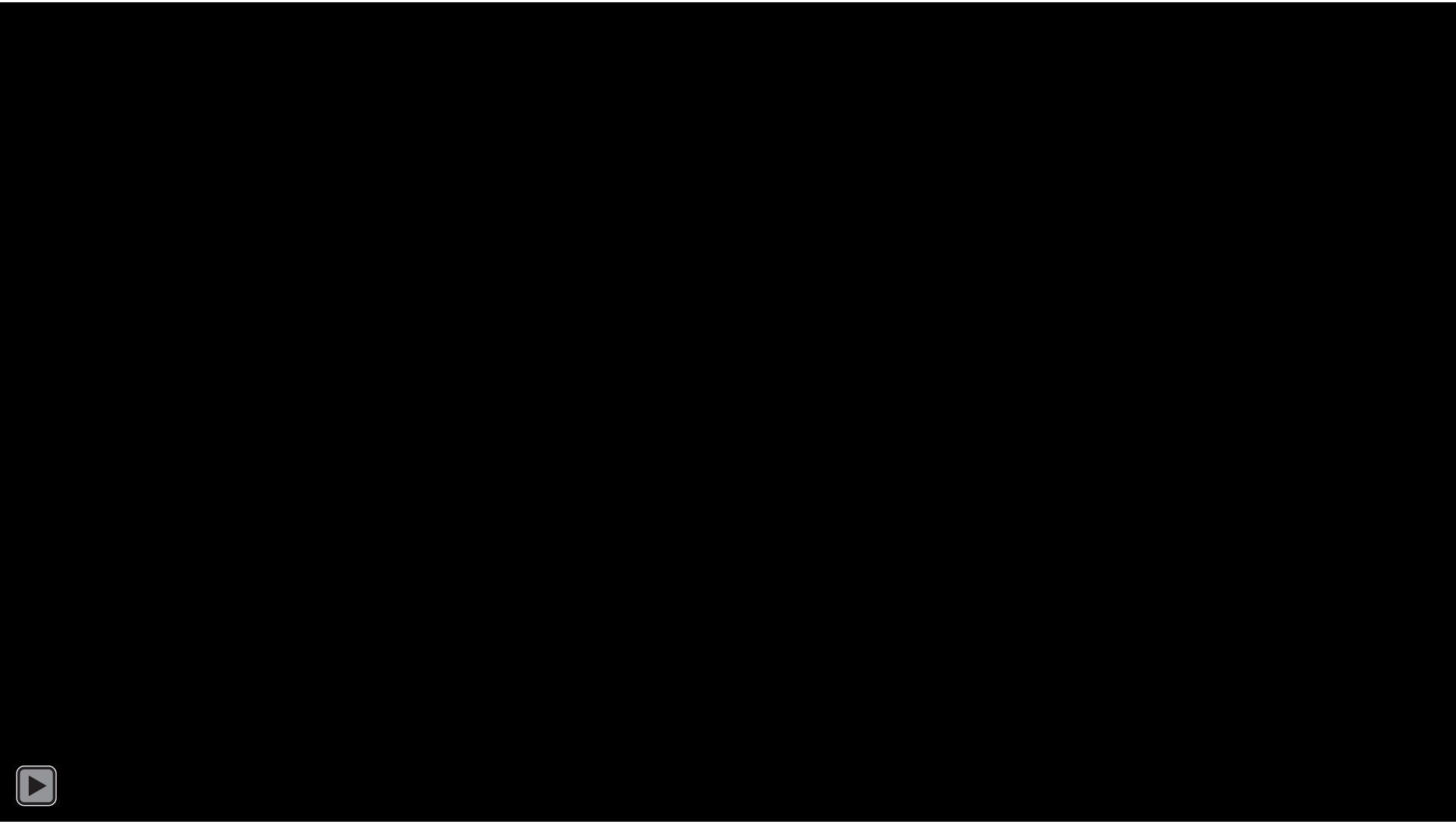
- Access to GDS tools
- Direct access to select Ops data
- Automation of SO/GDS integration

