Geological field activities at the HI-SEAS planetary surface analog mission simulation in Hawai‘i

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SERVI EXPLORATION SCIENCE FORUM

Time Delay → Need *Autonomous* Crews

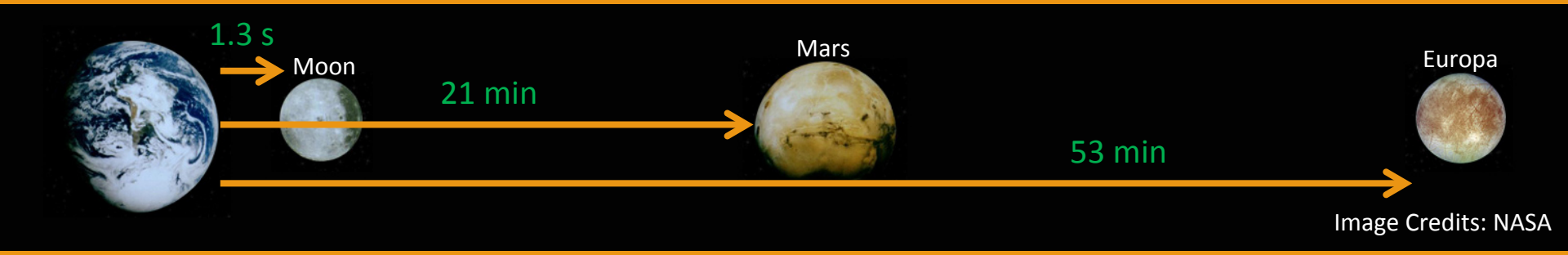


Image Credits: NASA

Use analogs to *discover* problems, test solutions,

design in the context of use,

integrate people + systems in realistic scenarios.

Image Credit: NASA

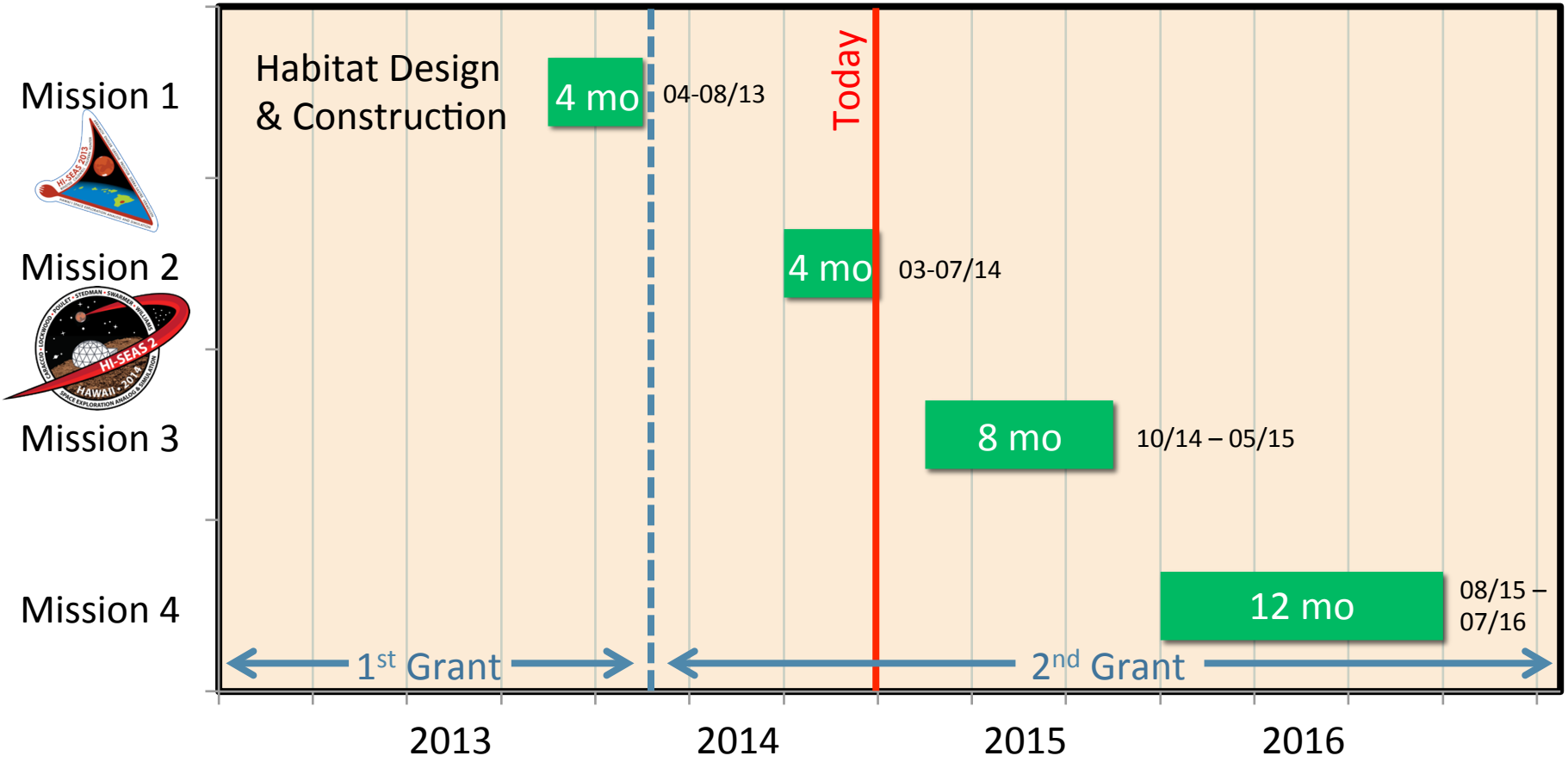
Why HI-SEAS?

