THE UNIVERSITY OF TEXAS AT EL PASO

Candidate Selection for Mission Extension Vehicles

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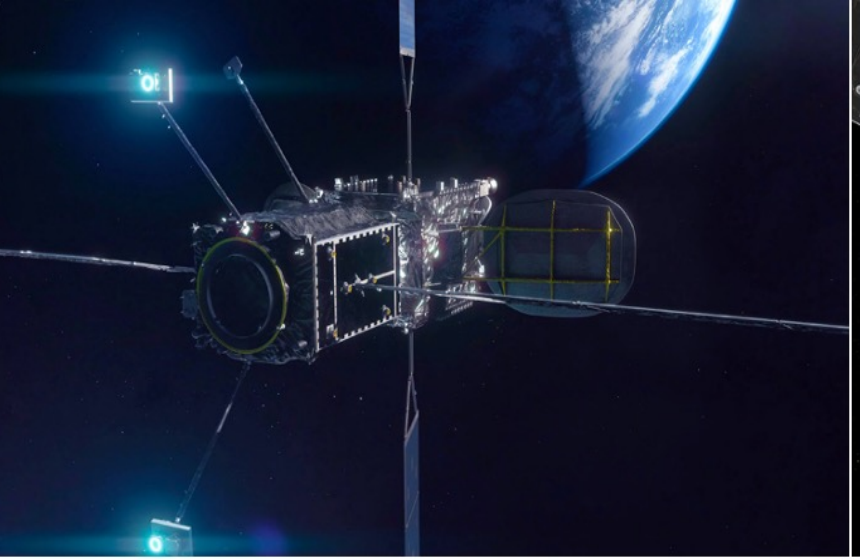
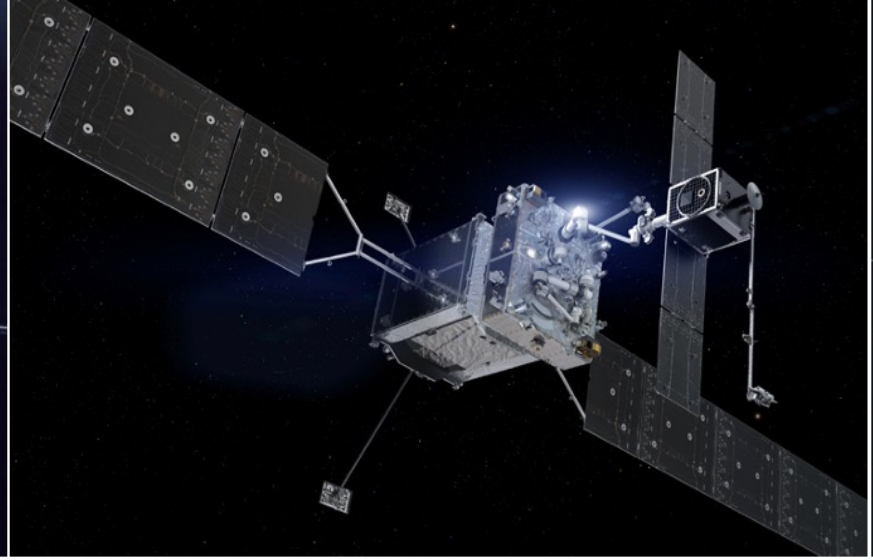


MEV

Delivered as a service, the MEV takes over the attitude and orbital maintenance for a client satellite. It is designed to service multiple client satellites, carrying fuel for a planned 15+ year service life.

MEV Capabilities:

- Station keeping
- Attitude control
- Relocation
- Inclination reduction
- Remote inspections



MRV

Launching in 2024, the MRV incorporates a robotic module in place of the existing docking system of the MEV. The primary mission of the MRV is to install MEPs on client satellites.

MRV Capabilities:

- Robotic inspection
- Augmentation
- Relocation
- Repair
- Active debris removal
- Refueling

MEP

Sold as a product, the MEP is a small, customer-owned, customer-controlled propulsion augmentation device that uses electric propulsion to provide orbit control and momentum unloading for client satellites already on-orbit. Once installed, the MEP can provide six years of life extension for a 2,000 kg satellite.

MEP Capabilities:

- Station keeping
- Relocation
- Momentum unloading

Cost Estimates

- Cost of a Class A Satellite: **500 million to billions USD**

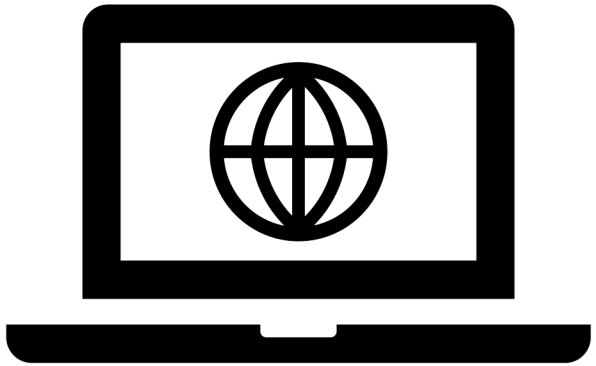
- Cost to launch a satellite to GEO: $6,000-$30,000 per kg

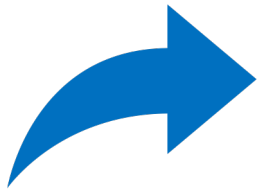
- MRV Weight: 3000 kg
- MEP Weight: 400 kg
- MRV Weight (Loaded with 3 MEPs): 4200kg

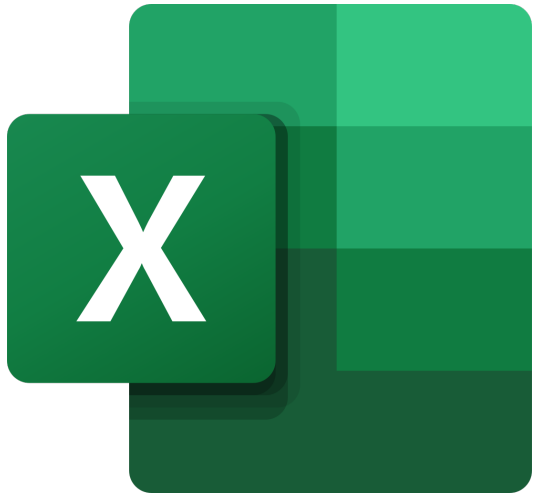
- MRV launch cost: **25 – 126 million USD**

Approach I:
Human Research

Approach I: Human Research







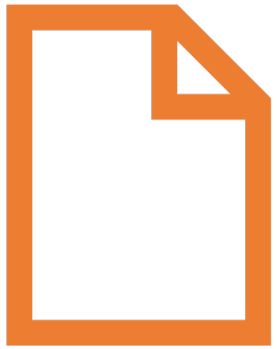
Research Questions

What is the current status and configuration of satellites in GEO?

Which GEO satellites could benefit from the services provided by MEVs, MEPs, and MRVs?

What are the specific issues faced by these satellites that NGC's services could address?

