

# **OFFWORLD**

## **INDUSTRIAL ROBOTIC WORKFORCE**

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# AD ASTRA PER TERRAM ENABLING HUMAN EXPANSION OFF OUR HOME PLANET



1. Life insurance policy
2. Sustainable development on Earth
3. The new frontier

# SETTLEMENT HAS ALWAYS BEEN DIFFICULT

- Limited supply chain
- Harsh environment
- Forced labor







# SPACE SETTLEMENT IS EVEN HARDER

1. No usable atmosphere
2. Radiation environment
3. No supply chain
4. Variable gravities
5. Biological challenges
6. No indigenous foods
7. The most expensive labor

# SPACE NEEDS TAKERS FOR TOUGH JOBS

- build landing pads
- excavate underground habitats
- extract water ice and materials
- make drinkable water, breathable air and rocket propellant
- manufacture basic structures and solar cells
- produce electricity
- ...and eventually replicate themselves



# FOUR DESIGN CONSTRAINTS

#1

## No infrastructure

Assume we cannot build new facilities and other infrastructure, cannot access external power sources, etc.

IDEAL  
SOLUTION  
SPACE

#4

## No consumables

Assume we cannot bring any consumables to the operations site or use locally sourced water in the process.

#2

## No humans

Assume humans cannot be used to perform any of the industrial functions directly, only to oversee and enable the performance of robotic workforce.

#3

## No footprint

Assume we cannot use fossil fuels to power robotic operations. Assume footprint at the site of operations must return to pre-existing format

# ENVIRONMENTAL IMPACT OF WORKING IN THE SOLAR SYSTEM



Genus Terra

	Gravity	Water	Dust	Radiation	Thermal Cycle
Genus Terra	High	High	High	Low	Medium
Genus Astra	Low	Low	Low	High	High
Genus Luna	Medium	Low	High	High	High
Genus Etiam	Low	Low	Low	High	High
Genus Martialis	Medium	Low	High	Medium	High

