

Mars Living

Group 13C

Matt
Sam
Alex
Jacob
Leon
Arsh

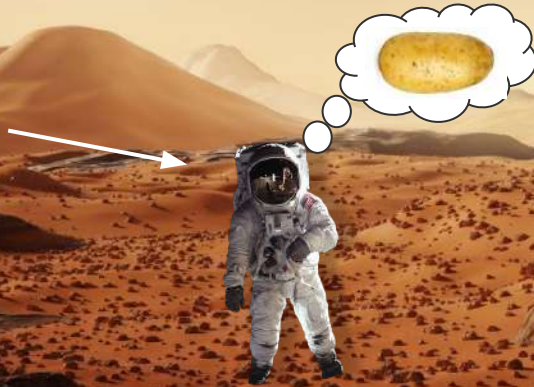


Astronauts need help!

Astronaut Tracy is all alone with
no closed loop resource
production system :(

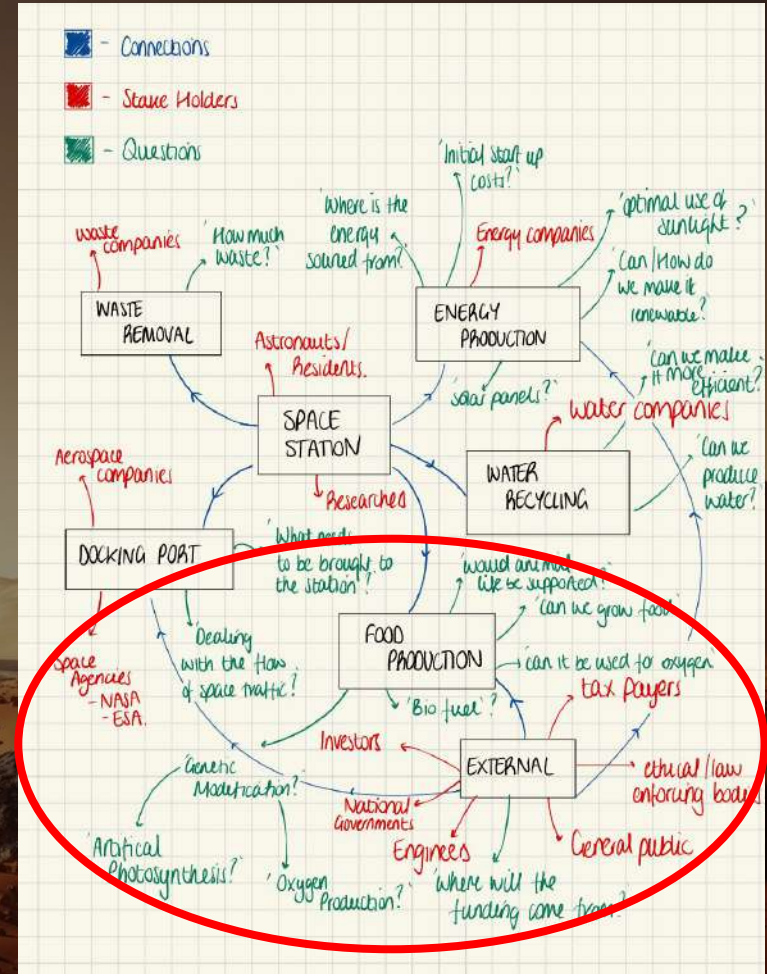
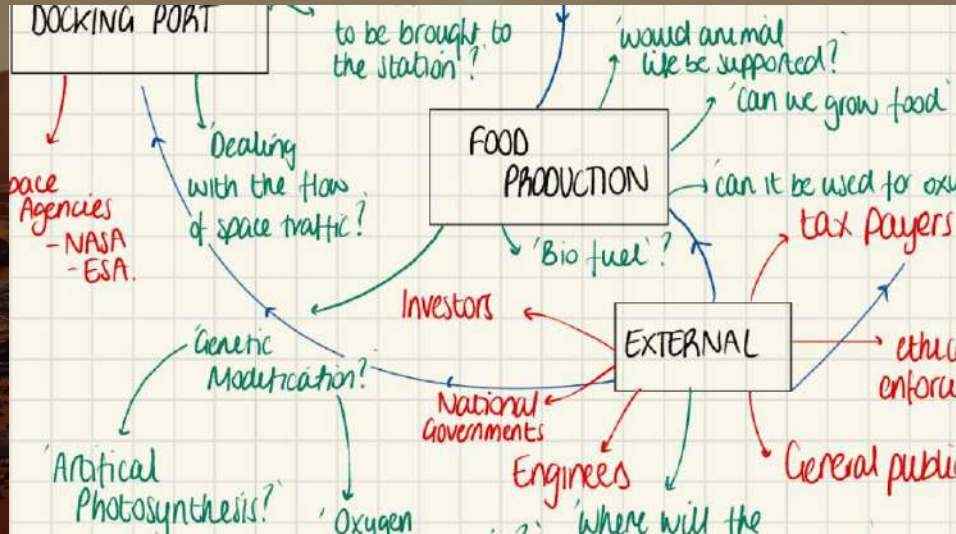
Here's how we propose to
ensure her wellbeing during
extended missions on Mars

