EML4551-2

Team 517
Sample On-Boarding and Orientation

October 10, 2019

Joshua Jones
Ryan Dingman
Matthew Schrold

Justin Bomwell
Victor Prado
Kalin Burnside

Senior Design Team 517

Joshua Jones
Robotics Engineer

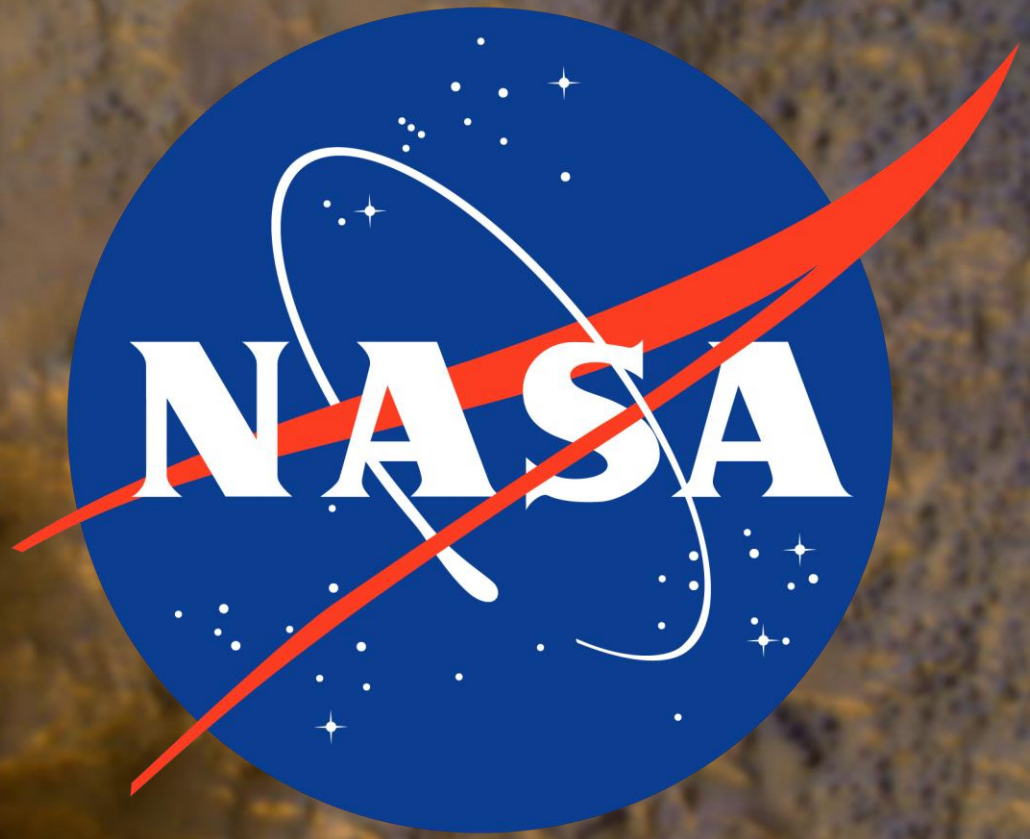
Ryan Dingman
Controls Engineer

Matthew Schrold
Test Engineer

Justin Bomwell
Software Engineer

Victor Prado
Design Engineer

Kalin Burnside
Power Systems Engineer



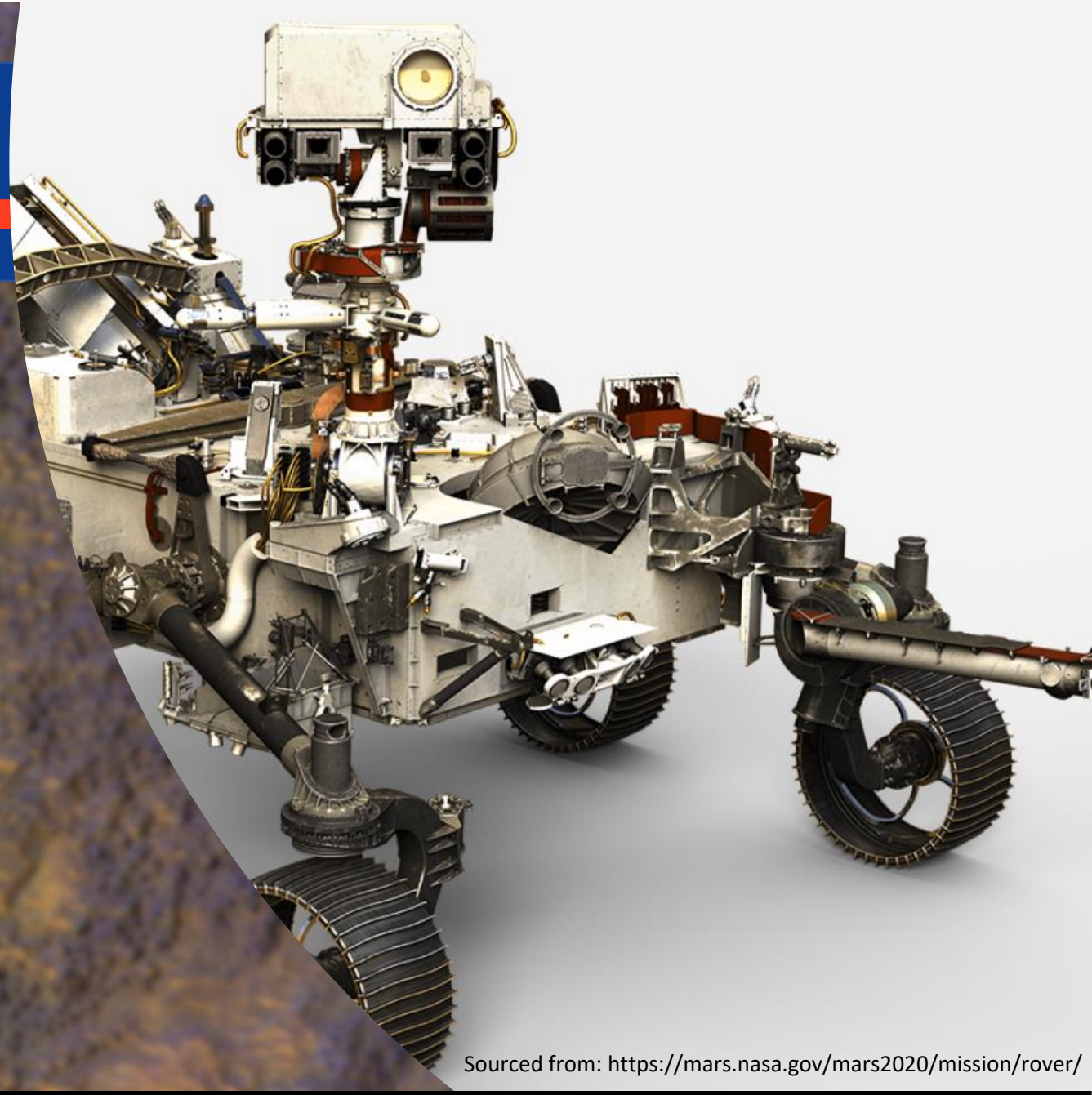
Angela Jackson
Sponsor

Dr. Shane McConomy
Professor

Dr. Camilo Ordóñez
Advisor

Objective

The objective of this project is to onboard a sample from the environment, then manipulate it within the rover so that testing instruments can perform all necessary tests on the sample.



Sourced from: https://mars.nasa.gov/mars2020/mission/rover/

In 2015, NASA confirmed that water flows on Mars.

Signs of life could be in the form of fossils.

Could there also be/have been life on Mars?

Samples must be brought back to Earth to study.