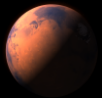
Genus Astra



Genus Luna



Genus Etiam



Genus Martialis

**EARTH IS THE EXTREME ENVIRONMENT IN SOME CASES**

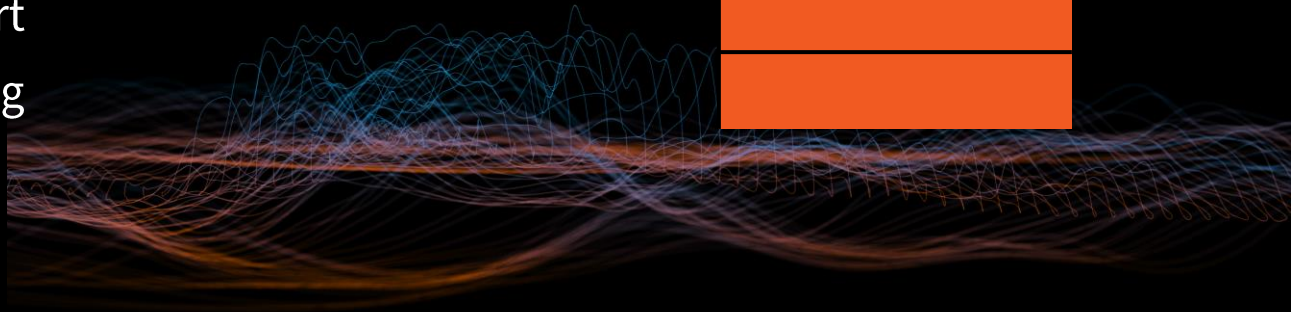
High

Medium

Low

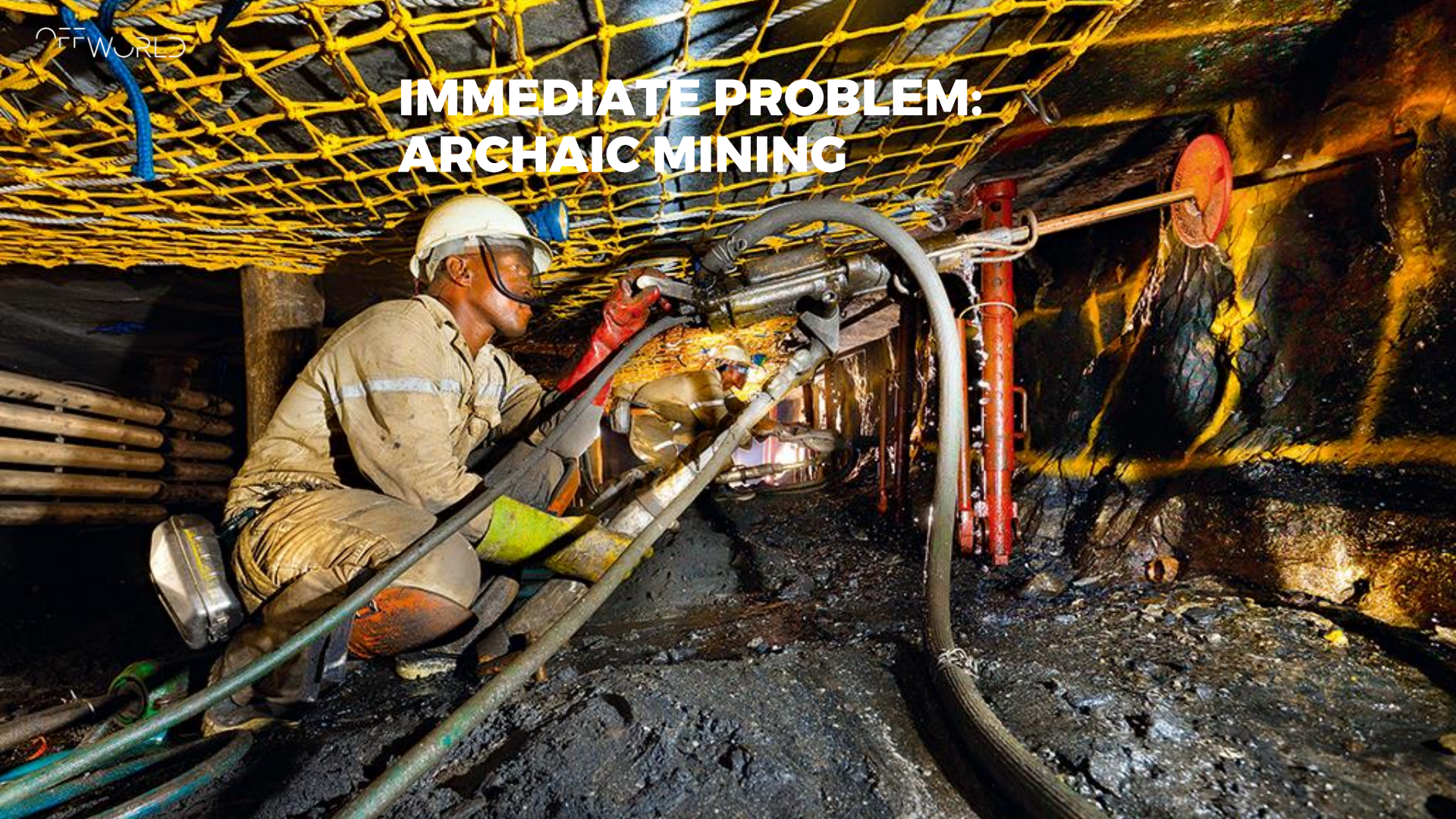
# ROBOTIC WORKFORCE NEEDS FOR SOLAR SYSTEM EXPLORATION

	Outpost	Settlement	Colony
Survey	Required	Required	Required
Excavation/Mining	Required	Required	Required
Construction/Assembly	Required	Required	Required
Life Support		Required	Required
Processing		Required	Required
Human Support			Required
Manufacturing			Required