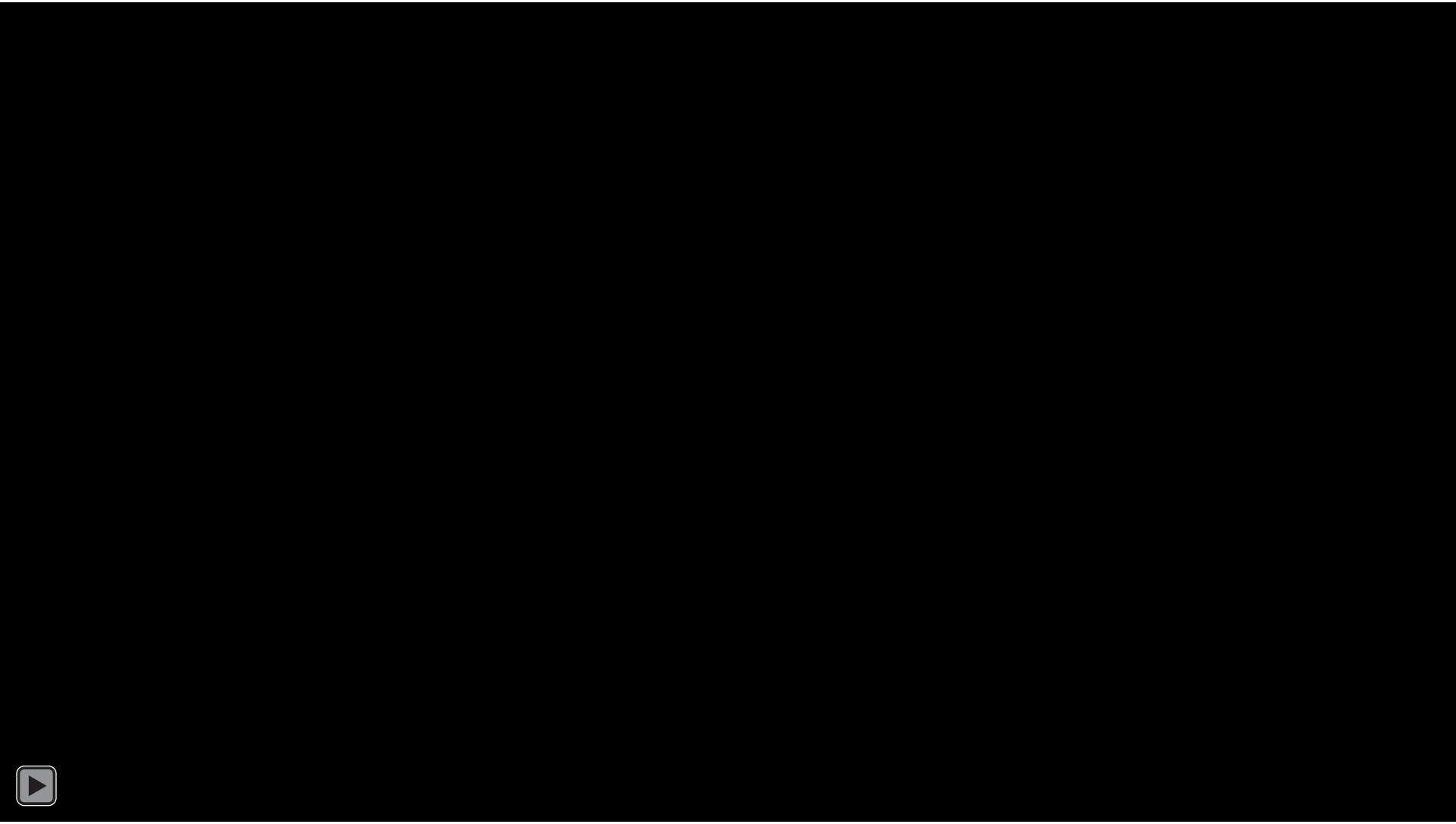
ASTTRO: Advanced Science Targeting Toolkit for Robotic Operations