Methodology Overview: Data Sources

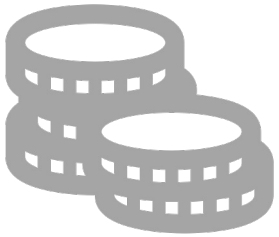


Provided NGC Files, Research Papers, NGC Website, Online Newspapers

Gunter's Space Page

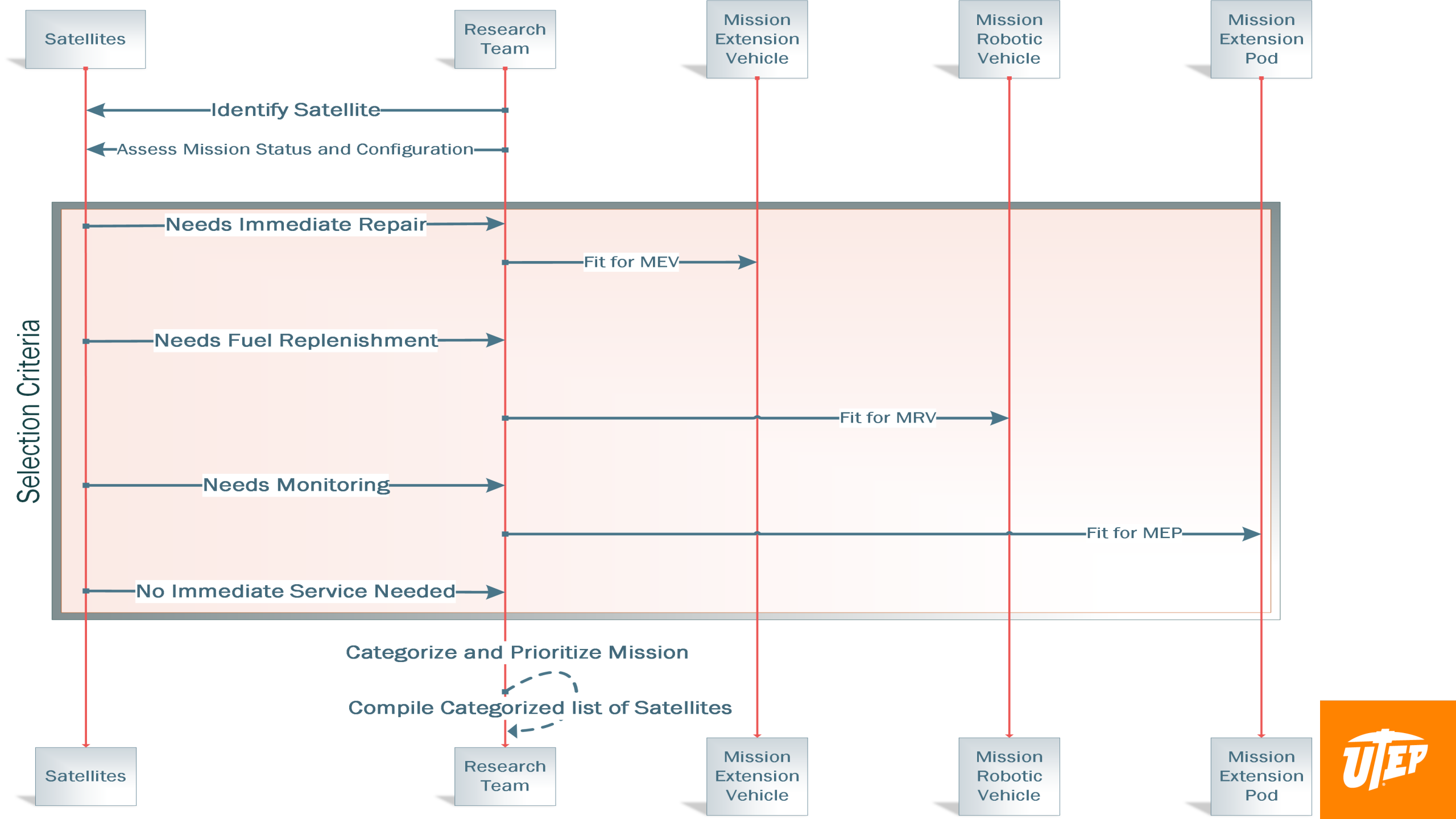
Satellite Assessment Stage 1: Criteria Compliance

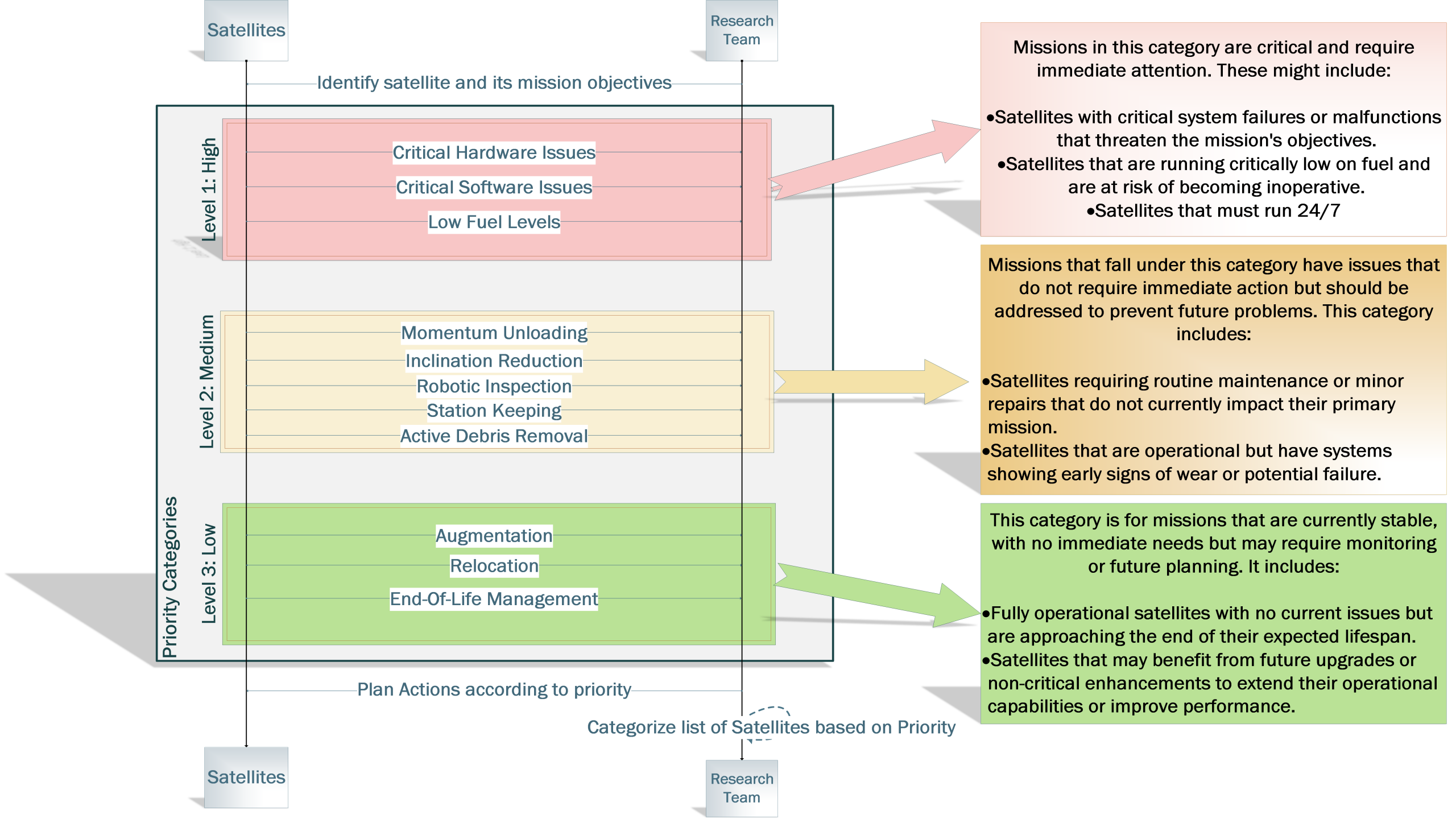
Orbital Position



Economic and Operational Classification
(Class A Satellite, dependent on mass

Mission Status


Satellites
Research Team
Mission Extension Vehicle
Mission Robotic Vehicle
Mission Extension Pod
Identify Satellite
Assess Mission Status and Configuration
Selection Criteria
Needs Immediate Repair
Fit for MEV
Needs Fuel Replenishment
Fit for MRV
Needs Monitoring
Fit for MEP
No Immediate Service Needed
Categorize and Prioritize Mission
Compile Categorized list of Satellites
Satellites
Research Team
Mission Extension Vehicle
Mission Robotic Vehicle
Mission Extension Pod


Satellites
Research Team
Identify satellite and its mission objectives
Priority Categories
Level 1: High
Critical Hardware Issues
Critical Software Issues
Low Fuel Levels
Level 2: Medium
Momentum Unloading
Inclination Reduction
Robotic Inspection
Station Keeping
Active Debris Removal
Level 3: Low
Augmentation
Relocation
End-Of-Life Management
Plan Actions according to priority
Categorize list of Satellites based on Priority
Satellites
Research Team
Missions in this category are critical and require immediate attention. These might include:
•Satellites with critical system failures or malfunctions that threaten the mission's objectives.
•Satellites that are running critically low on fuel and are at risk of becoming inoperative.
•Satellites that must run 24/7
Missions that fall under this category have issues that do not require immediate action but should be addressed to prevent future problems. This category includes:
•Satellites requiring routine maintenance or minor repairs that do not currently impact their primary mission.
•Satellites that are operational but have systems showing early signs of wear or potential failure.
This category is for missions that are currently stable, with no immediate needs but may require monitoring or future planning. It includes:
•Fully operational satellites with no current issues but are approaching the end of their expected lifespan.
•Satellites that may benefit from future upgrades or non-critical enhancements to extend their operational capabilities or improve performance.

