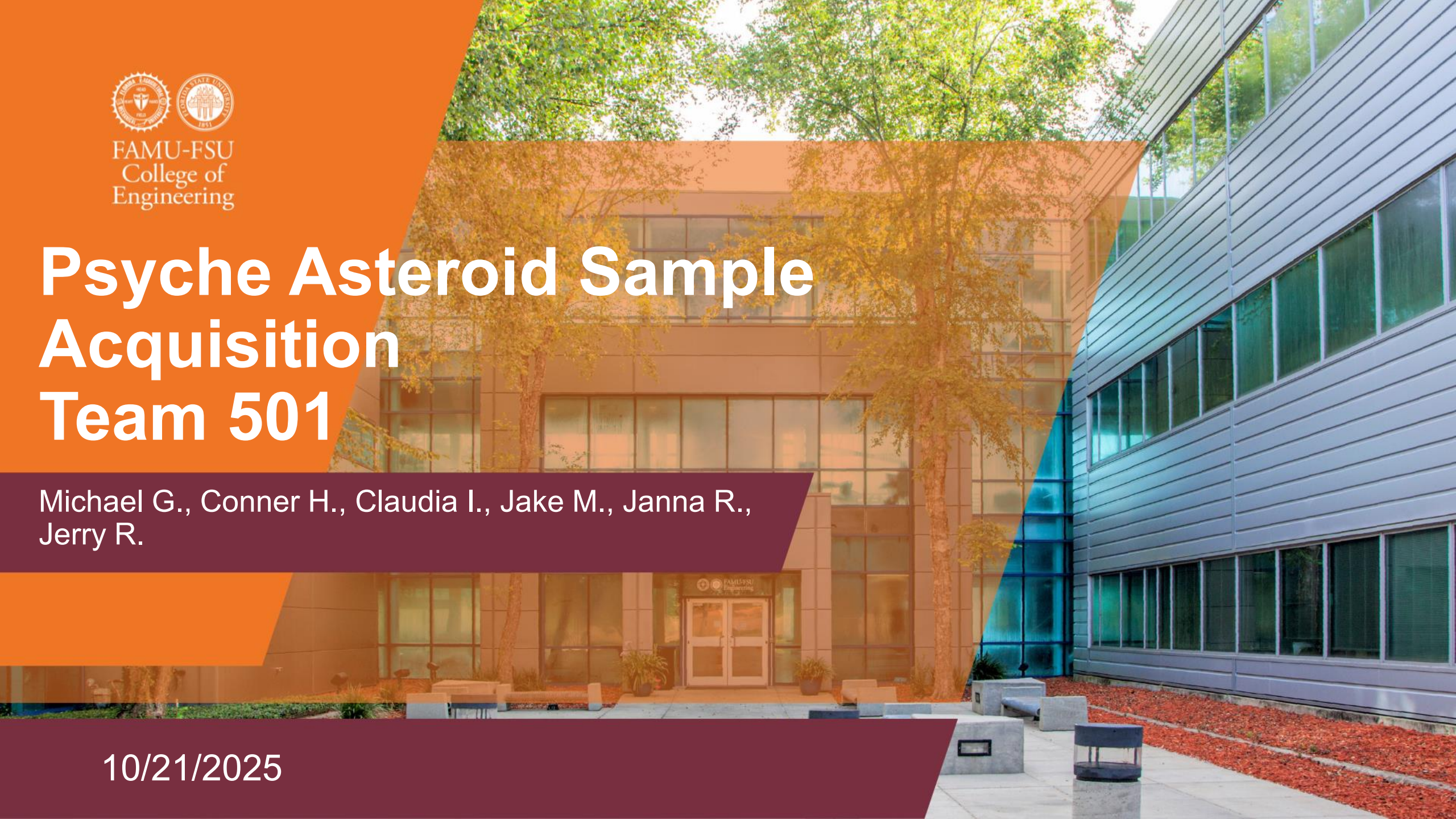

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Psyche Asteroid Sample Acquisition Team 501

Michael G., Conner H., Claudia I., Jake M., Janna R., Jerry R.

