Project Charter

Leila Abdul Hadi, Jesse Brown-Bosch, Colin Jones, Asia Russell

Florida State University, Panama City Campus

EML4551C: Senior Design I

Dr. Damion Dunlap

January 18, 2021

Table of Contents

Project Charter

Project Scope

Project Background

The Psyche Rover design team has been tasked with conceiving a robotic explorer to assist in the examination and analysis of the 16 Psyche asteroid. It is hypothesized that the asteroid is mainly metallic in composition, being comprised of metallic iron and nickel. Due to this composition, the asteroid is of significant interest, as scientists believe that Psyche may be the exposed core of an early planet. As the first investigation of a world of metal, the Psyche mission may provide insight on the history of planetary collisions and what may lie at the Earth's core (In Depth, 2021).

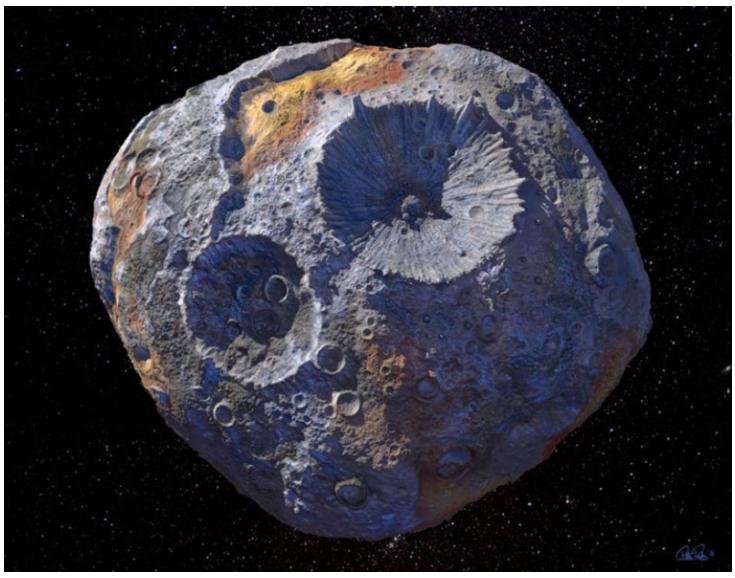

Figure 1 - Artist Concept of Psyche, Credit: Maxar/ASU/P.Rubin/NASA/JPL-Caltech

Project Description

Design and build a robotic explorer that can successfully traverse and adapt to the terrains existing on the Psyche asteroid.

Key Goals

The Psyche Rover design team has several goals:

- Navigate and adapt to a variety of complex terrains
- Durable
- Limited operational complexity
- Easy integration with necessary peripherals, such as surveying or photographic equipment
- Redundant sources of power

Markets

The primary markets for the Psyche Rover project are NASA and other relevant international government space exploration activities, such as Roscosmos or CNSA.

Surveying agencies, such as the US Army Corps of Engineers, and volcanologists serve as secondary markets, as an adaptable rover would be an asset for varying or dangerous terrain types. Additionally, SpaceX and other galactic startups would comprise potential secondary markets.

Assumptions

The design team is assuming several factors to help define the success and scope of the project:

- Communication devices, such as satellites, are designated and available
- External transport to asteroid is provided
- Power provision is local to the rover
- Earth's gravitational environment is sufficient for prototyping
- Ambient local environment - no extreme conditions

- Rover will not operate completely autonomously
- Necessary peripheral equipment is specified in advance of CAD design
- Rover is not required to be amphibious

Stakeholders

Several stakeholders have an interest in the success of the Psyche Rover project:

- NASA
    - As one of the project sponsors, NASA is primarily responsible for scope definition and is a principle beneficiary of a successful project
- Arizona State University
    - As one of the project sponsors, ASU is primarily responsible for scope definition and is a principle beneficiary of a successful project
- Mission Partners
    - Johns Hopkins
    - MIT
    - Maxar
- Florida State University
    - A successful project can result in positive reputational and financial impacts for the university, college of engineering, and associated teaching faculty
- Dr. Damion Dunlap
    - As a member of the mechanical engineering faculty and primary advisor, Dr. Dunlap influences the project scope and has a vested interest in the success of the project

- Psyche Rover Design Team
    - As aspiring engineers, a successful project allows the design team to gain practical experience and network with professionals in the field

Code of Conduct

Mission Statement

The Psyche Rover design team is committed to providing an innovative solution by fostering an environment of positivity, inclusivity, professionalism, and hard work.

Team Roles

The design team has designated members to specific roles to enhance continuity and to ensure important project functions are recognized. Jung personality tests were taken, Appendix A, in an effort to assist in role definition and supplement team chemistry through understanding the potential strengths and weaknesses of the group. Although tasks are defined relative to the assigned roles, the opinions of group members are weighted equally, and majority agreement is required when delegating tasks outside of predicted responsibilities. In the absence of a majority, the project engineer agrees to objectively arbitrate.