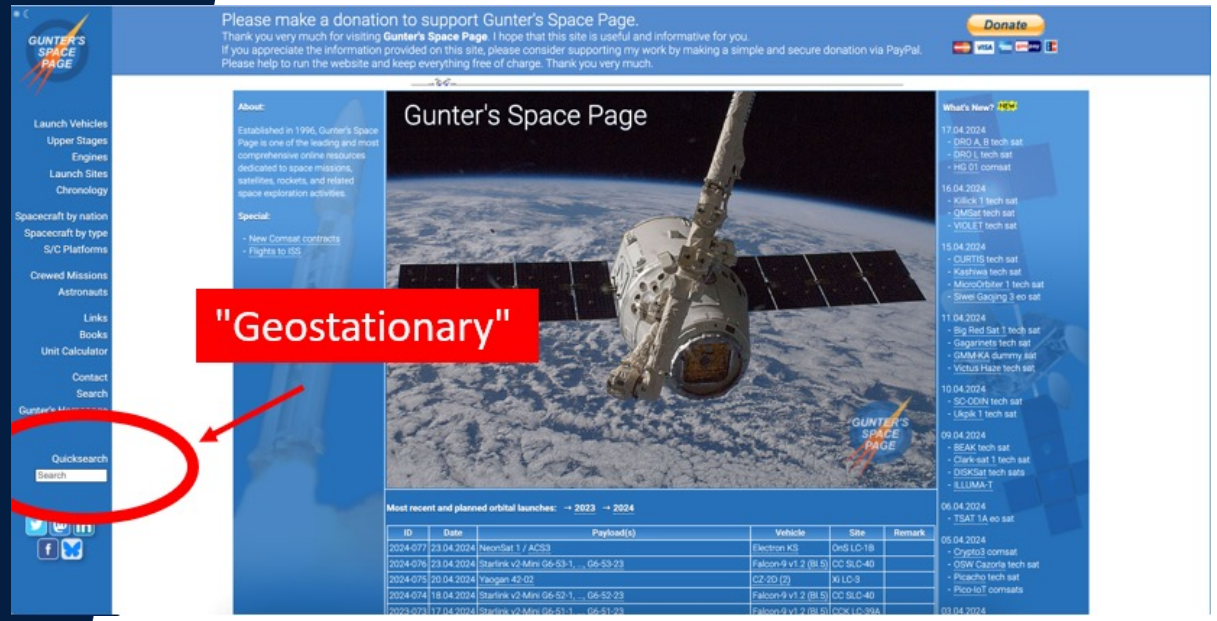
Methodology Recap

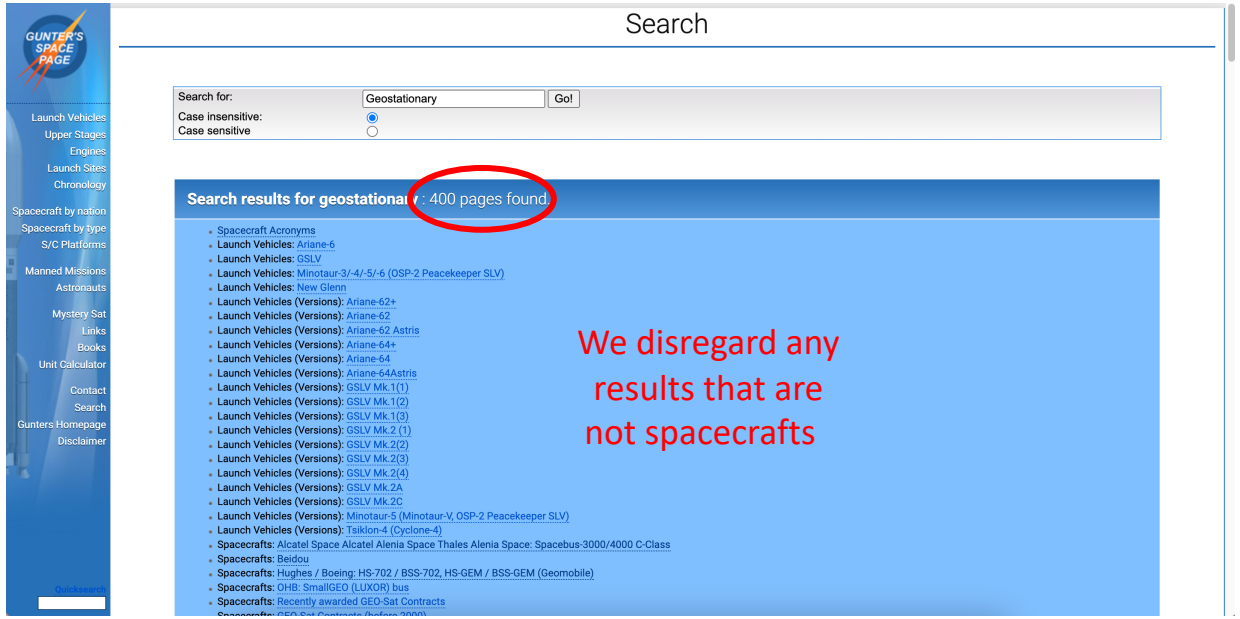
- **Check candidate mission for:**
  1. **Initial Requirements:** Orbit, weight, launch and end-of-life date
  2. **Current Status:** Planned, cancelled, failed, complete, in-progress
  3. **Mission Status Details:** Anomalies present, take a second look at the end-of-life date to determine fuel levels

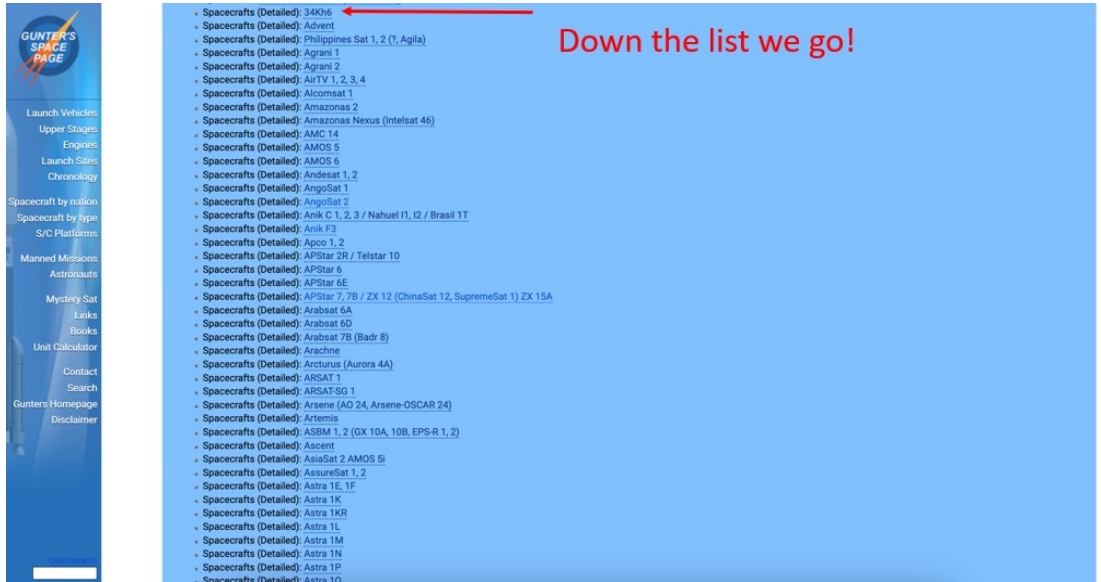
Once requirements are met then:

- **Determine candidate mission's:**
  1. **Recommended Service or Products:** MEV, MRV, MEP
  2. **Priority Level:** High, medium, low