Key Goals

Collect

On-board

Orient

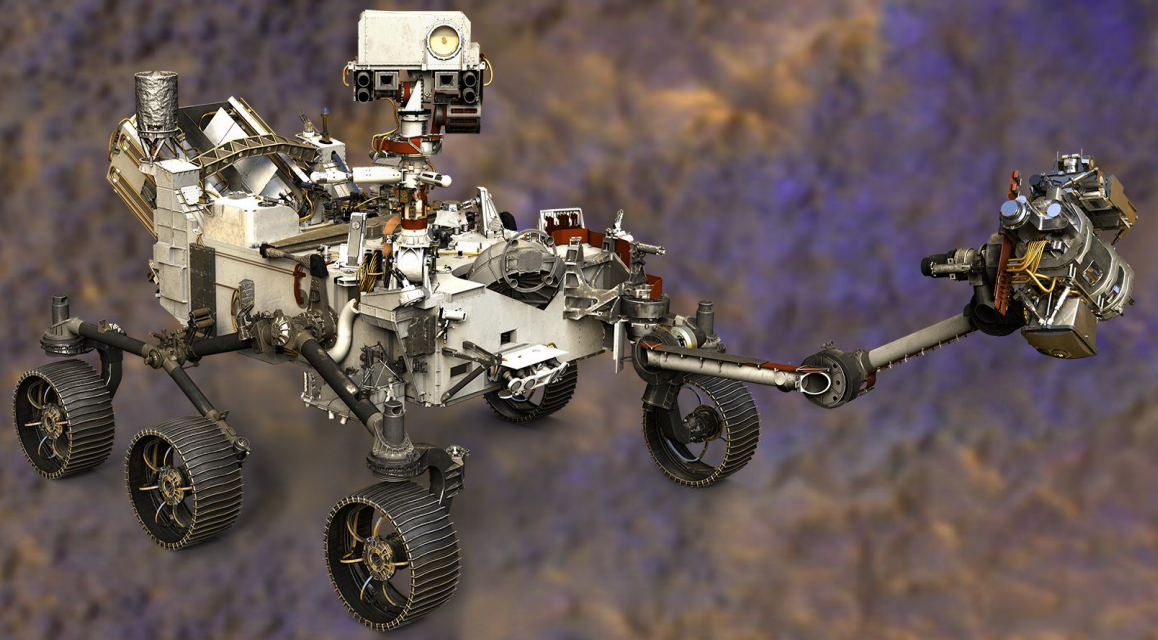
Assumptions

Device will be part of a larger rover system, which will provide power

The rover will be stationary during sample collection, loading, and orienting

Air resistance will be negligible

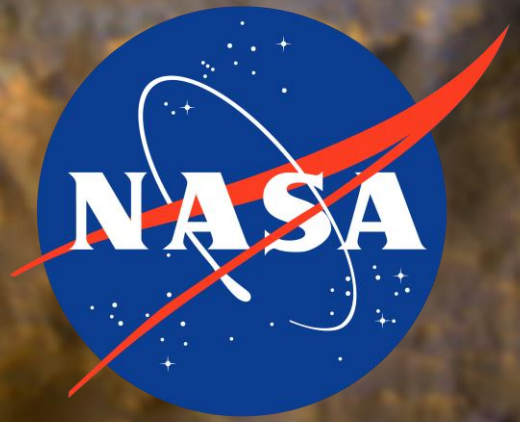
Samples will be free of sand or dirt



Sourced from: https://mars.nasa.gov/mars2020/mission/rover/

Markets

Primary Market :



Secondary Markets :