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





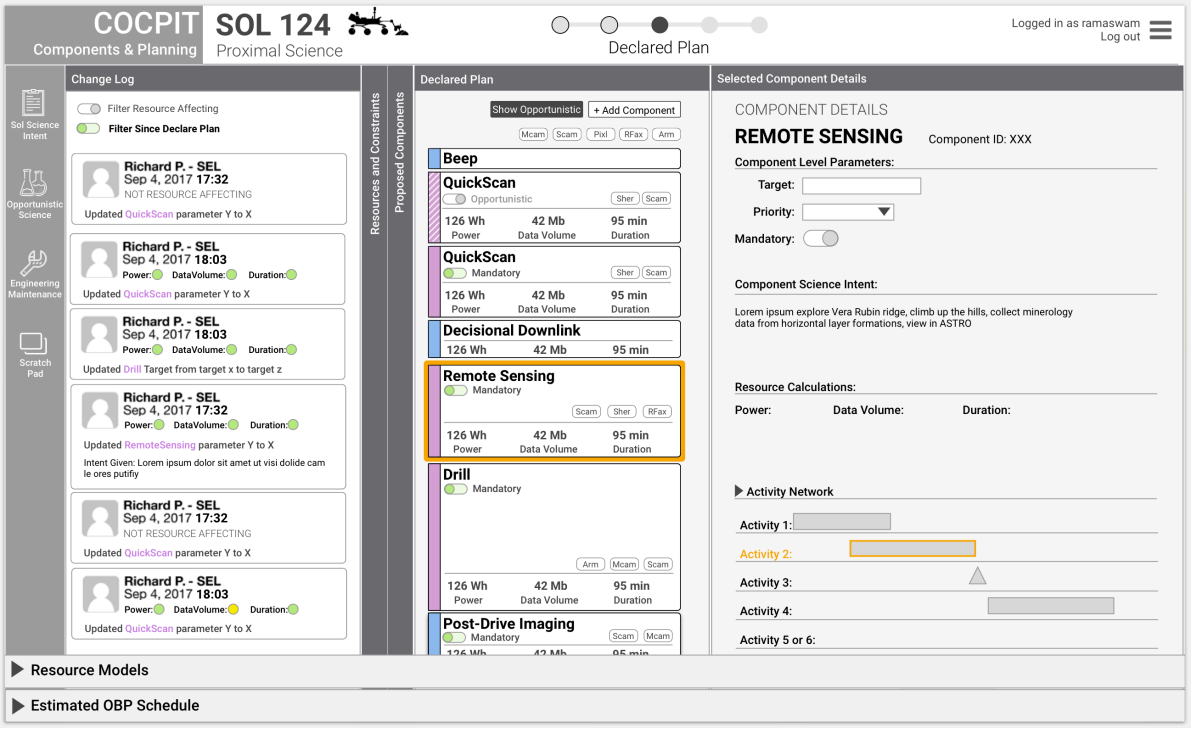


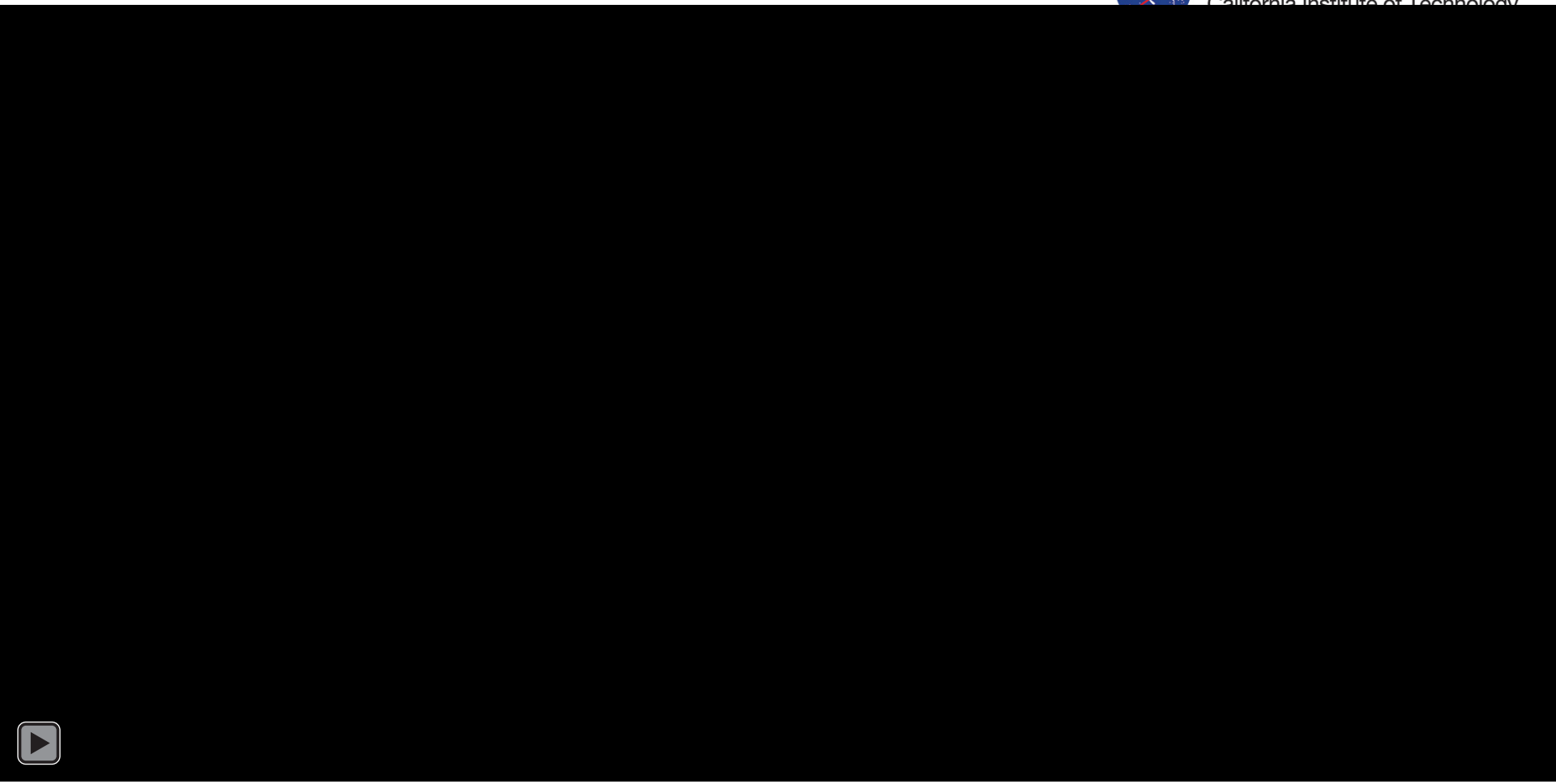


COCPIT

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





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