Tracy



Rich Picture

- Asking relevant questions
- Identified unanswered questions to create focus



Hofstede Dimensions

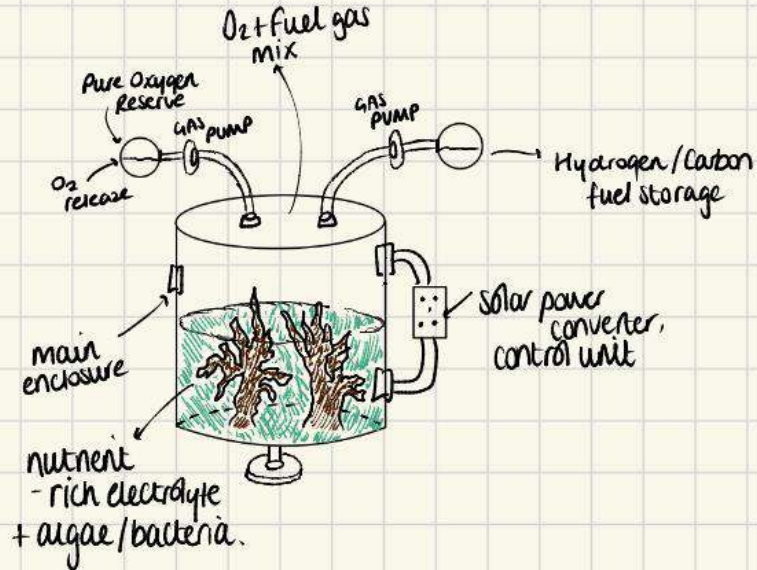
Dimension	Cultural Challenge	Possible Mitigation
Power Distance	Disputes over who should live in space first, correct allocation of resources?	Decisions should have clear reasoning.
Indulgence vs Restraint	Requires strict control of resources. Creates restrained environment, people value comfort.	Balance efficiency and wellbeing. E.g. small amounts of fresh food, private spaces, adjustable lighting, leisure time.
Long term vs short term orientation	Requires huge injection of money. However, long term orientation is a challenging over large time scales.	Distinction between the short term plan and the long term implementations.

CLEAR

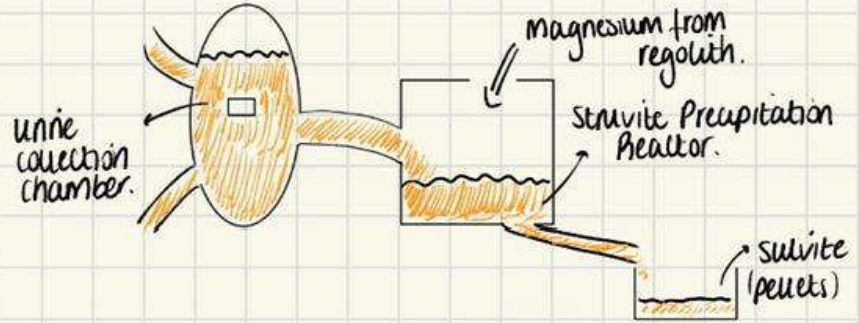
As a team, improve the wellbeing of astronauts by developing closed resource production systems, using a proposed timeline to test validity of the solution, and moving towards self-sustainability.