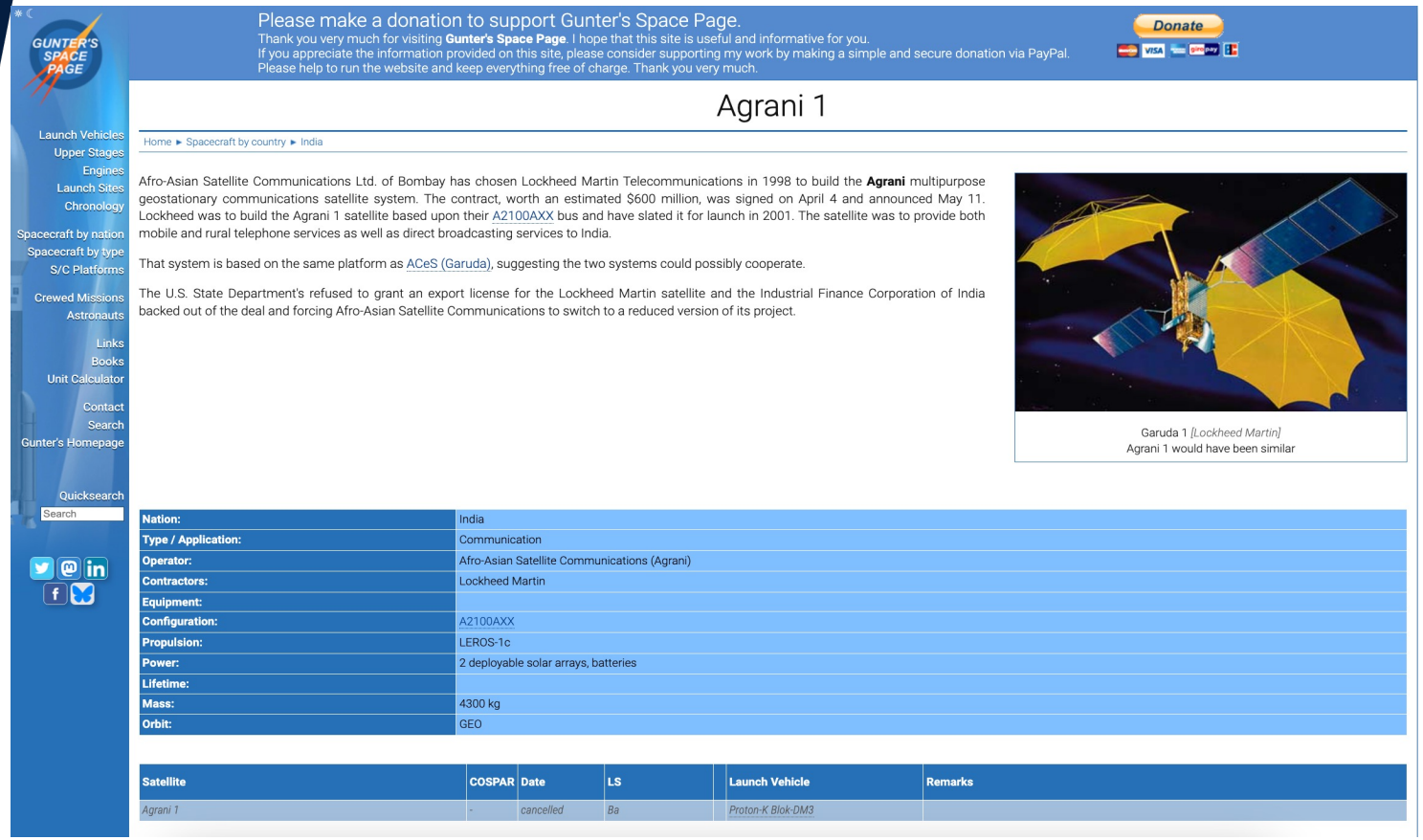
Approach I: Human Research







Approach I: Human Research



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Agrani 1

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Afro-Asian Satellite Communications Ltd. of Bombay has chosen Lockheed Martin Telecommunications in 1998 to build the **Agrani** multipurpose geostationary communications satellite system. The contract, worth an estimated $600 million, was signed on April 4 and announced May 11. Lockheed was to build the Agrani 1 satellite based upon their A2100AXX bus and have slated it for launch in 2001. The satellite was to provide both mobile and rural telephone services as well as direct broadcasting services to India.

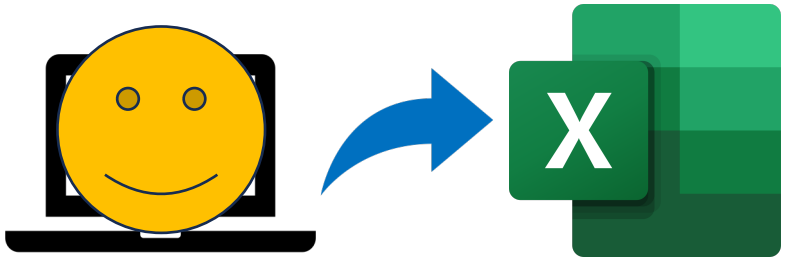
That system is based on the same platform as ACeS (Garuda), suggesting the two systems could possibly cooperate.

The U.S. State Department's refused to grant an export license for the Lockheed Martin satellite and the Industrial Finance Corporation of India backed out of the deal and forcing Afro-Asian Satellite Communications to switch to a reduced version of its project.

Garuda 1 *[Lockheed Martin]*
Agrani 1 would have been similar

Nation:	India
Type / Application:	Communication
Operator:	Afro-Asian Satellite Communications (Agrani)
Contractors:	Lockheed Martin
Equipment:	
Configuration:	A2100AXX
Propulsion:	LEROS-1c
Power:	2 deployable solar arrays, batteries
Lifetime:	
Mass:	4300 kg
Orbit:	GEO

Satellite	COSPAR	Date	LS	Launch Vehicle	Remarks
Agrani 1	-	*cancelled*	*Ba*	*Proton-K Blok-DM3*	



Relevant Information For The Categorized List

Priority	Satellite Mission	Nation & NORAD ID	Type/Application	Operator
Configuration	Background	Mission Status	Mission Status Details	Anomalies
Launch Date	End of Life Date	Orbit	Recommended Service and Why	Mass