10/21/2025

Meet the Team

Michael Gregory
Mechanical Engineer

Conner Holmes
Robotics Engineer

Claudia Irausquin
Materials Engineer

FAMU-FSU College of Engineering

Meet the Team

Jake Marcus
Design Engineer

Janna Rhodes
Test Engineer

Jerry Richardson
Materials Engineer

FAMU-FSU College of Engineering

Meet the Supervisors

Dr. Cassie Bowman
Project Sponsor

Dr. Shreyas Balachandran
Faculty Advisor

FAMU-FSU College of Engineering

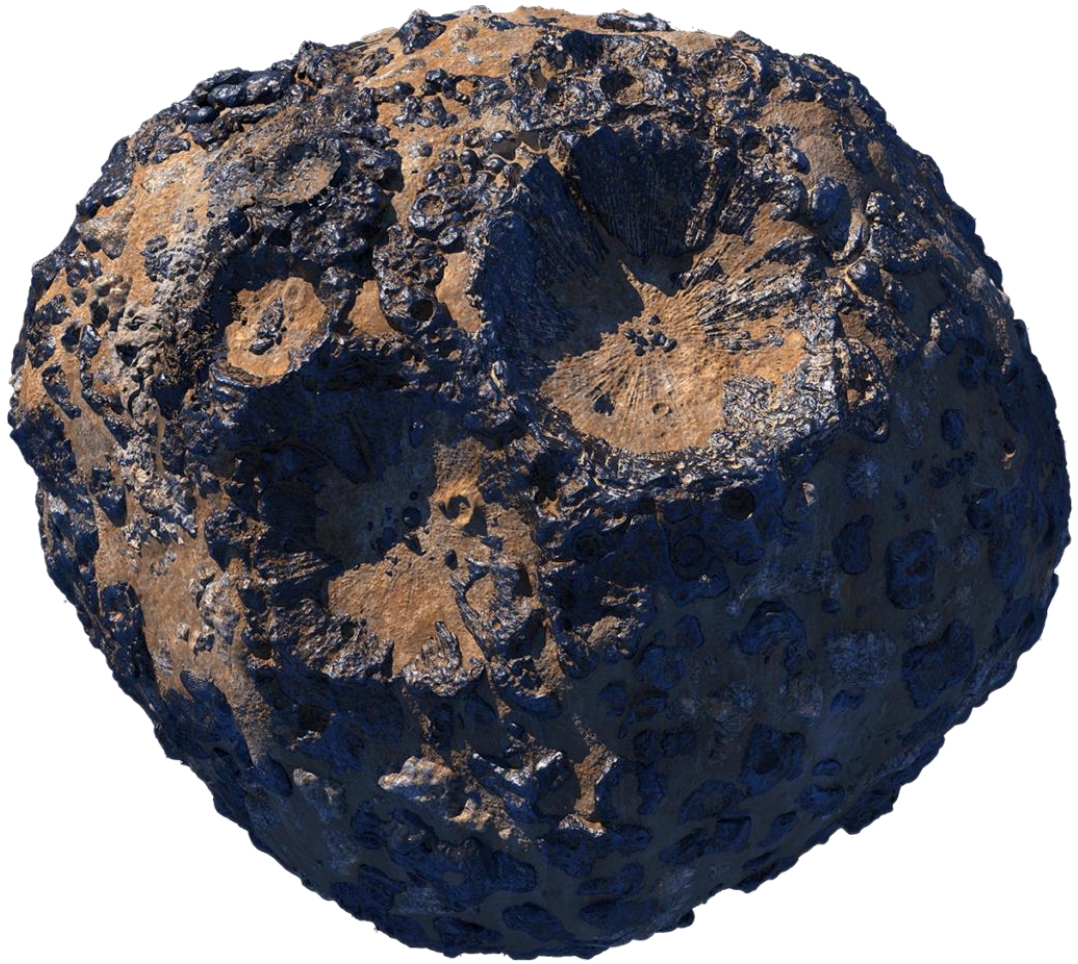
Dr. Shayne McConomy
Faculty Advisor

FAMU-FSU College of Engineering

Claudia
Irausquin

Psyche Brief

The objective of this project is to acquire and cache samples across multiple surface types on asteroid (16) Psyche. This effort is coordinated with Team 502, who is focused on sample retrieval.



NASA Rendering of Asteroid (16) Psyche

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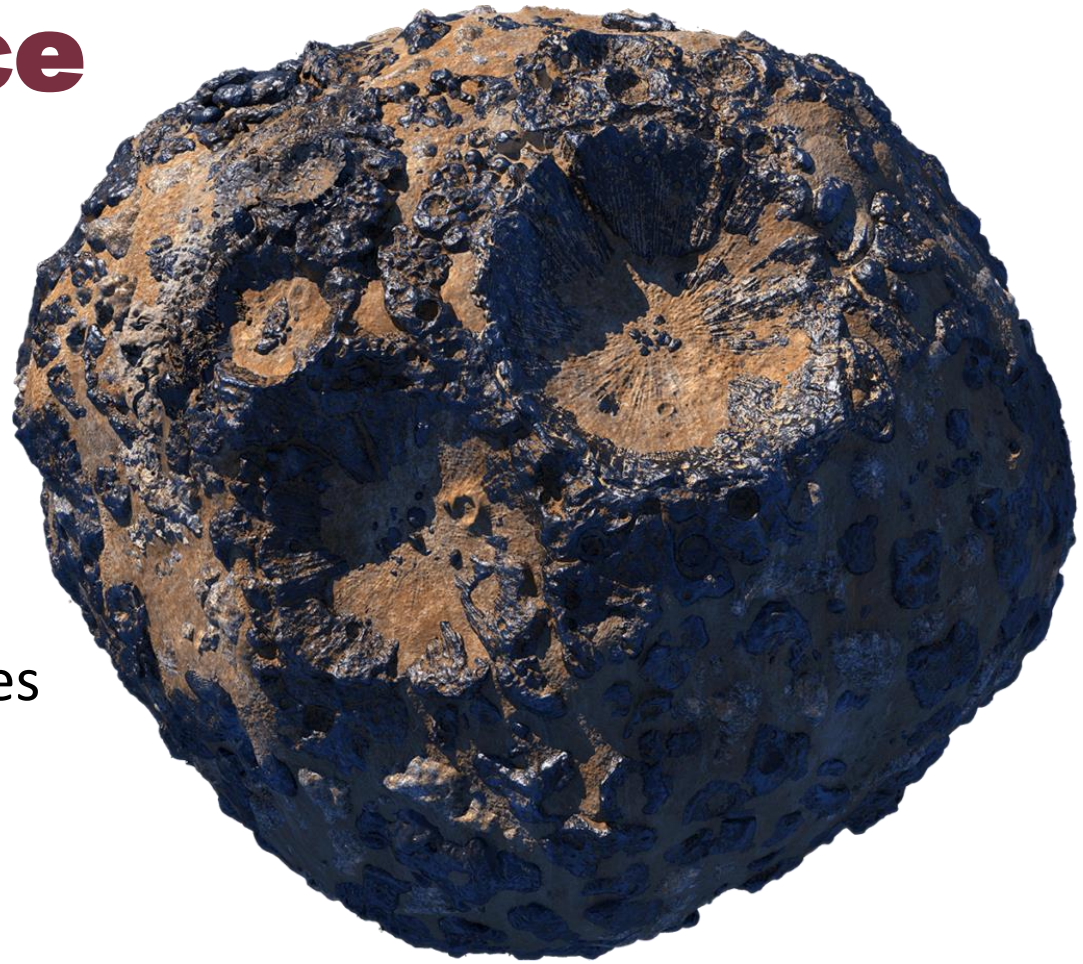
Psyche Importance