# IMMEDIATE PROBLEM: ARCHAIC MINING



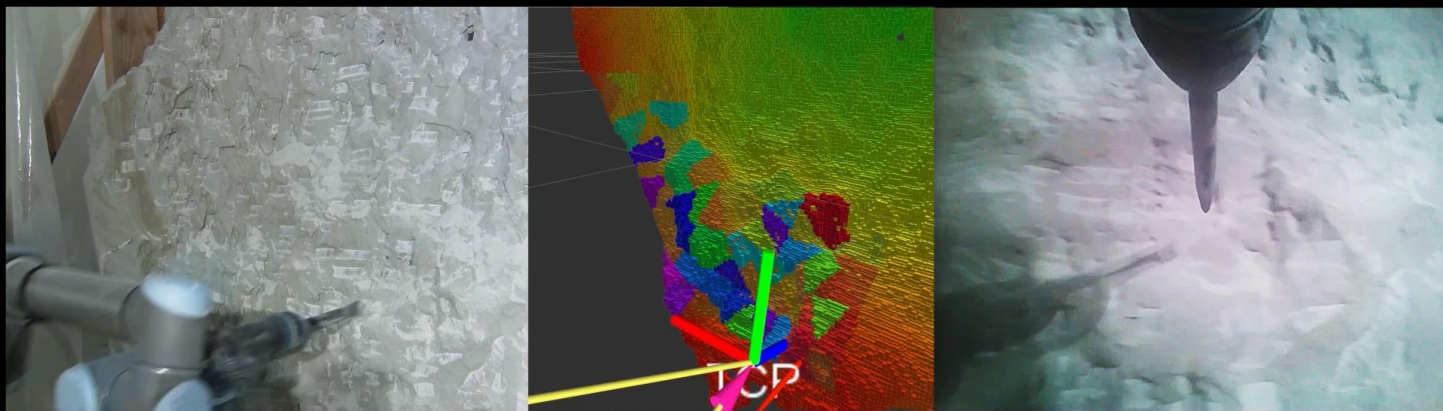


# IMMEDIATE FOCUS: DISRUPT MINING



# DEEP REINFORCEMENT LEARNING IN REAL

## TRAINING TARGETER AGENT ON BEREA SANDSTONE



### 2 ML agents

**Targeter** learns to pick the best spots

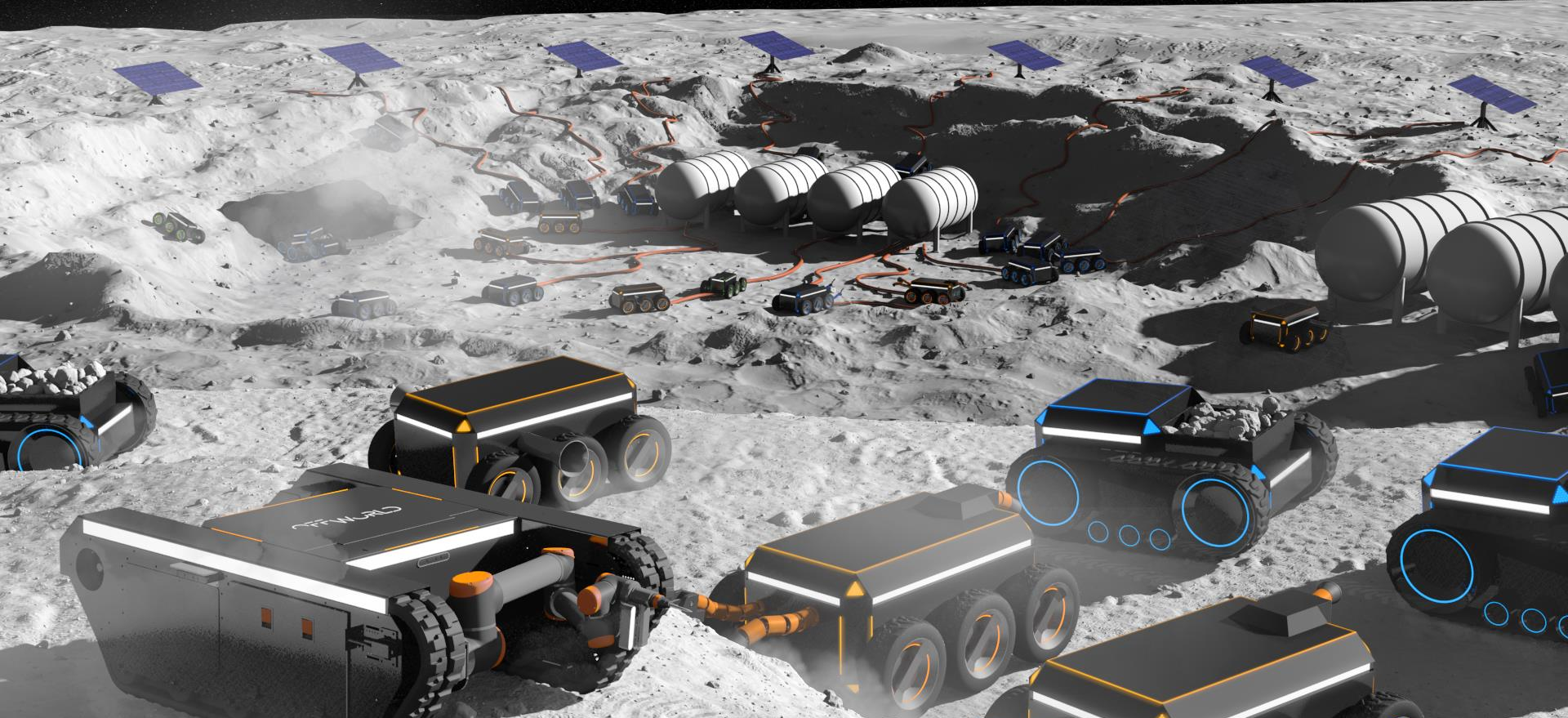
**Chiseler** learns to choose the best angle of attack







# GENUS LUNA IS NEXT



**[WWW.OFFWORLD.AI](http://WWW.OFFWORLD.AI)**