Prior	Satellite Mission	Nation	Type/Application	Operator	Configuration	Background	Mission Status	Mission Status Details	Anomalies	Launch Date	End of Life Date	Orbit	Recommended Service	Mass
High	GSat 6A	India NORAD ID: 38356	Communication	Insat	I-2K (I-2000) Bus	The GSAT-6A, a communication satellite developed by the Indian Space Research Organization (ISRO), was equipped with a 6-meter (20 ft) unfurl able S-band antenna, similar to its predecessor, GSAT-6. Approximately 17 minutes post-launch, the satellite was successfully placed into a geosynchronous transfer orbit by the three-stage GSLV Mk.II rocket during the GSLV F08 mission.	Inactive	ISRO plans to launch the GSAT-32 satellite as a replacement for the GSAT-6A.	On 1 April 2018, while GSAT-6A was executing its third and final orbit-raising maneuver, communication with the satellite was unexpectedly lost, rendering the spacecraft temporarily untraceable. Although the satellite's position was later reacquired, subsequent attempts to reestablish communication proved unsuccessful. A malfunction in the power system was suspected as the primary cause of the loss of contact.	2018	2027	GEO	MRV(Repair)	2117 kg
High	AMC 14	USA NORAD ID: 32708	Communication	SES Americom	A2100AXS	AMC-14 was a Broadcasting Satellite System (BSS) satellite constructed by Lockheed Martin, equipped with 32 Ku-band transponders and high levels of redundancy in core components. Its purpose was to provide Direct-to-Home services in the United States, marking the first BSS satellite in SES AMERICOM's domestic fleet. Originally planned for launch in 2008, modifications were requested by EchoStar, the lessee of its capacity, to increase flexibility, including the ability to temporarily operate from Mexico's 77 degrees west longitude orbital slot. **Launched in March 2008, AMC-14 encountered a launch vehicle failure, leaving it stranded in a low transfer orbit. Despite efforts to maneuver it to geostationary orbit, it was deemed a complete loss by SES Americom. The satellite was subsequently sold to the US Department of Defense and eventually reached geosynchronous orbit in late January 2009, now positioned at around 35 degrees East with a notable inclination of more than 13 degrees.**	Failed	Partial failure, declared a complete loss	Launch vehicle failure	2008	2023	GEO	MRV: Can be utilized to conduct a detailed robotic inspection. MEV: Once the Client is repaired, an MEV would be beneficial to give it a new life.	4140 kg
High	Intelsat 29e	USA NORAD ID: 41308	Communication	Intelsat for DirecTV Latin America	Eurostar-3000X	Intelsat 29e (IS-29e) was a significant satellite in the Intelsat EpicNG series, representing a major step forward in the evolution of Intelsat's satellite services. The Intelsat EpicNG series was designed to provide advanced broadband services featuring high throughput capabilities. These satellites were built to offer improved performance, better economics, and simplified access for Intelsat's customers, catering to a wide range of services including mobile and fixed telecommunications, enterprise, government, and Internet services across the Americas, the Atlantic Ocean, Europe, and Africa.	Inactive	IS-29e is currently tumbling and drifting to the East.[29] Intelsat issued a statement declaring the satellite a total loss on 18 April 2019.	On 7 April 2019, the propulsion system of Intelsat 29e developed a fuel leak. Service to customers was interrupted, and communication with the satellite intermittent.[28] On 8 April 2019, the ground telescopes of ExoAnalytic Solutions spotted debris around Intelsat 29e. Damage resulted either from an electrostatic discharge in a cable harness or form an micrometeorite or orbital debris impact.	2016	2031	GEO	MRV (Repair, Refuel, Relocation)	6000 kg
High	KazSat 3	Kazakhstan NORAD ID: 39728	Communication	JSC KazSat	Ekspress-1000NTA	KazSat-3, developed under contract with the Republican Center of Space Communication (RCSC), is a satellite designed to provide telecommunications services, television broadcasting, and high-speed Internet access. It serves Kazakhstan and neighboring countries as part of a project to create a national telecommunications and broadcasting space system.	Inactive	Reported lost on 16 September 2023	Battery issues that prematurely ended its mission, limiting its operational lifespan to nine years.	2014	2029	GEO	MRV(Repair)	1701 kg
High	Telstar 14R / Estrela do Sul 2	USA NORAD ID: 37602	Communication	Telesat	SSL-1300	Telstar 14R/Estrela do Sul 2, which will deliver high-powered Ku-band services to growing markets throughout the Americas and over the Atlantic Ocean. Telstar 14R is designed with five antenna beams that have high-power transponders with substantial on-orbit switching capability. The satellite will provide additional capacity and improved capabilities in its coverage areas.	In-progress	Telstar 14R failed to deploy the north solar array. It remains unclear, if the panel can finally be deployed, but the satellite can be operated with reduced capacity with the jammed array.	Telstar 14R failed to deploy the north solar array	2011	2026	GEO	MRV: Can be utilized to repair the failed solar array. MEV: Once the Client is operating at 100% capacity, an MEV would be beneficial to maximize the newly repaired satellite.	4970 kg
Medium	Galaxy 11	USA NORAD ID: 26038	Communication	PanAmSat	BSS 702	The Galaxy 11 is a large geostationary communications satellite owned by Intelsat. It was the first Boeing BSS-702 satellite. It was ordered in May 1997 and was successfully launched in December 1999 on an Ariane-44L H10-3 rocket from Kourou, French Guiana. Galaxy XI has a payload of 64 active transponders; 24 operate in C-band and 40 operate in Ku-band. The spacecraft was designed for an end-of-life power of more than 10 kW. The satellite provides service to North America and Brazil. **Galaxy 11 suffers from a generic failure of the early BSS-702 model: the fogging of the concentrator mirrors on the solar arrays leads to reduced available power.** **In September 2022 Galaxy 11 suffered a fragmentation event. At least 5 pieces of debris were tracked.**	Complete	In September 2022 Galaxy 11 suffered a fragmentation event. At least 5 pieces of debris were tracked.	the fogging of the concentrator mirrors on the solar arrays leads to reduced available power. Experienced a fragmentation event	1999	2014	GEO	MRV: To assist in debris removal reducing the risk of compromising neighboring satellites.	4477 kg
Medium	GSat 15	India NORAD ID: 41028	Communication	Insat	I-3K (I-3000) Bus	GSAT-15 was approved by the Government on 17 July 2013. The satellite built on the I-3K bus carries 24 Ku-band transponders and a GAGAN (GPS Aided Geo Augmented Navigation) payload. It will provide replacement for the Ku-band capacity of INSAT-3A and INSAT-4B satellites to augment and support the existing DTH and VSAT services in the country. The GAGAN payload of GSAT-15 will meet the in-orbit redundancy requirement for Safety of Life (SOL) operations benefiting the civil aviation services in the country.	In-progress	The Gsat 15 is still InProgress	Low fuel levels	2015	2027	GEO	MEV: This high class satellite could benefit from an extended life.	3164 kg
Medium	Jupiter 1 / EchoStar 17	USA NORAD ID: 38551	Communication	EchoStar, Hughes Network Systems	SSL-1300	Employing a multi-spot beam, bent pipe Ka-band architecture, the new geostationary satellite will provide significant additional capacity for HughesNet service in North America. Its capabilities will augment the successful Spaceway 3 satellite system, the world's first with on-board switching and routing. EchoStar acquired Hughes Network Systems for $1.3 billion in February 2011 and the satellite was renamed EchoStar 17.	In-progress	The Jupiter 1 / EchoStar 17 is still in progress	Low fuel levels	2012	2027	GEO	MEV: This high class satellite could benefit from an extended life.	6100 kg
Low	Eutelsat 65 West A	International NORAD ID: 41382	Communication	Eutelsat	SSL-1300	Eutelsat 65 West A is a telecommunications satellite providing broadband and data services to customers in Latin America and the Caribbean.	In-progress	Delivering telecommunications services to a wide user base	Propulsion failure, Power system failure	2016	2036	GEO	MEP	6564 kg
Low	GOES-16	USA NORAD ID: 41866	Meteorology	NASA	A2100A	GOES-16, operated by NOAA, is a geostationary weather satellite providing real-time monitoring of atmospheric conditions over the Americas for weather forecasting and severe weather detection.	In-progress	Providing real-time weather data and forecasts for meteorological agencies.	Thermal control failure, Instrument malfunction	2016	2036	GEO	MEP	5192 kg (launch); 2857 kg (dry)
Low	Intelsat 14	International NORAD ID: 36097	Communication	Intelsat	SSL-1300	Intelsat 14 is a communications satellite providing broadband and television services to customers in the Americas and Europe.	In-progress	Delivering telecommunications services to a wide user base.	Propulsion failure, Power system failure	2009	2029	GEO	MEP	5663 kg
Low	Intelsat 19	International NORAD ID: 38356	Communication	Intelsat	SSL-1300	Intelsat 19 is equipped with 24 C-band and 34 Ku-band transponders. The C-band transponders are dedicated to covering the Asia-Pacific region, while the Ku-band transponders facilitate Direct to Home television services in Australia, New Zealand, Southeast Asia, Japan, and the Western United States. The satellite is expected to remain operational for eighteen years.	In-progress	In June 2012, Intelsat 19 was successfully transferred to geostationary orbit. Upon reaching this orbit, all of the satellite's communication antennas were deployed to their operational positions, and testing of the communications payload commenced. However, data received from the satellite revealed that the south solar array had sustained damage, resulting in a reduction in the power available to the satellite.	After successful launch on 1 June 2012, the satellite failed to deploy one of the solar panels. After several maneuvers, the jammed array was finally deployed on 12 June, but it reportedly generates only one-third of its rated power.	2012	2030	GEO	MRV(Repair)	5600 kg

Candidate Missions

Satellite Mission	Configuration	Background	Anomalies	Launch and End Date	Recommended Service
Telstar 14R / Estrela do Sul 2 **Nation**: USA **Type**: Communication **Mass**: 4970 kg **Operator**: Telesat **Status**: In-progress **NORAD ID**: 37602 **Cost**: Unknown $125 million insurance claim	SSL-1300	Telstar 14R/Estrela do Sul 2 is designed to deliver high-powered Ku-band services across the Americas and the Atlantic Ocean. Equipped with two deployable solar arrays.	Telstar 14R failed to deploy the north solar array, but the satellite can be operated with reduced capacity with the jammed array.	2011-2026	**MRV**: Can be utilized to repair the failed solar array. **MEV**: Once the Client is operating at 100% capacity, an MEV would be beneficial to maximize the newly repaired satellite. **Priority**: High

Candidate Missions

Satellite Mission	Configuration	Background	Anomalies	Launch and End Date	Recommended Service
Intelsat 29e **Nation**: USA **Type**: Communication **Mass:** 6,552 kg **Operator**: Intelsat **Status**: Inactive **NORAD ID**: 41308 **Cost**: $400-450 Million	BSS-702MP	IS-29e features high-throughput C- and Ku-band payloads for Intelsat's Epic system, delivering 25-30 gigabits per second of bandwidth. It serves fixed and mobile customers in North and South America, as well as over North Atlantic maritime and aeronautical routes, powered by two solar wings with ultra triple-junction gallium arsenide solar cells.	The satellite suffered a propulsion system damage, lost communication, and a debris cloud was observed around the IS-29e. In 2019 the satellite was deemed a complete loss.	2016-2031	**MRV:** MRV recommended to repair fuel leak and refuel **Priority:** High