esa
European Space Agency

APL
JOHNS HOPKINS
APPLIED PHYSICS LABORATORY

LOCKHEED MARTIN

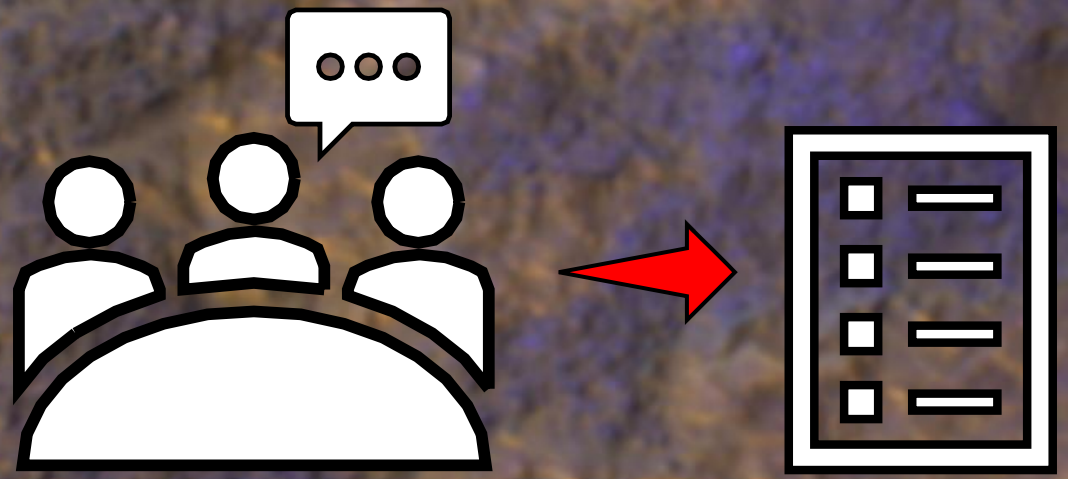
BOEING

Customer Needs

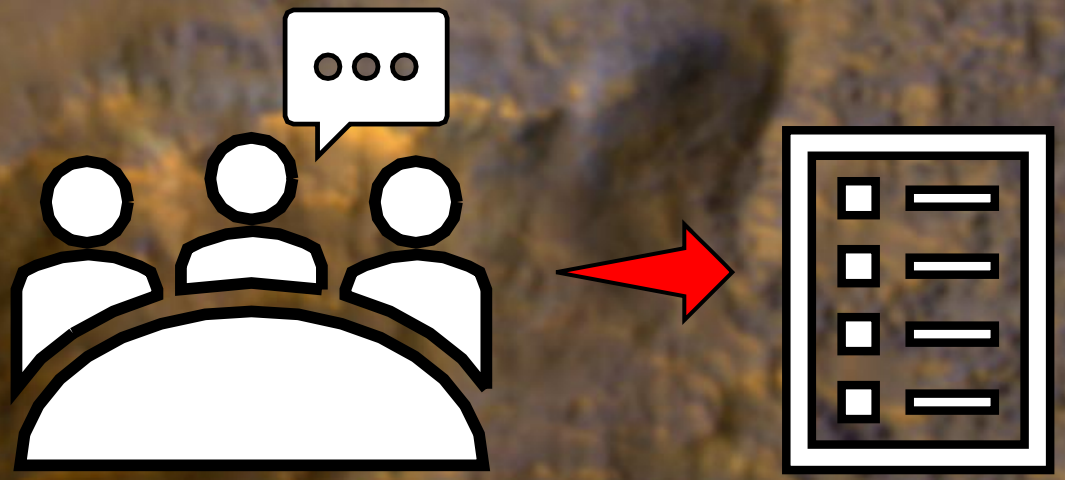
Transports the sample on-board

Manipulates the sample vertically and rotationally