- Why?
  - Relevant to understanding of Earth
- How?
  - NASA expeditions & sampling studies
- So What?
  - Scientific implications
  - Future resource applications



NASA Rendering of Asteroid (16) Psyche

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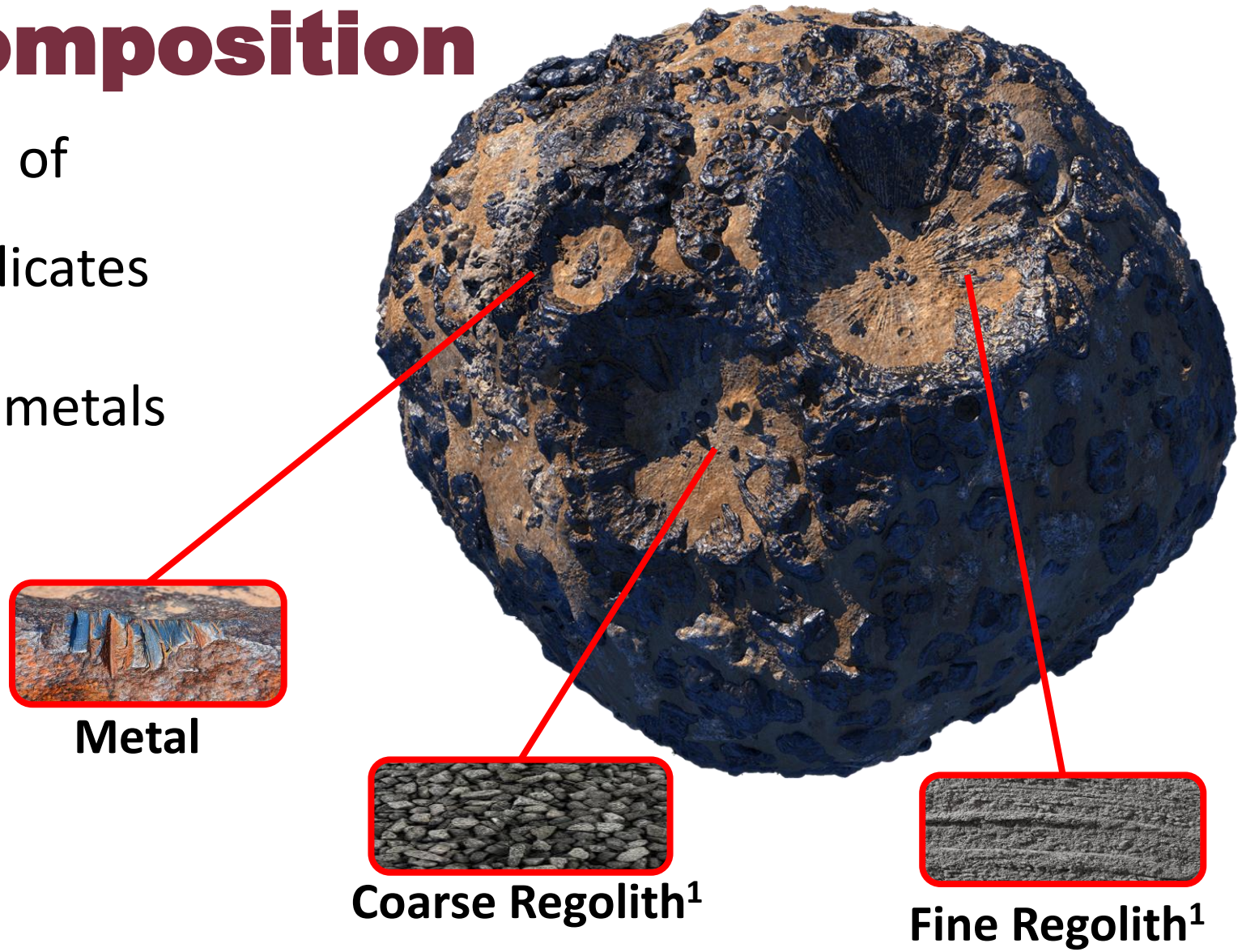
Psyche Composition