Project Engineer – Colin Jones

Responsibilities include:

- Sponsor and advisor point of contact
- Project refinement and quality control
- Organizing team meetings
- Material research and selection

Design Engineer – Leila Abdul Hadi

Responsibilities include:

- Determining static and dynamic design viability
- Material research and selection
- Website design
- Custodial team meeting duties

Design Engineer – Jesse Brown-Bosch

Responsibilities include:

- Computer-aided modeling and design
- Drafting
- Website design
- Budgeting and material purchasing

Controls Engineer – Asia Russell

Responsibilities include:

- Determining mechatronic design viability
- Sizing and selection of electronics
- Computer-aided modeling and design
- Writing source code and defining major mechatronic functions

Communication

The design team has designated the group messenger WhatsApp as the preferred method of communication, with an acceptable delay in response of no more than 24 hours. Zoom has been designated as the preferred method of hosting team meetings until regular in-person contact can be established.

The course schedules of group members have been posted on Basecamp to reduce organizational conflicts and the team has agreed to use this resource to post and work on project

milestones. Scheduling and time conflicts will be addressed using WhatsApp on a case-by-case basis, with a three day advance notice of any identified conflict being preferred.

Dress Code

The design team has designated business professional attire for all presentations and professional interactions, and business casual attire for sponsor meetings. Casual attire is acceptable for any other group-related activities, including advisor meetings.

Attendance Policy

The design team has developed several policies relating to the attendance of members for group-related activities:

- Attendance is mandatory to all presentations and sponsor meetings
- Members absent from in-person team meetings are responsible for communicating with the group to acquire missed information
    - Zoom sessions will be recorded for online meetings
- Attendance will be archived in WhatsApp chat history
- Meeting absences will be excused with an advance notice of 24 hours
    - No show, no notice absences will be considered unexcused
    - Absences with less than a 24-hour notice will be evaluated by the group
- Senior design advisor will be notified if a group member accrues 2 or more unexcused absences

Statement of Understanding

I have read and understand the Code of Conduct pertaining to the Psyche Rover project and agree to comply with the listed responsibilities as a member of the group. I understand that expectations and duties are subject to change to support team and project success.

Leila Abdul Hadi	Date
Jesse Brown-Bosch	Date
Colin Jones	Date
Asia Russell	Date

References

Dunlap, D. (2021). Project Descriptions. Retrieved January 18, 2021, from https://canvas.fsu.edu/courses/158203/pages/2021-project-descriptions

ESTJ. (n.d.). Retrieved January 18, 2021, from http://www.humanmetrics.com/personality/estj

In Depth. (2021, January 12). Retrieved January 18, 2021, from https://solarsystem.nasa.gov/asteroids-comets-and-meteors/asteroids/16-psyche/in-depth/

INFJ. (n.d.). Retrieved January 18, 2021, from http://www.humanmetrics.com/personality/infj

INTJ. (n.d.). Retrieved January 18, 2021, from http://www.humanmetrics.com/personality/intj

INTJ. (n.d.). Retrieved January 18, 2021, from http://www.humanmetrics.com/personality/intj-type?EI=-56&SN=-12&TF=31&JP=41

Psyche. (n.d.). Retrieved January 18, 2021, from https://www.jpl.nasa.gov/missions/psyche/