Allow stationary sensors access to any surface location on the sample

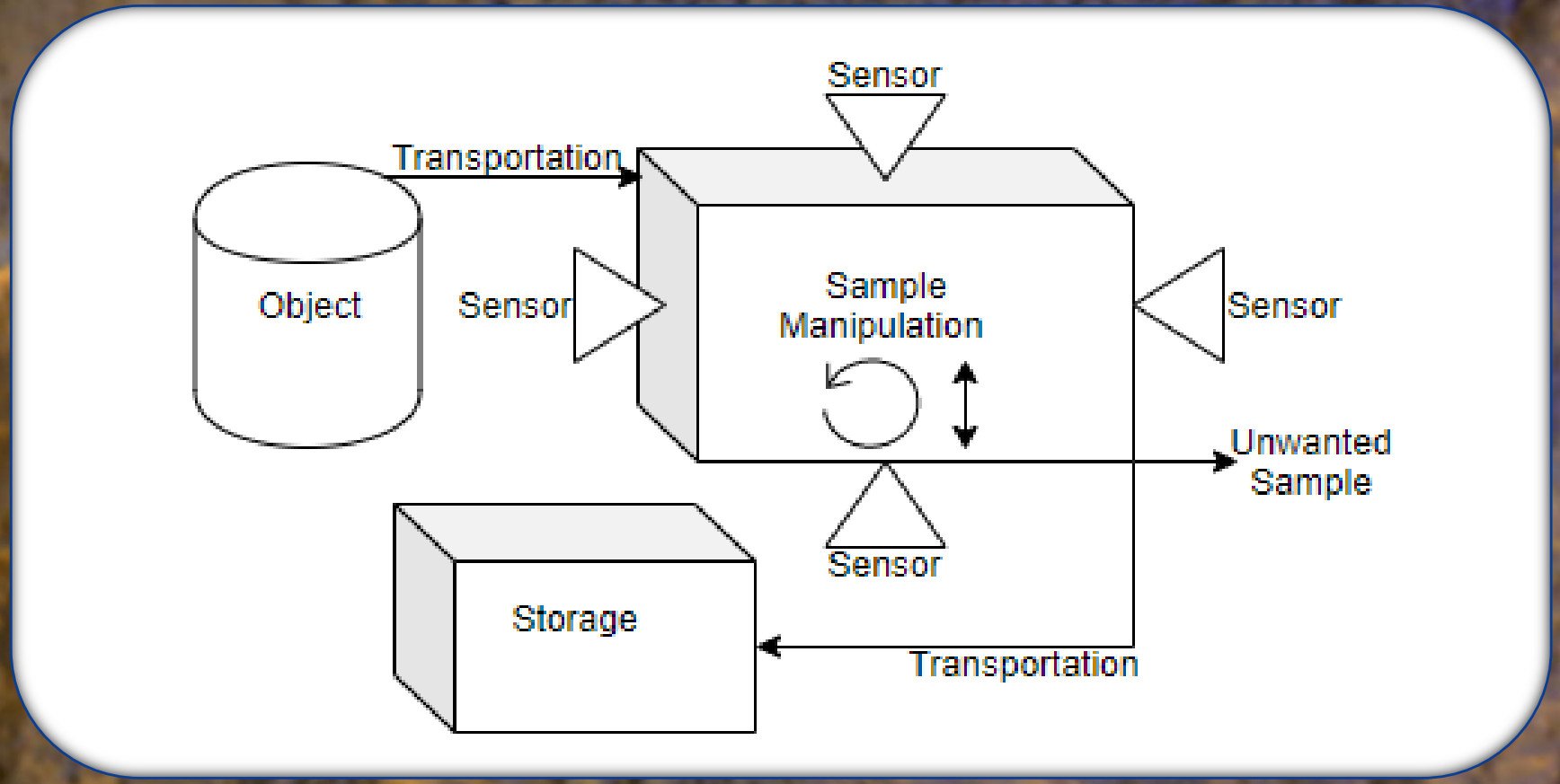


Customer Needs



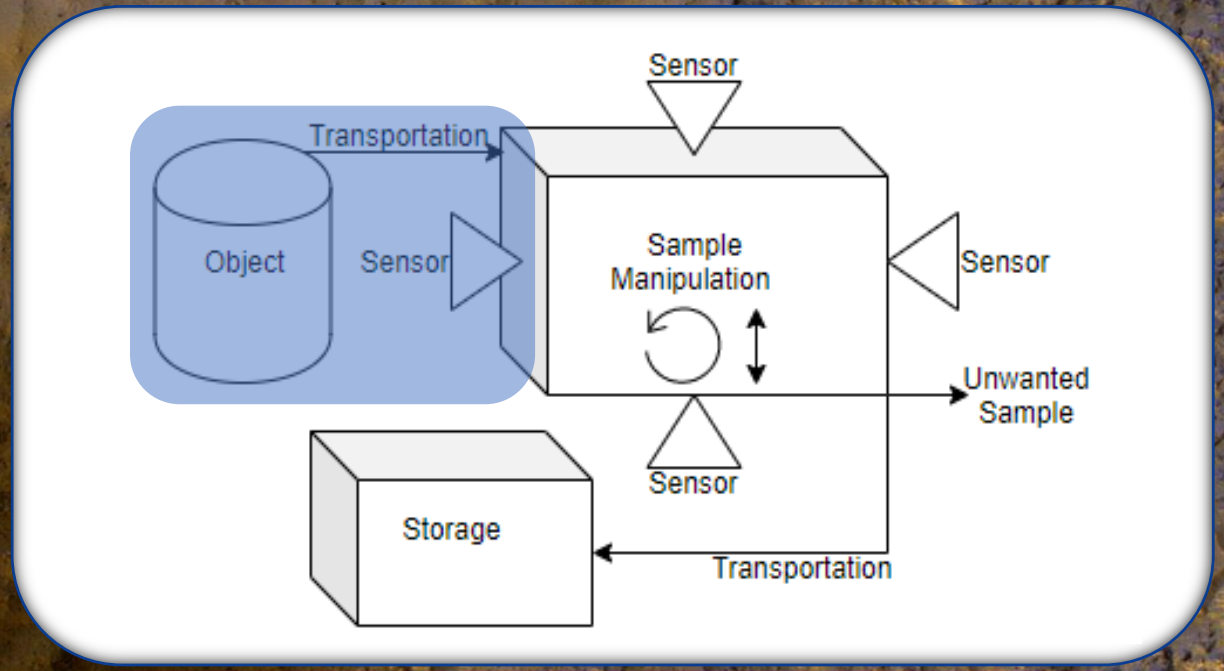
- Accommodates varying sample sizes
- Stores samples in a separate location
- Light weight
- Allows for the integration of power systems with the rover