- Mainly composed of

  Iron-Nickel and Silicates

- Possibility of rare metals



1. A layer of small fragmented material; almost like dust

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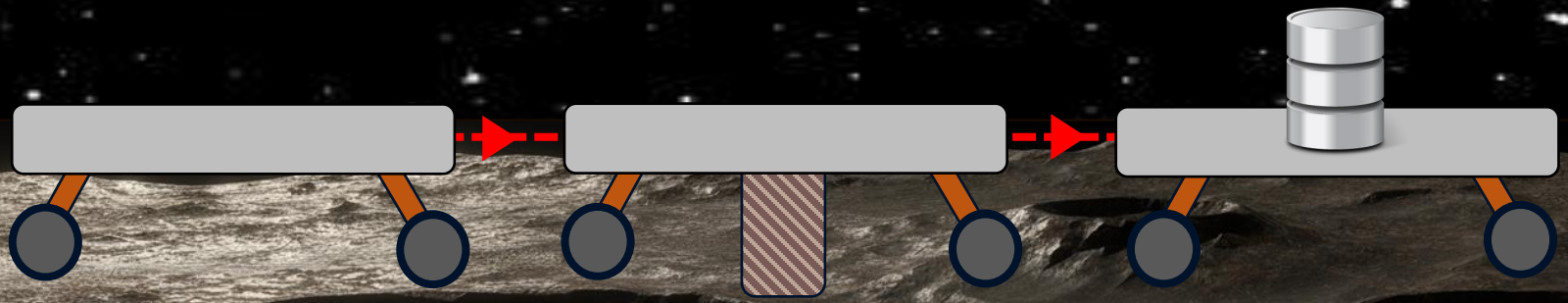
- **Team 501 Mission:**

Acquire and cache samples across varied surfaces on asteroid (16) Psyche

- **Team 502 Mission:**

Retrieve cached samples and return them to Earth

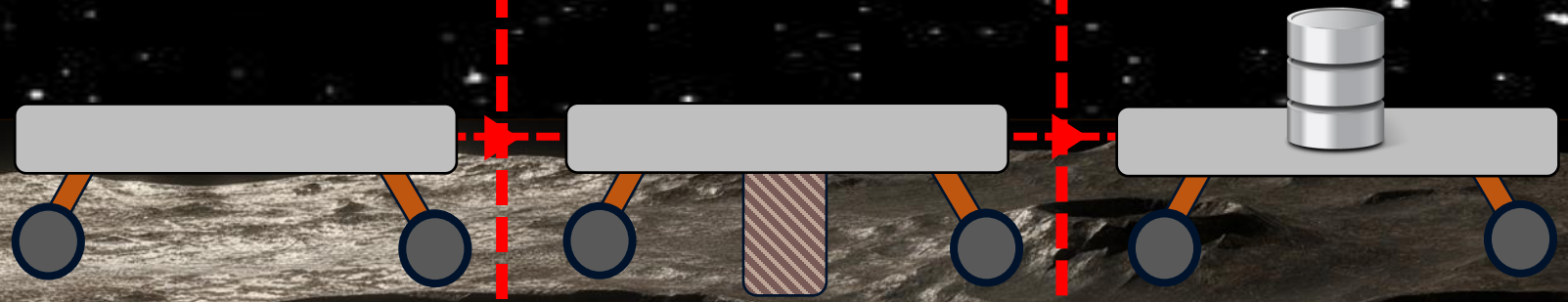


Michael Gregory

Team 501 Sample Cache Transfer Team 502

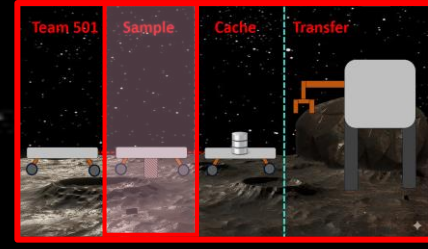
Assumptions:

- Sampling system is on host of our choice
- Host begins latched on asteroid
- Host safely travels to multiple extraction points