Appendix A – Jung Personality Tests

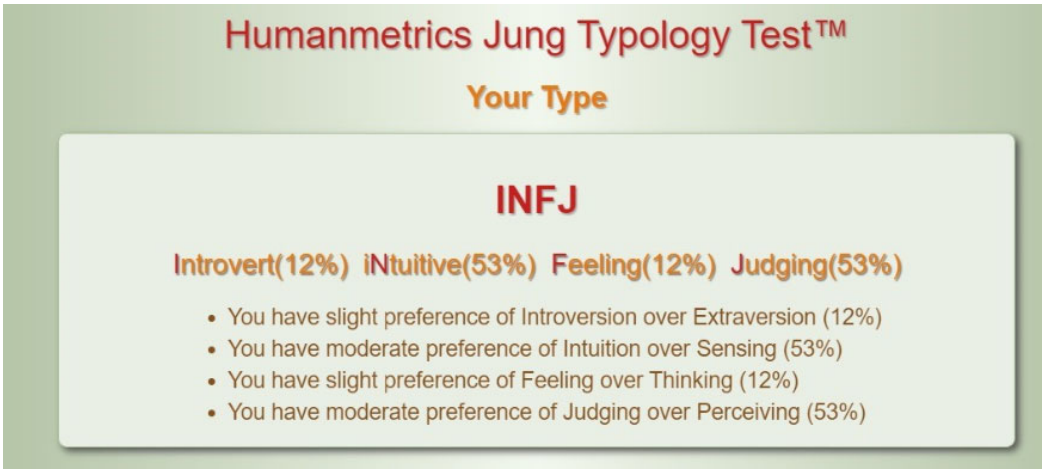

Figure 2 - Abdul Hadi, Leila - Jung Personality

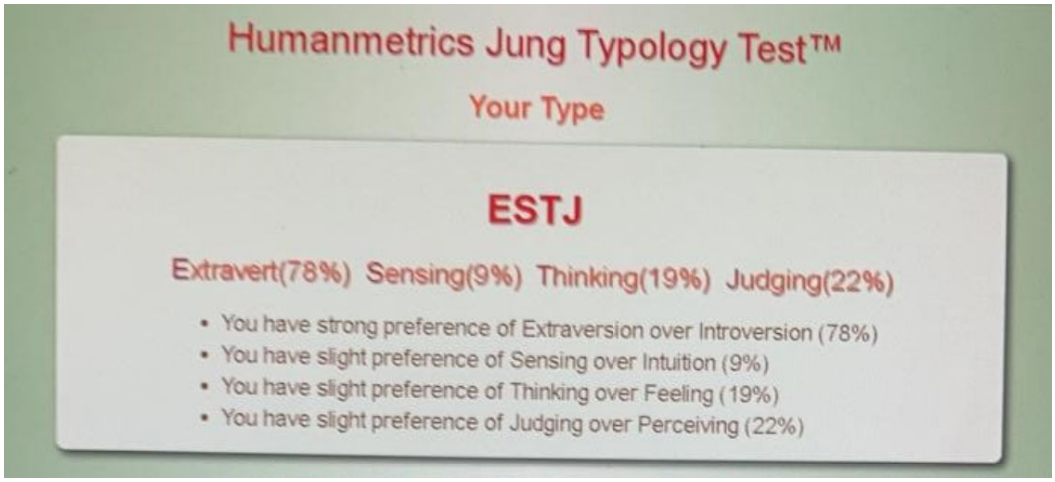

Figure 3 - Brown-Bosch, Jesse - Jung Personality

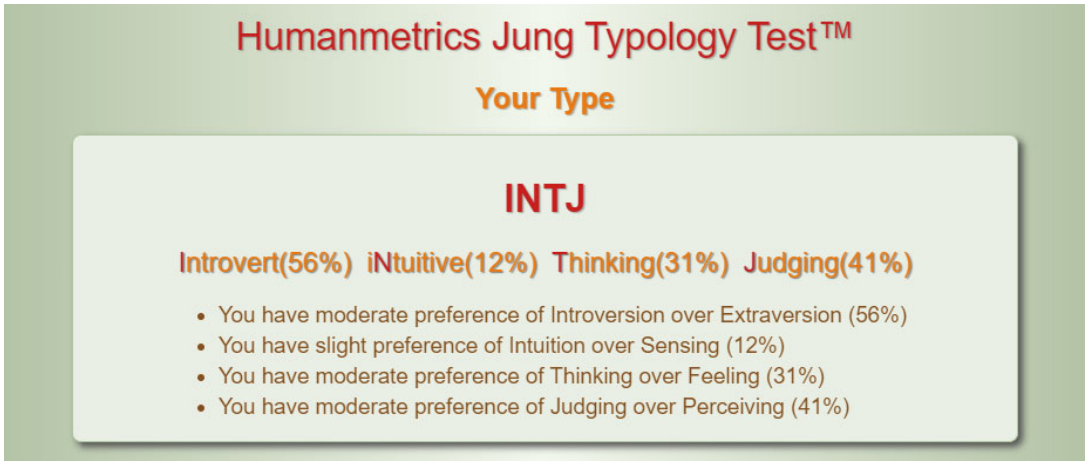

Figure 4 - Jones, Colin - Jung Personality

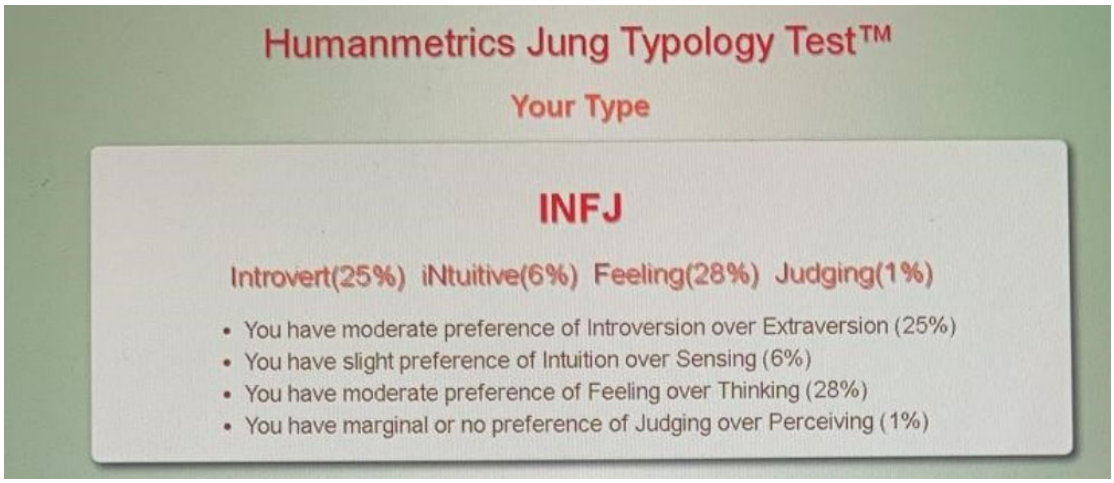

Figure 5 - Russell, Asia - Jung Personality