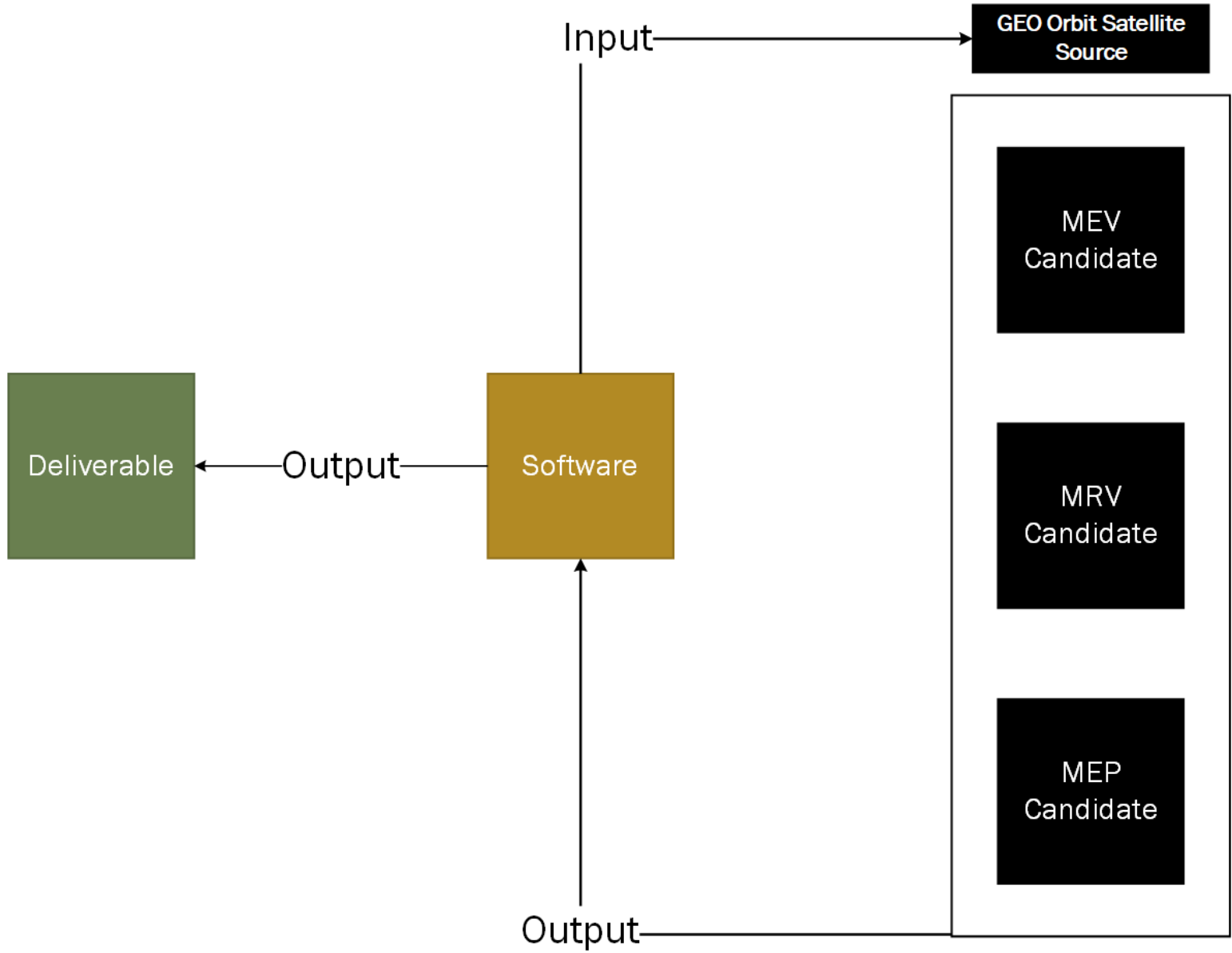
Candidate Missions

Satellite Mission	Configuration	Background	Anomalies	Launch and End Date	Recommended Service
Intelsat 14 **Nation**: USA **Type**: Communication **Mass:** 5663 kg **Operator**: Intelsat **Status**: In-progress **NORAD ID**: 36097 **Cost**: $1.18 Billion**(Mission)**	SSL-1300	Intelsat 14 is a communications satellite providing broadband and television services to customers in the Americas and Europe.	Propulsion failure, power system failure	2009-2029	**MEP**: Capabilities align well with Intelsat 14's needs, offering a reliable solution to extend its operational lifespan without significant disruptions to ongoing operations. **Priority**: High

Approach II:
Automated Assistance

Automated Satellite Assessment Tool: Introduction

- -Automated Software
- -Web Scrapper (Selenium)
- -Decision Support System



```python
# Determine potential product candidates based on mass, orbit type, and additional criteria
def determine_ppc(mass, orbit_type, end_of_life, background_info):
    ppc = []

    # Define keywords for MEV and MRV
    mev_keywords = ['life extension', 'altitude control', 'adjustment', 'orbital adjustment',
                    'propulsion support', 'payload', 'payload delivery', 'relocation']
    mrv_keywords = ['repair', 'debris', 'servicing', 'maintenance', 'refueling', 'payload', 'payload delivery']

    try:
        # Calculate remaining years to determine if MEV is needed
        remaining_years = (end_of_life - datetime.now()).days / 365.25
        if any(keyword in background_info.lower() for keyword in mev_keywords) and "GEO" in orbit_type:
            ppc.append("MEV")
    except Exception as e:
        print("Error processing end_of_life date:", e)  # Print error message to understand what went wrong

    # Check if MRV is required based on background info keywords
    if any(keyword in background_info.lower() for keyword in mrv_keywords):
        ppc.append("MRV")

    # Determine if MEP is suitable based on mass and orbit type
    if 1500 < mass < 2500 and "GEO" in orbit_type:
        ppc.append("MEP")
    return ', '.join(ppc) if ppc else "No P.P.C determined"
```

Background
Advent [USAF]Advent was an ambitious military
Agila [Astranis]Agila 3 is a small geostationary Ku
Garuda 1 [Lockheed Martin]Agrani 1 would have
Agrani-2 [Thaicom]The 2,800 kg Alcatel Space-bu
AirTV 1 [Alcatel]Alcatel Space has announced in
Alcomsat 1 [ASAL]Alcomsat 1 is the first Algerian
Amazonas 2 [EADS Astrium]Hispasat ordered in
Amazonas Nexus [TAS]Amazonas Nexus is a plan
AMC 14 [Lockheed Martin]AMC-14 is a BSS satel
AMOS 5 [ISS Reshetnev]On July 30 2008 a contra

Orbit type	Class type
LEO (#1, 2, 3); GEO (#4 o	Class B
GEO	Class N
GEO	Class A
GEO	Class A
GEO	Class A
GEO	Class A
GEO	Class A
GEO	Class A
GEO	Class A
GEO (planned)	Class A

```python
# Determine the mission status based on launch and end-of-life dates and background info
def determine_msd(launch_date, end_of_life, background_info):
    if "cancelled" in launch_date.lower() or "cancelled" in end_of_life.lower():
        return "Cancelled"
    elif "mission complete" in background_info.lower() or "failure" in background_info.lower():
        return "Mission complete"
    try:
        launch_date_dt = datetime.strptime(launch_date, "%d.%m.%Y")
        if datetime.now() < launch_date_dt:
            return "Planned"
    except ValueError:
        if int(launch_date) > datetime.now().year:
            return "Planned"
    try:
        end_of_life_dt = datetime.strptime(end_of_life, "%d.%m.%Y")
        if datetime.now() < end_of_life_dt:
            return "Operational"
    except:
        pass
    if "extended" in background_info.lower():
        return "Extended Mission"
    return "Operational"  # Default status
```

M.S.D (Mission Status Details)	Launch Date	End of life
Cancelled	cancelled	cancelled
Planned	2025	2032
Cancelled	cancelled	cancelled
Cancelled	cancelled	cancelled
Cancelled	cancelled	cancelled
Operational	10.12.2017	10.12.2032
Operational	01.10.2009	01.10.2024
Operational	07.02.2023	07.02.2038
Mission complete	14.03.2008	14.03.2023
Mission complete	11.12.2011	11.12.2026
Operational	2023	2030
Operational	26.12.2017	26.12.2032
Operational	12.10.2022	12.10.2037
Operational	12.04.1985	12.04.1995
Operational	09.04.2007	09.04.2022
Planned	2025	2032
Operational	16.10.1997	16.10.2011
Operational	12.04.2005	12.04.2019