HI-SEAS
Hawai'i Space Exploration Analog and Simulation

To mitigate risk on **long-duration**, **high-latency** missions.

- High-fidelity mission profile and environment.
- Site that allows both crew isolation and easy access year-round.
- Astronaut-like crews.
- Track crew cognitive and team performance through collaborative field tasks.

HI-SEAS Missions



The HI-SEAS Habitat

Site Geologic Overview

- Mauna Loa (8200 ft)
- Disused quarry
- Very little vegetation
- Situated on historical flows (mid 1800s – mid 1900s)
- Pāhoehoe and ʻaʻā textures
- Skylights and lava tubes

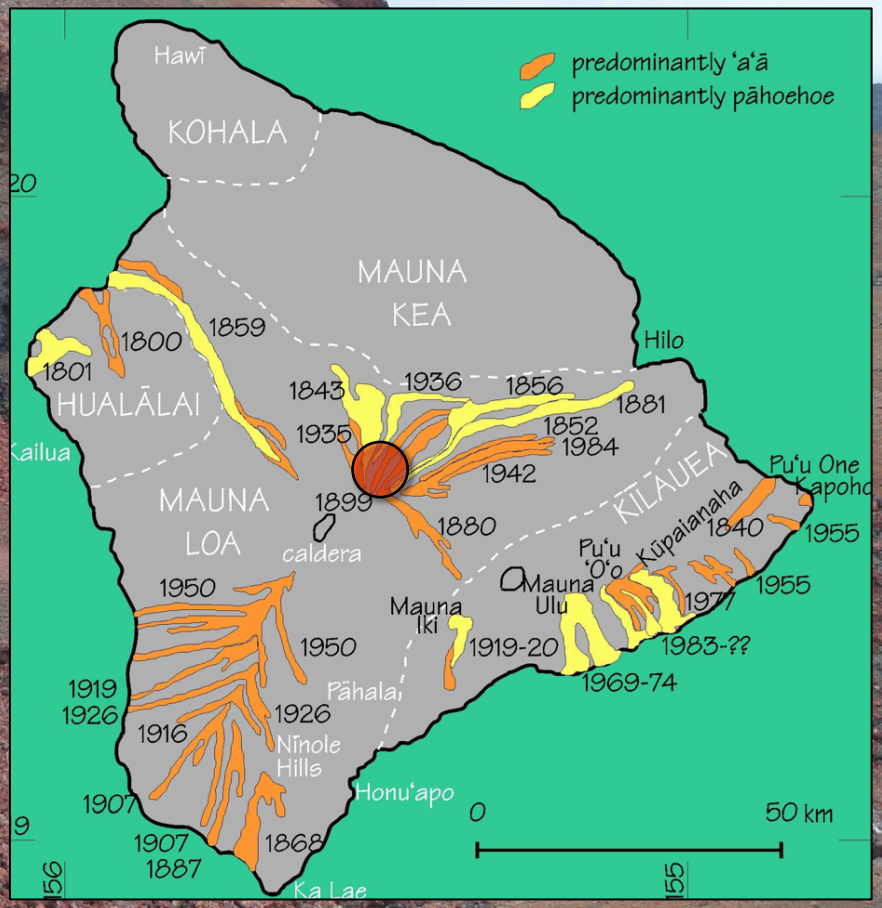
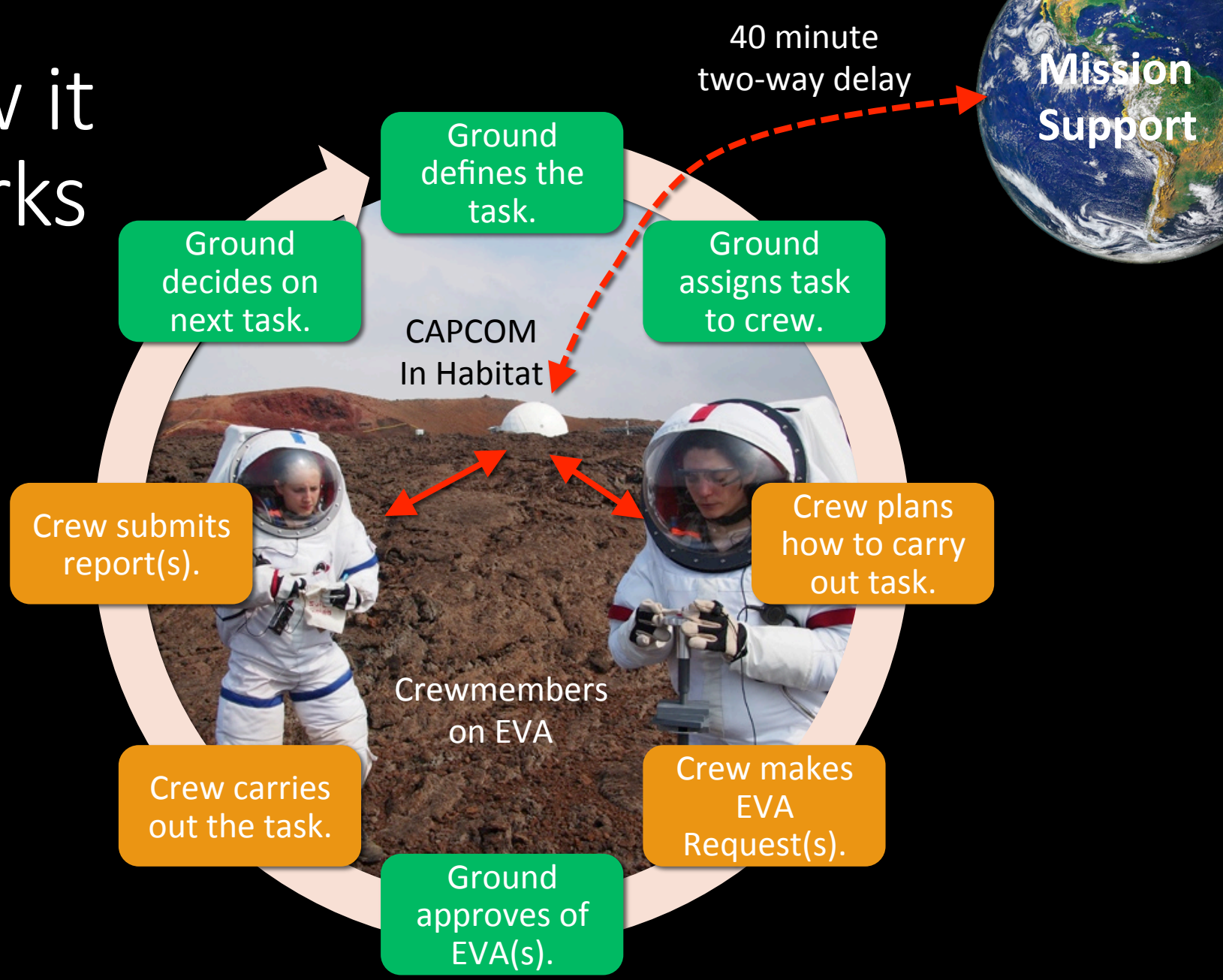


Image Credit: Rowland and Walker (1990)

How it Works


40 minute
two-way delay
Mission Support
Ground defines the task.
Ground assigns task to crew.
Crew plans how to carry out task.
Crew makes EVA Request(s).
Ground approves of EVA(s).
Crew carries out the task.
Crew submits report(s).
Ground decides on next task.
CAPCOM
In Habitat
Crewmembers
on EVA

Geology Tasks

- Team oriented
- Progressive
- Gradable with quantifiable metrics (e.g., time, distance, accuracy)
- What *not* How.
- Context of resource exploration and environment characterization

Going forward

Submit YOUR research proposal by 8 Sept 2014!
http://hi-seas.org/?p=3129

- Ground-truth the tasks to provide control results. Create additional tasks for the longer missions.
- Enhance fidelity and add functionality through opportunistic collaboration (e.g., geophysics studies, robotics, etc.).
- Improve understanding of autonomous crew EVA operations on high-latency, long-duration missions.

Questions?

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