Michael Gregory

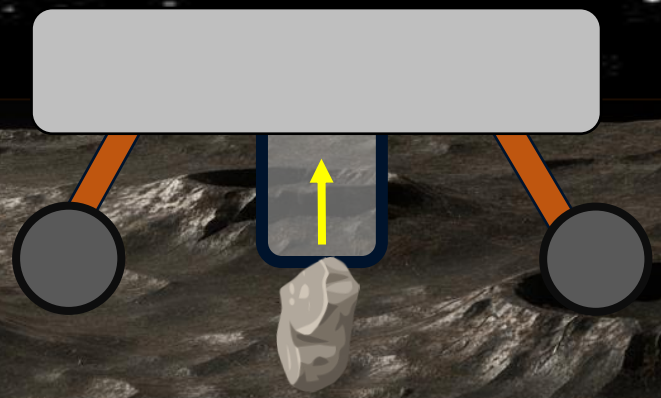
Sample

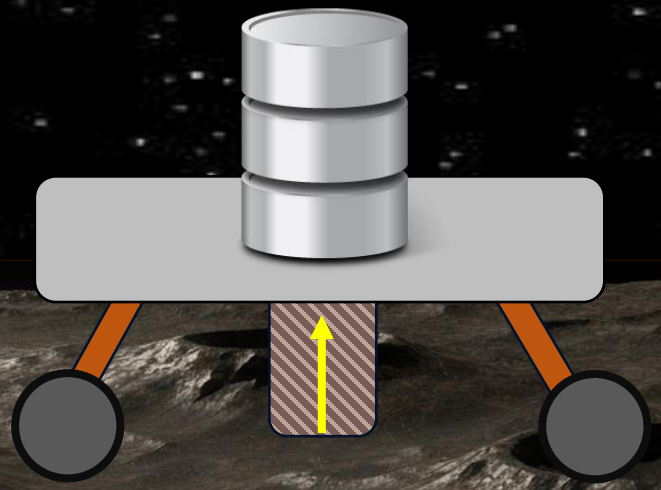


Stabilize Extraction Device

Extract Sample

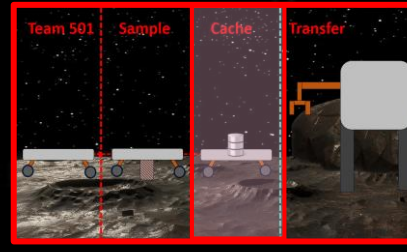
Decontaminate and Transfer to Cache





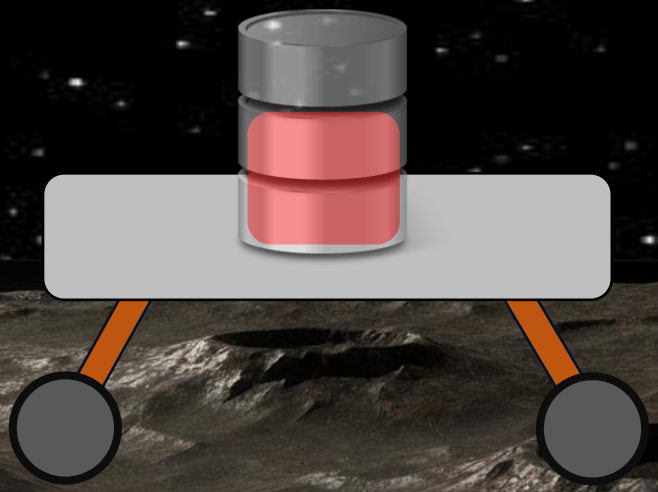
Michael Gregory

Cache



Measure Amount Extracted

Store and Protect Sample



Host Moves to Next Extraction Point

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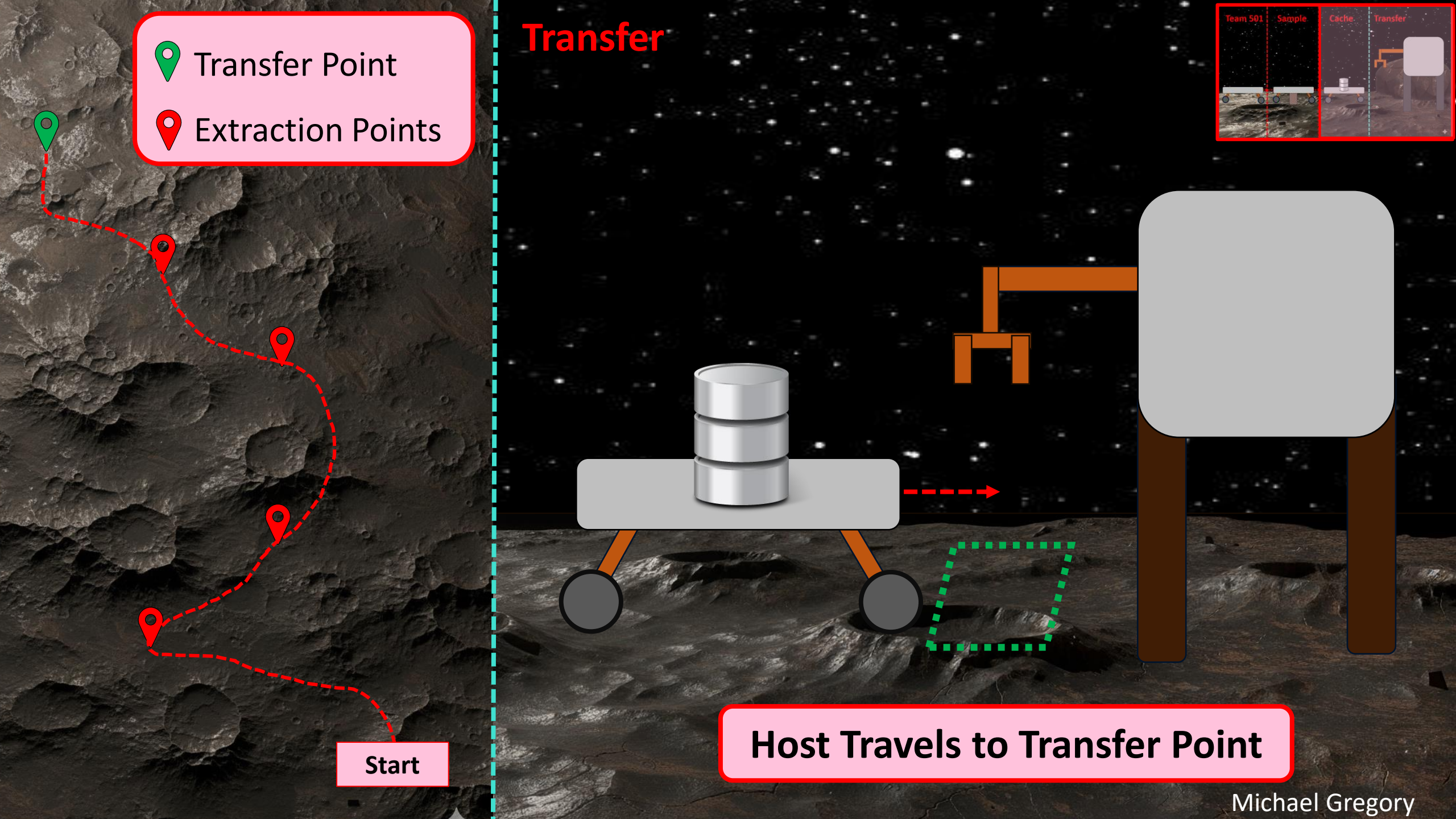
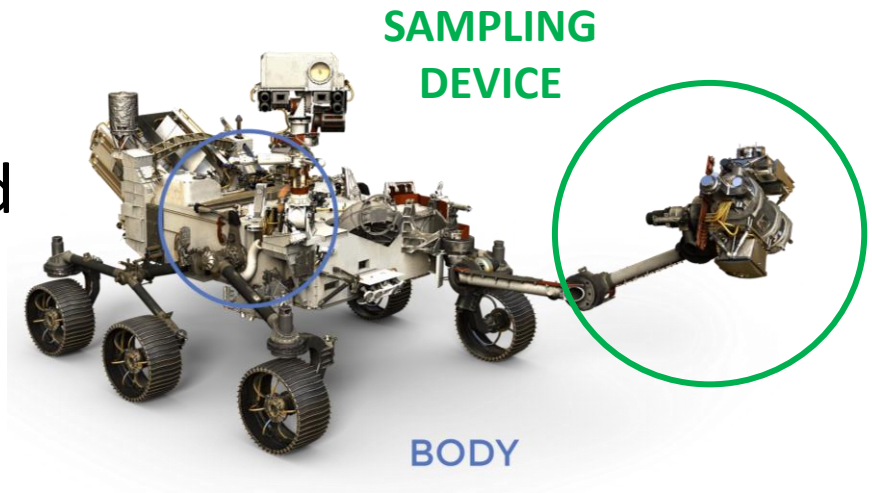

Transfer Point
Extraction Points
Start
Transfer
Team 501
Sample
Cache
Transfer
Host Travels to Transfer Point
Michael Gregory

Conner Holmes

Lander