D
Background
Advent [USAF]Advent was an ambitious military
Agila [Astranis]Agila 3 is a small geostationary Ku
Garuda 1 [Lockheed Martin]Agrani 1 would have
Agrani-2 [Thaicom]The 2,800 kg Alcatel Space-bu
AirTV 1 [Alcatel]Alcatel Space has announced in
Alcomsat 1 [ASAL]Alcomsat 1 is the first Algerian
Amazonas 2 [EADS Astrium]Hispasat ordered in
Amazonas Nexus [TAS]Amazonas Nexus is a plan
AMC 14 [Lockheed Martin]AMC-14 is a BSS satell
AMOS 5 [ISS Reshetnev]On July 30 2008 a contra
Andesat 1 [Astranis]Andesat 1 is a small geostati

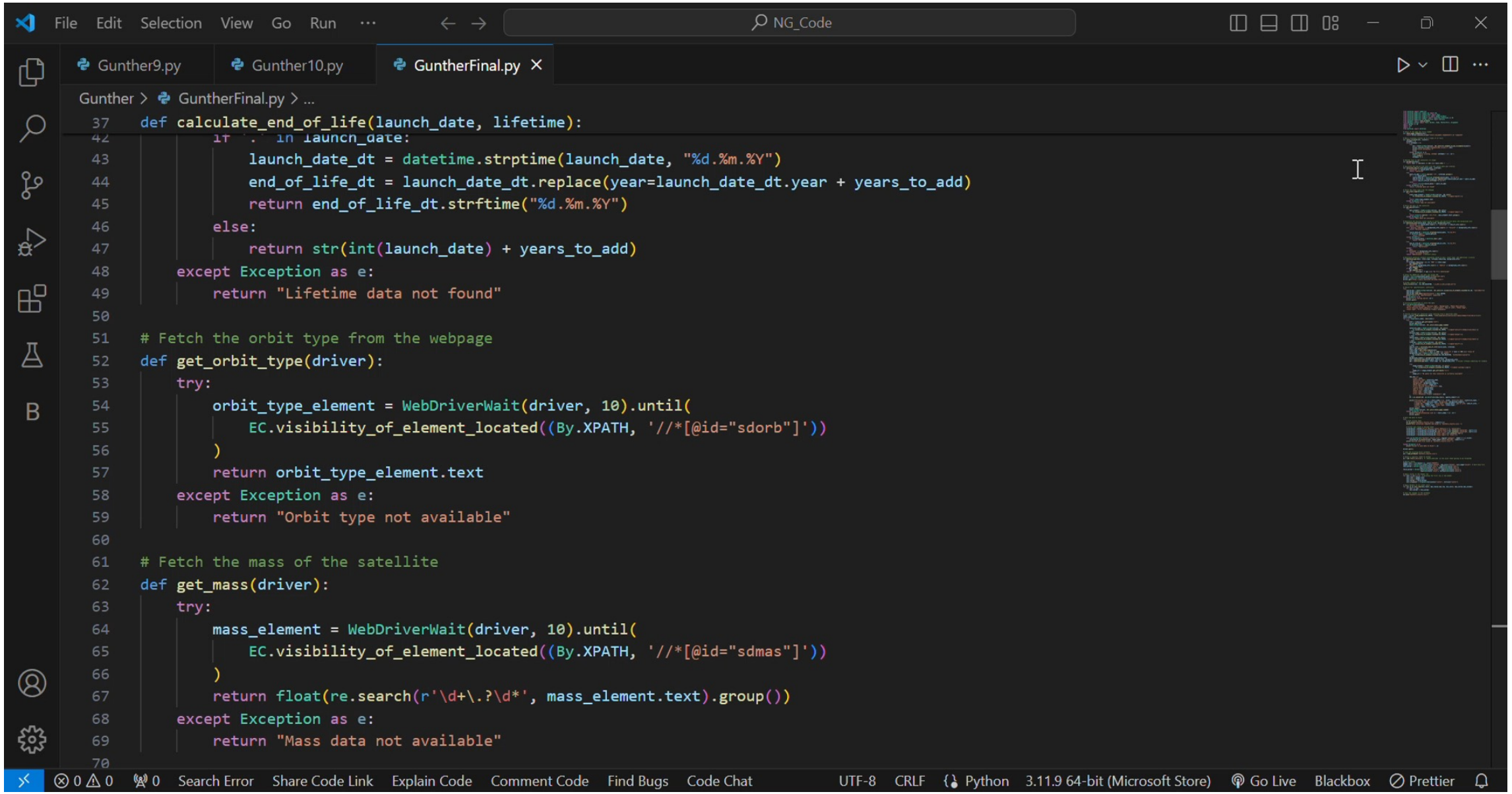
```python
# Calculate the end-of-life date from the launch date and lifetime
def calculate_end_of_life(launch_date, lifetime):
    if "cancelled" in launch_date.lower():
        return "cancelled"
    try:
        years_to_add = int(re.search(r'\d+', lifetime).group())
        if '.' in launch_date:
            launch_date_dt = datetime.strptime(launch_date, "%d.%m.%Y")
            end_of_life_dt = launch_date_dt.replace(year=launch_date_dt.year + years_to_add)
            return end_of_life_dt.strftime("%d.%m.%Y")
        else:
            return str(int(launch_date) + years_to_add)
    except Exception as e:
        return "Lifetime data not found"
```

Launch Date	End of life
cancelled	cancelled
2025	2032
cancelled	cancelled
cancelled	cancelled
cancelled	cancelled
10.12.2017	10.12.2032
01.10.2009	01.10.2024
07.02.2023	07.02.2038
14.03.2008	14.03.2023
11.12.2011	11.12.2026
2023	2030
26.12.2017	26.12.2032
12.10.2022	12.10.2037
12.04.1985	12.04.1995
09.04.2007	09.04.2022
2025	2032
16.10.1997	16.10.2011

Nation:	Spain
Type / Application:	Communication
Operator:	Hispasat
Contractors:	Thales Alenia Space
Equipment:	Ku-band High Throughput Payload, Ka
Configuration:	Spacebus-Neo-200
Propulsion:	?, electric propulsion
Power:	2 deployable solar arrays, batteries
Lifetime:	+15 years
Mass:	4500 kg
Orbit:	GEO

Satellite	COSPAR	Date	LS
Amazonas Nexus (Intelsat 46)	2023-017A	07.02.2023	CC SLC-40