Functional Decomposition



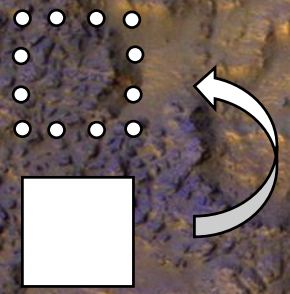
Functional Decomposition

On-board



Locate Sample

Secure Sample



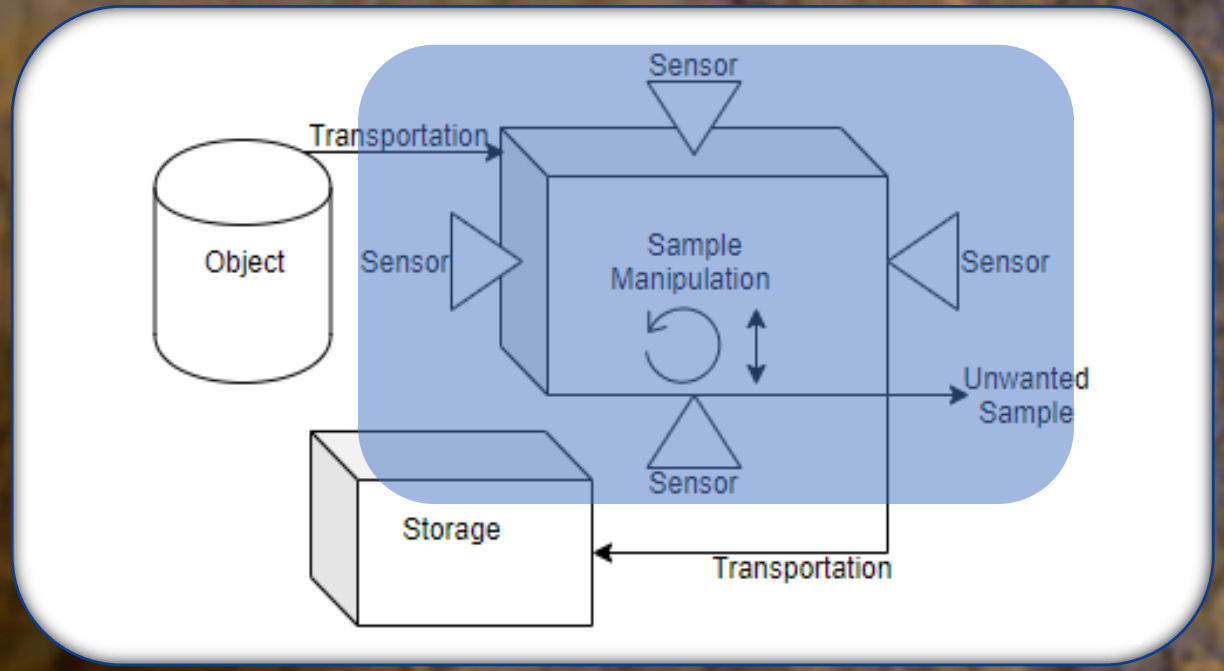
Move Sample

Position Sample

Icon made by Freepik from www.flaticon.com

Functional Decomposition

Orient



Import Sample

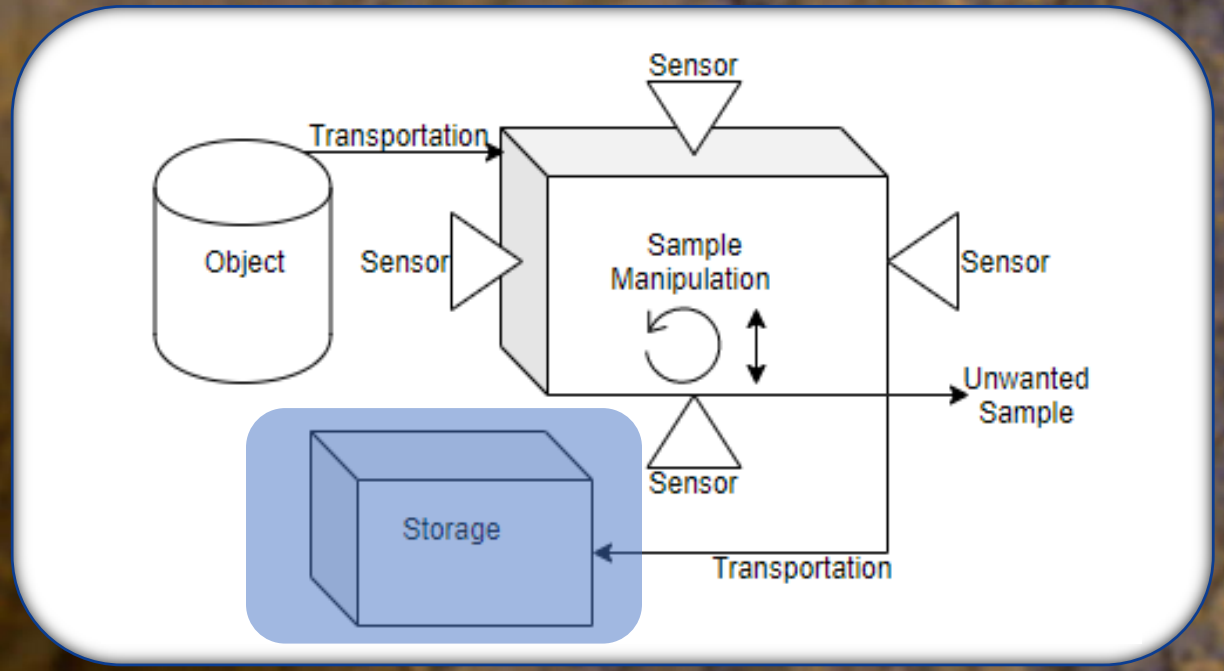
Stabilize Sample

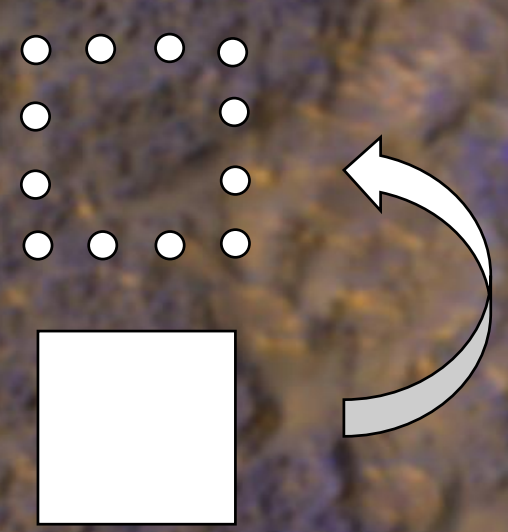
Rotate Sample

Icon made by Freepik from www.flaticon.com

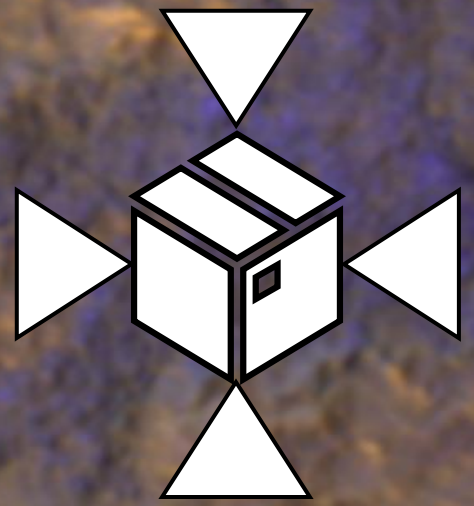