- Sampler and cache system are mounted on a chosen host
  - LEMUR 3
  - Perseverance
- Host stays stable during extraction
- Host provides power to sampling and caching system

NASA LEMUR 3 Rover



NASA Perseverance Rover

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Psyche Attributes

- Season, diurnal cycle, and extraction point are predetermined
- Psyche composition will be like NASA's projections
- Prototype is assumed to work in microgravity and no atmosphere

Customer Needs: Sampling & Storing

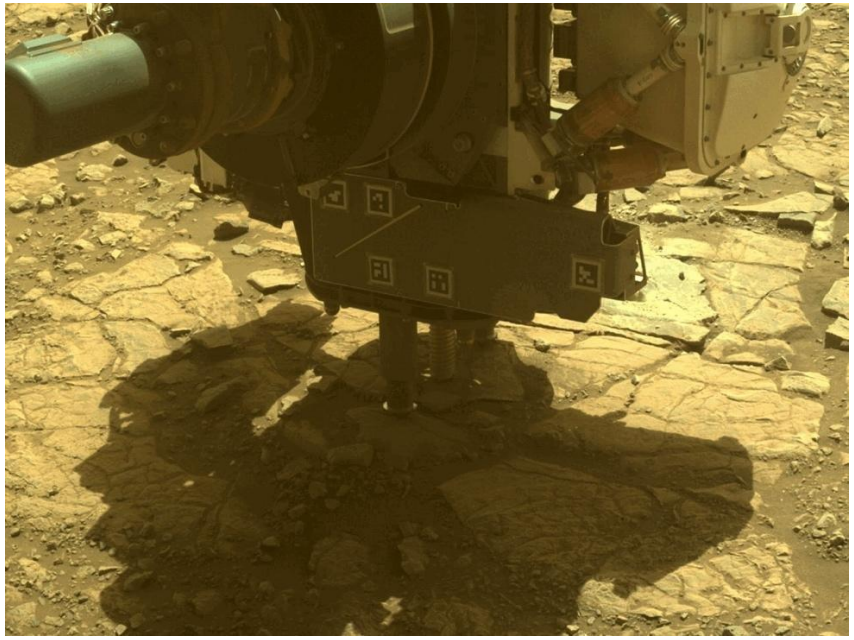
- Stay compatible for a handoff to T502
- Take multiple samples
- Keep the integrity of the samples
  - All must be benchmarked from other missions

