**Executive Summary**

**Motivation**

**Data Question**

**Minimum Viable Product (MVP)**

**Description:**

* Presentation that shows why we should harvest water from space.

**How will analysis be presented?:**

* All data/facts presented will have a visual/blurb showing the source of information to assert that the data is credible and accurate.

A diagram of the sun

Description automatically generated

* (Super Duper Optimus Prime Victory Over the Decepticons Stretch Goal) Gather the data (or whatever is needed) from the video of the orbit paths above and find a way to edit it so that it is not so boring. The visual will have icons/visuals representing the sun, planets, and asteroid with the stars in the background.

**Intended audience:**

General public from high school age and up. It is expected that everyone in the audience either graduated high school or is in high school.

**Schedule (through <date of demo day>)**

1. Get the Data (11/15) DATA GATHERED PENDING REVIEW
2. Clean & Explore the Data (11/22)
3. Create Presentation of your Analysis (12/13)

* Should be a presentation, but could include a Jupyter Notebook or dashboard in Excel, Tableau, or PowerBI

1. Internal demos (12/13)
2. Demo Day!! (<date of demo day>)

**Data Sources**

\*\*\* All data/information sourced from WIKI will be traced back to the original research/article that is cited for the information. If not cited directly to a credible source it will not be used. All topics have multiple sources of data/information so I will have the data I need. All of the info I gathered was specifically stated by WIKI that the info was derived from research papers/articles. I just didn’t go looking for the source yet. \*\*\*

1. Asteroid classifications for water: <https://en.wikipedia.org/wiki/Asteroidal_water>
2. Asteroid mining general info: <https://en.wikipedia.org/wiki/Asteroid_mining>
3. Asteroid orbit path: <https://ssd.jpl.nasa.gov/tools/sbdb_lookup.html#/?sstr=3366282&view=VOP>
4. Info showing that aeton asteroids have up to 20% water: <https://en.wikipedia.org/wiki/Aten_asteroid>
5. Water molecules detected on the surface of asteroids for the first time:

<https://www.cnn.com/2024/02/16/world/asteroid-water-molecule-detection-scn/index.html#:~:text=The%20Faint%20Object%20infraRed%20CAmera,million%20miles%20from%20the%20sun>.

1. Medical research that can only be done in spce:

<https://www.nasa.gov/missions/station/space-station-leads-to-breakthroughs-in-human-health-on-earth/>

1. Propellant Depot research by Nasa: Cost and functions of a fuel depot:

<https://en.wikipedia.org/wiki/Orbital_propellant_depot>

1. Current cost of water from earth to space:

<https://www.ars.usda.gov/ARSUserFiles/ott/New%20Website/Partnerships/SBIR%20-%20TT/Pancopia%20NASA%20Success%20Story.pdf>

1. Cost analysis of brining water to LOE:

In capstone folder/attached to email.

1. Cost analysis of different load/mission categories. This shows how much cargo and crew transportation costs.

In capstone folder/attached to email.

1. Medical research that can be done in microgravity:

<https://pmc.ncbi.nlm.nih.gov/articles/PMC8758939/>

1. University of Florida symposium and research on in-space medical research:

<https://pharmacy.ufl.edu/biomanufacturing-in-space-symposium/>

1. ISS successfully 3D prints knee meniscus:

<https://www.nasa.gov/missions/station/iss-research/3d-bioprinting/>

**Known Issues and Challenges**

* **Challenge**: Due to the high complexity of the subject matter it will be difficult to present it in a way that is palatable to everyone in the audience.
  + **Resolution**: My presentation will mimic high school science videos or documentaries about space made by Discovery Channel. This will provide a framework for presenting this material in a way that is easy to understand, interesting, and thorough.
* **Challenge**: I am a big space nerd and use many of the acronyms, terms, jargon in conversation. There have been several times where I don’t explain the jargon and I either lose the person’s attention or confuse them.
  + **Solution**: The presentation will be built layer by layer. I am going to start from Earth and work my way out.
  + Example Outline:
    - Scientists on the International Space Station have made a discovery that will make knee and heart transplants a thing of the past.
    - Overview of research, discovery, implications.
    - How much does it cost to do this research?
    - Why does it cost so much?
    - What is being done about it the high cost?
    - Why is water such a big contributor to the high cost?
    - Why is water so important to NASA that they pay this much to get it to the ISS?
    - How much does it cost to get to space?
    - What can we do to reduce cost?
    - Show that harvesting water is an interesting and serious solution.
    - Show cost analysis vs lifting water from earth to space.
* **Challenge**: The audience may just think this is BS and not take it seriously. There is a segment of the population that does not take NASA seriously at all and thinks it is a waste of time.
  + **Solution:** I cannot control somebody’s opinion on NASA, but I can present evidence that these are not fairy tale board room ideas. These are ideas that have billions of dollars invested into it from the public/private sectors and laboratories have been built in major universities to research/advance this field.