Functional Decomposition

Store





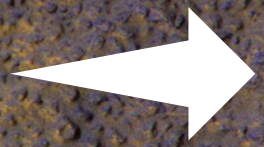
Move Sample

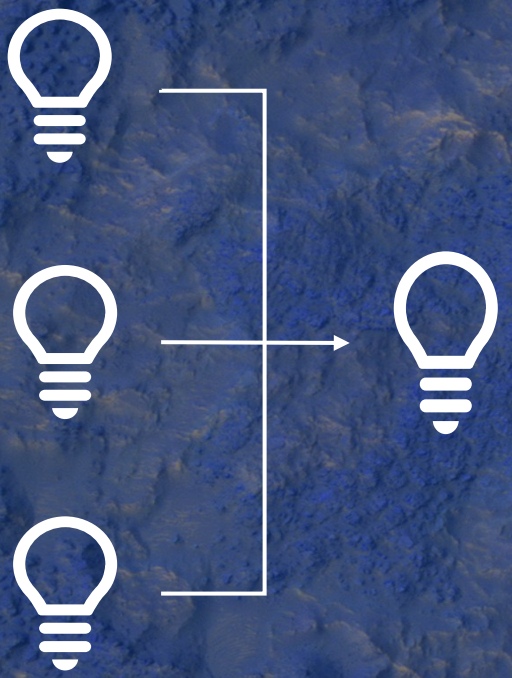


Contain &
Stabilize Sample

Future Work

Concept Generation

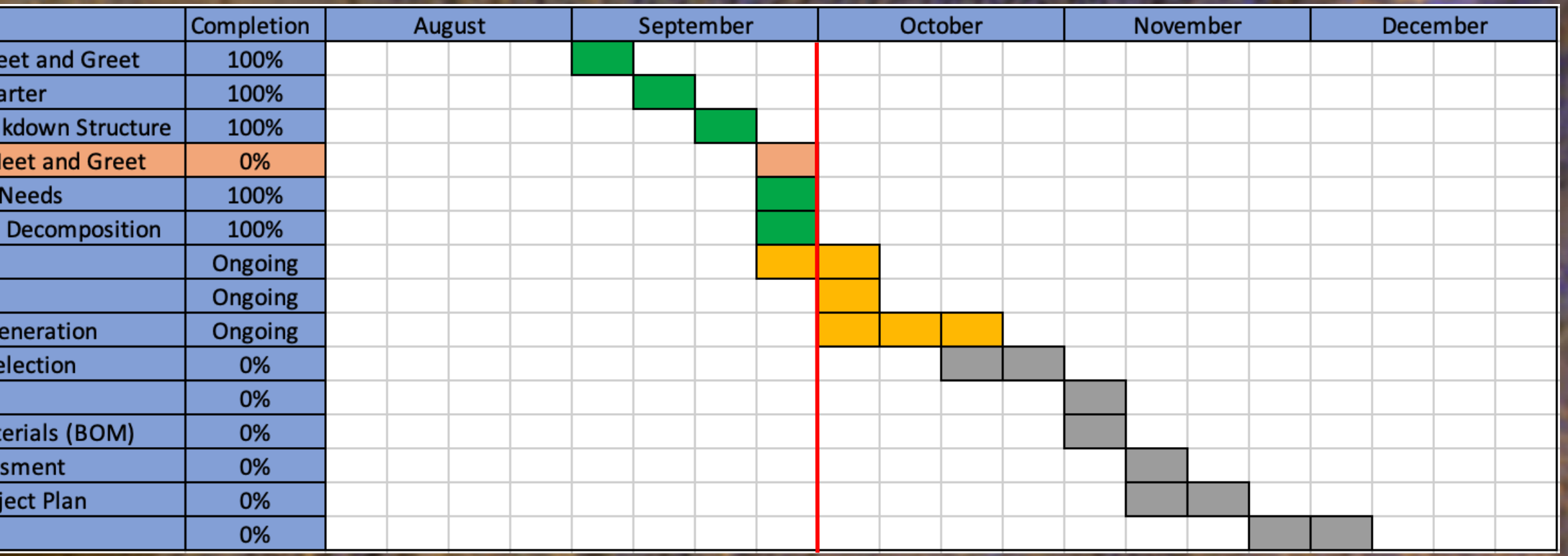




Concept Selection

Gantt Chart for Deliverables

Tasks	Completion
Advisor Meet and Greet	100%
Project Charter	100%
Work Breakdown Structure	100%
Sponsor Meet and Greet	0%
Customer Needs	100%
Functional Decomposition	100%
VDR 1	Ongoing
Targets	Ongoing
Concept Generation	Ongoing
Concept Selection	0%
VDR 2	0%
Bill of Materials (BOM)	0%
Risk Assessment	0%
Spring Project Plan	0%
VDR 3	0%



- Complete
- Ongoing
- Outstanding
- Indeterminate

References

1. https://mars.nasa.gov/mars2020/mission/rover/
2. https://www.nasa.gov/centers/marshall/news/background/facts/astp.html

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Project Background

Project Scope

Customer Needs

Functional Decomposition

Collect

On-board

Orient