Conner Holmes

Conner
Holmes

Perseverance Benchmark

- Cored out 33 samples with maximum volumes of 9 cubic inches
- Hermetically sealed each vial



Perseverance Rover Coring a Sample on Mars

Coring Vial used on Perseverance

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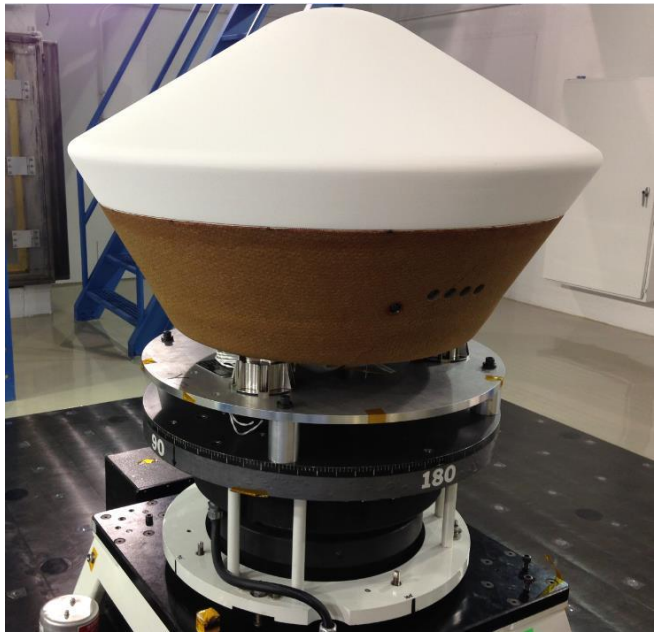
Conner
Holmes

OSIRIS-REx Benchmark

- Collected 121.6 grams of material with a high-purity nitrogen blast
- Sealed into the Sample Return Capsule (SRC)

OSIRIS-Rex Using Nitrogen Blast to Collect Regolith



Sample Return Capsule (SRC)

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Markets

Primary

- NASA
- Private Space Companies
- Research Institutions

Secondary

- Academic Institutions
- Advanced Manufacturing & Aerospace Companies
- Mining Companies
- Unmanned Underwater Vehicles (UUV) Industry

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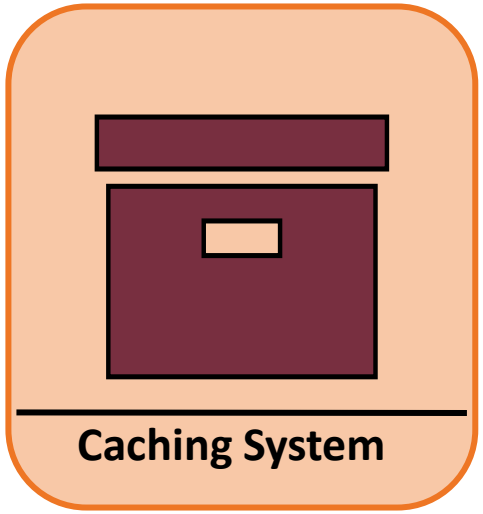
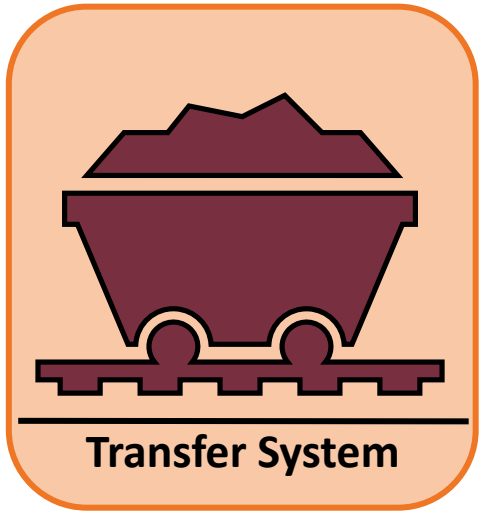
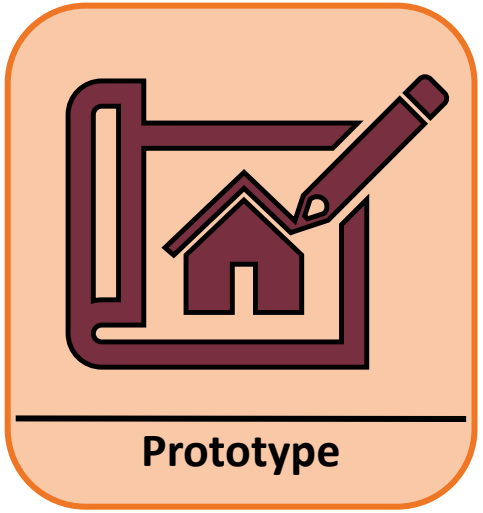
Key Goals