Automated Satellite Assessment Tool: Methodology

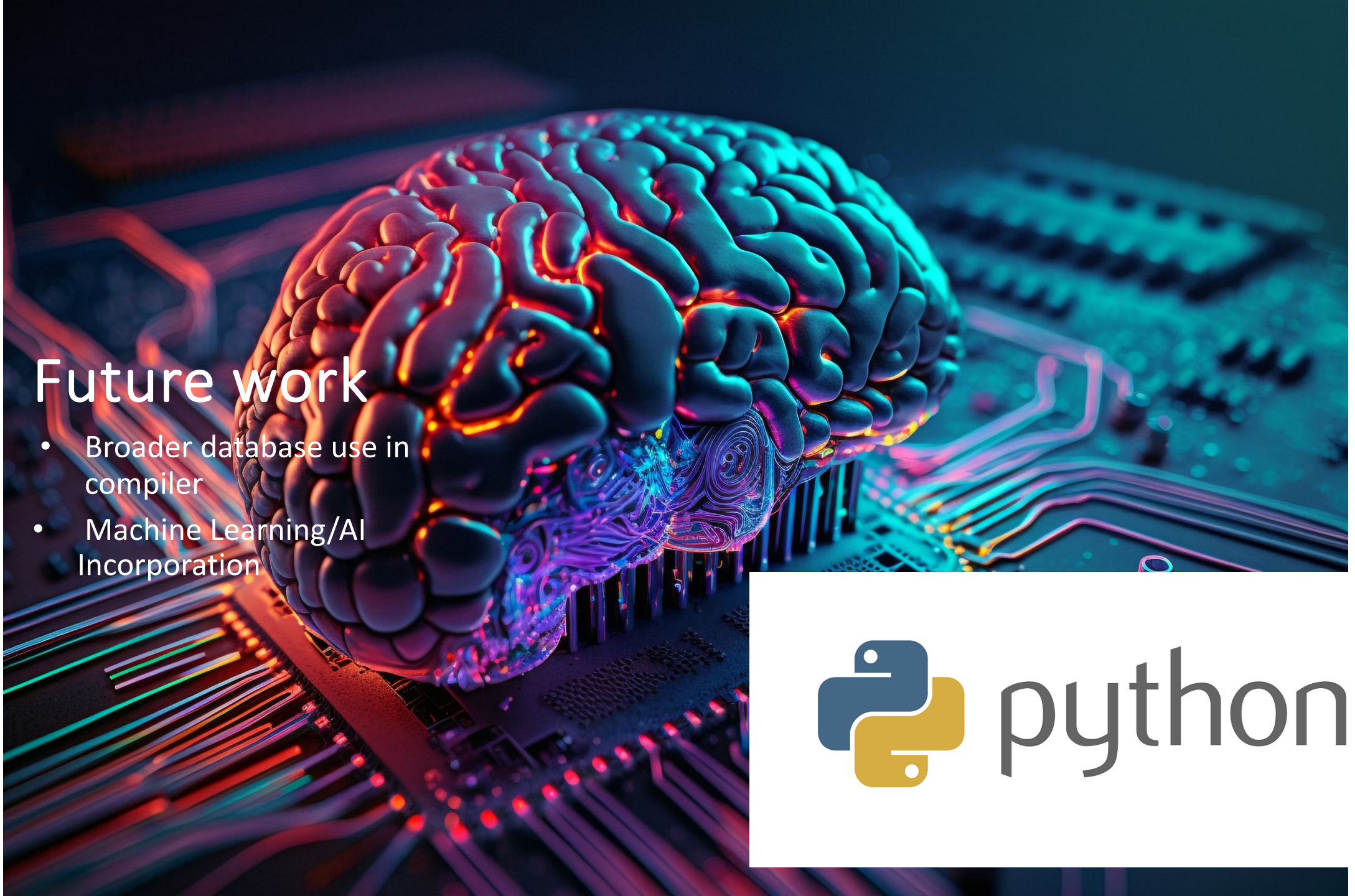


Results

60 Days to complete human research

8 minutes for software to find potential candidates, 1 day to review results and find top candidates

60 times faster using automated assistance



Future work

- Broader database use in compiler
- Machine Learning/AI Incorporation

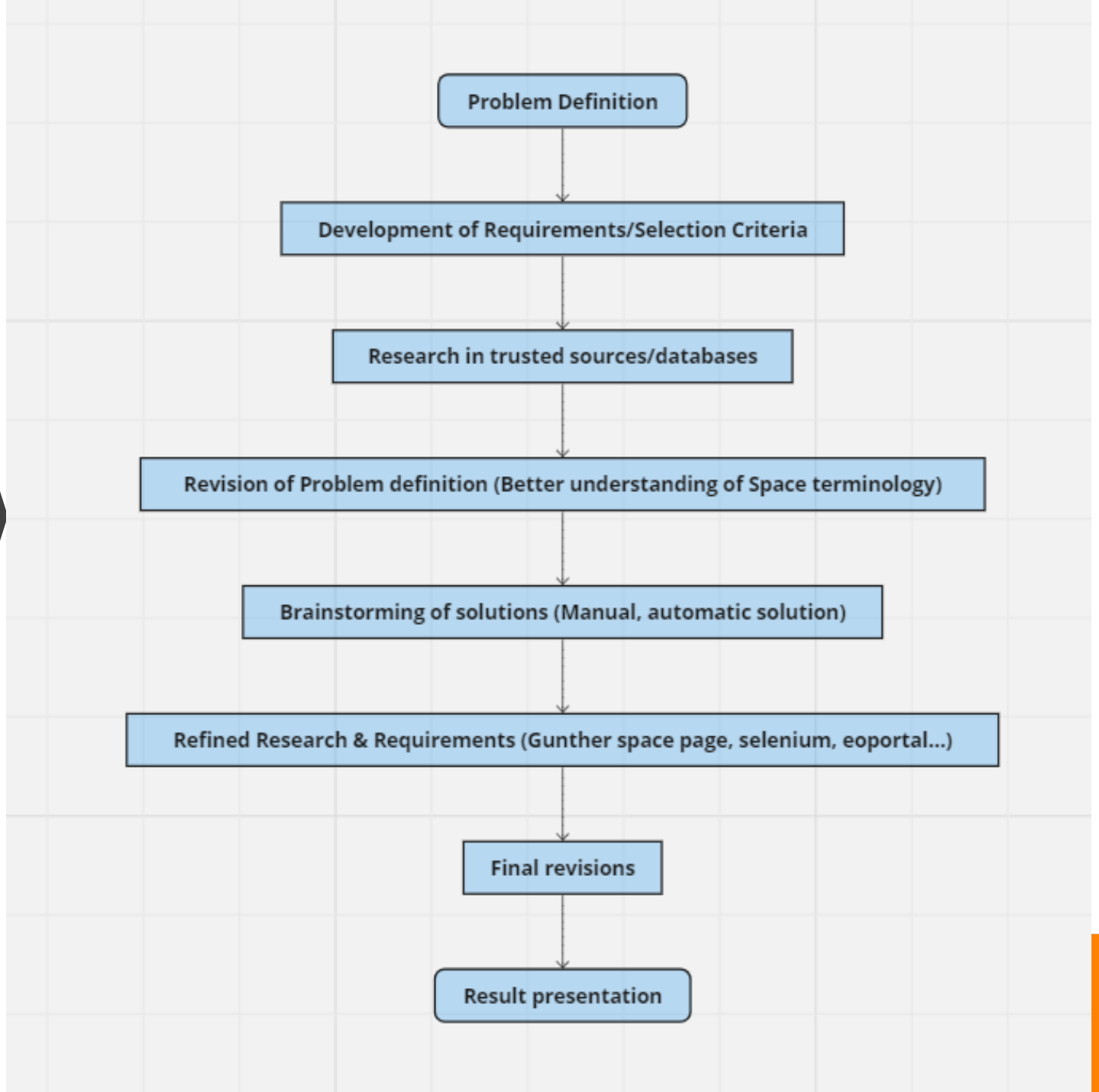
python

THE UNIVERSITY OF TEXAS AT EL PASO

ABET Presentation
Team 1

Carlos Ortega
Justine Adebayo
Alexis Escandon
Luis Ponce

ABET 2


Problem Definition
Development of Requirements/Selection Criteria
Research in trusted sources/databases
Revision of Problem definition (Better understanding of Space terminology)
Brainstorming of solutions (Manual, automatic solution)
Refined Research & Requirements (Gunther space page, selenium, eoportal...)
Final revisions
Result presentation

ABET 3

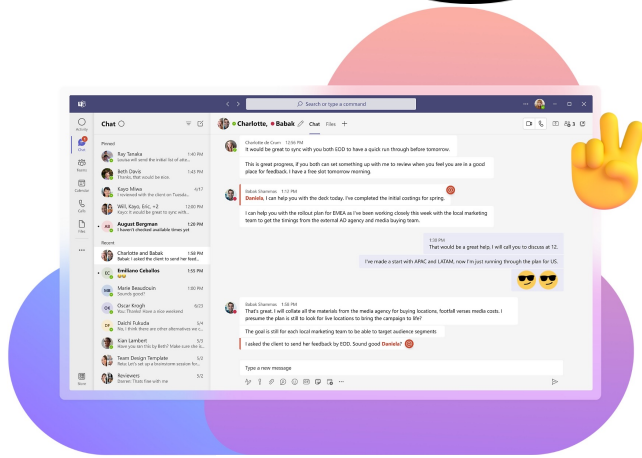
Communication

- **Ability to communicate** with external sources
- Practice with the team before each presentation
- Presenting to a range of audiences (Professors, Northrop Grumman engineers, Students & Peers, Engineering department)
- Actively listening of others to understand their perspectives
- Visual aids such as diagrams, charts, and graphs to enhance understanding and engagement.

ABET 5

Team effectiveness

Carlos	Team Leader
Alexis	Scribe
Justine	Programmer
Luis	Coordinator



Microsoft Teams

ABET 7

APPLYING PAST KNOWLEDGE

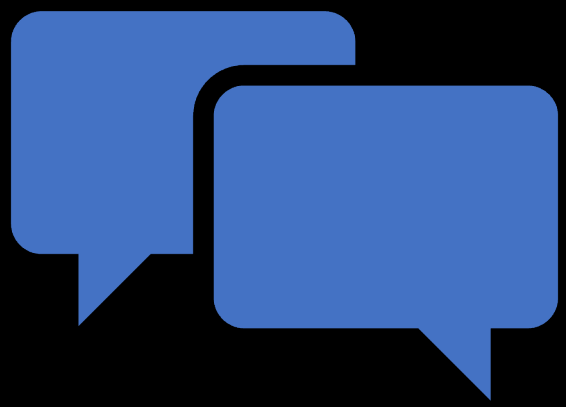
LEARNING SPACE METHODOLOGY

CHOOSING RELIABLE SOURCES

ACTIVE LEARNING AND PRACTICE

FEEDBACK AND REFLECTION

Closing Remarks



Thank you
for your time