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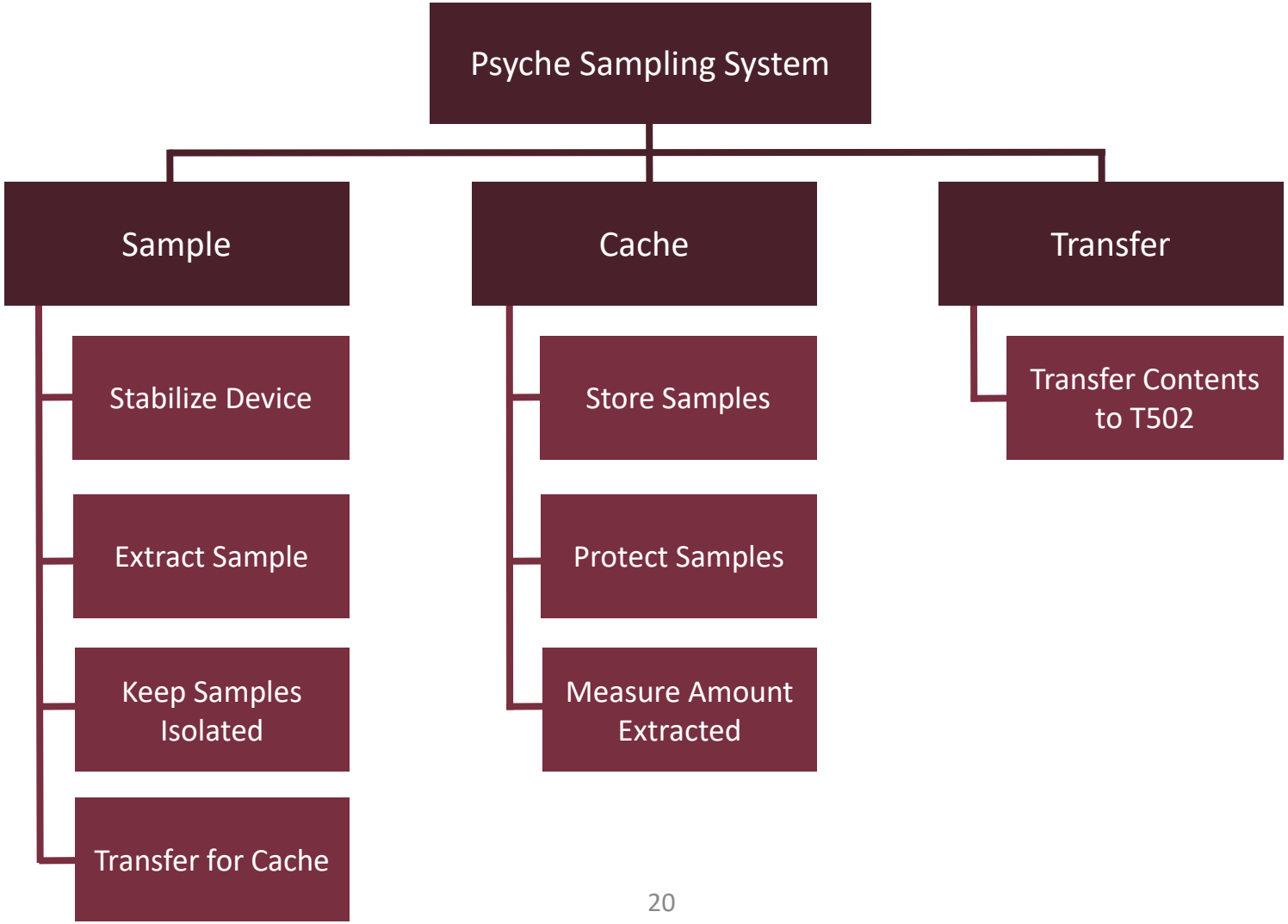
Functional Decomposition



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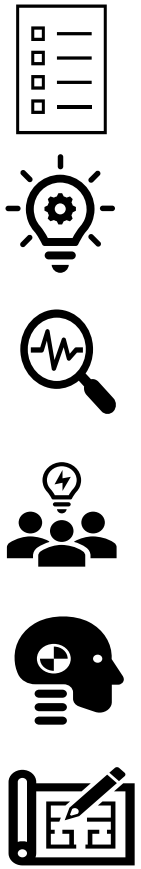
Future Work

- Concept Generation & Selection
- Design Refinement
- Integration with Team 502
- Material Selection
- Finalize Design
- Initial Prototyping



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Questions/Comments?

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