Initial Ideas

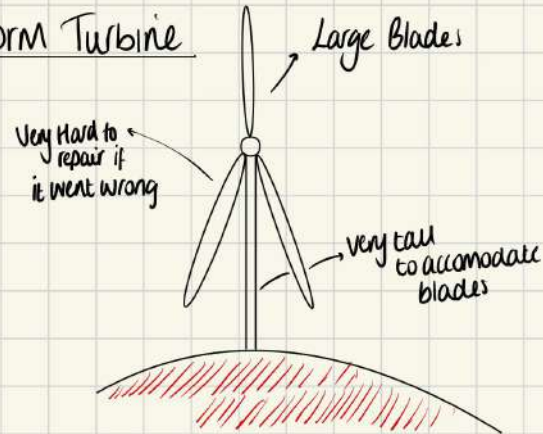
Artificial Photosynthesis



Urine Pellets



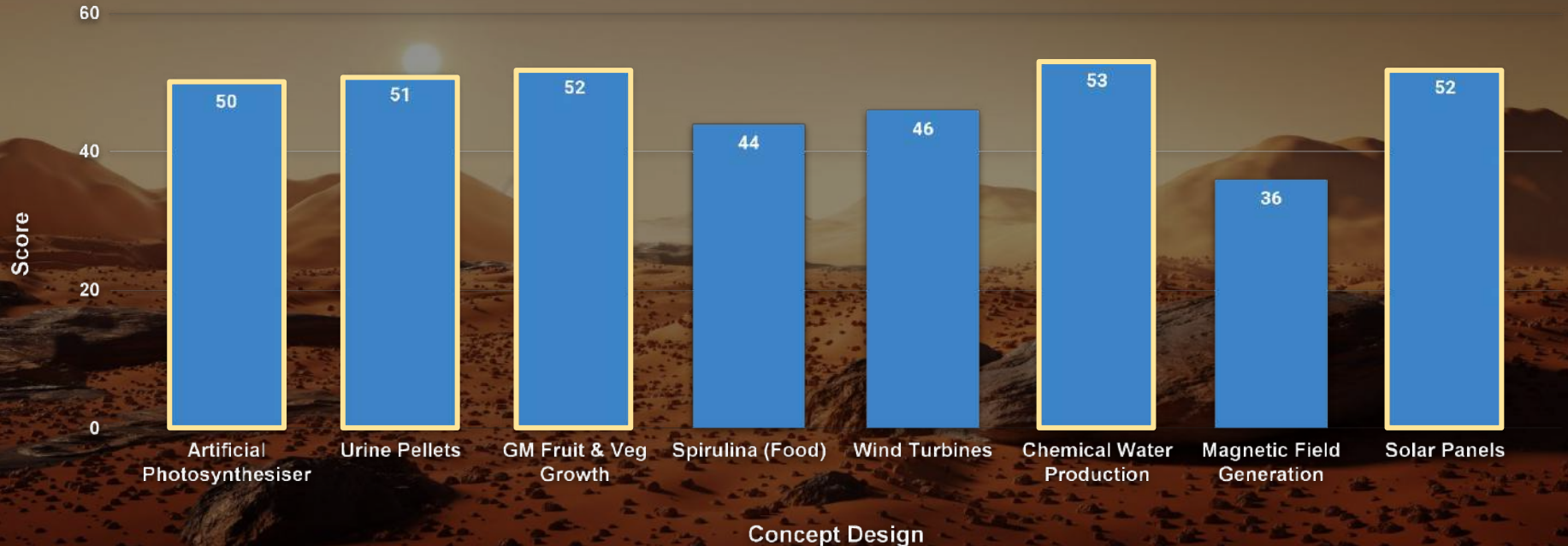
Storm Turbine



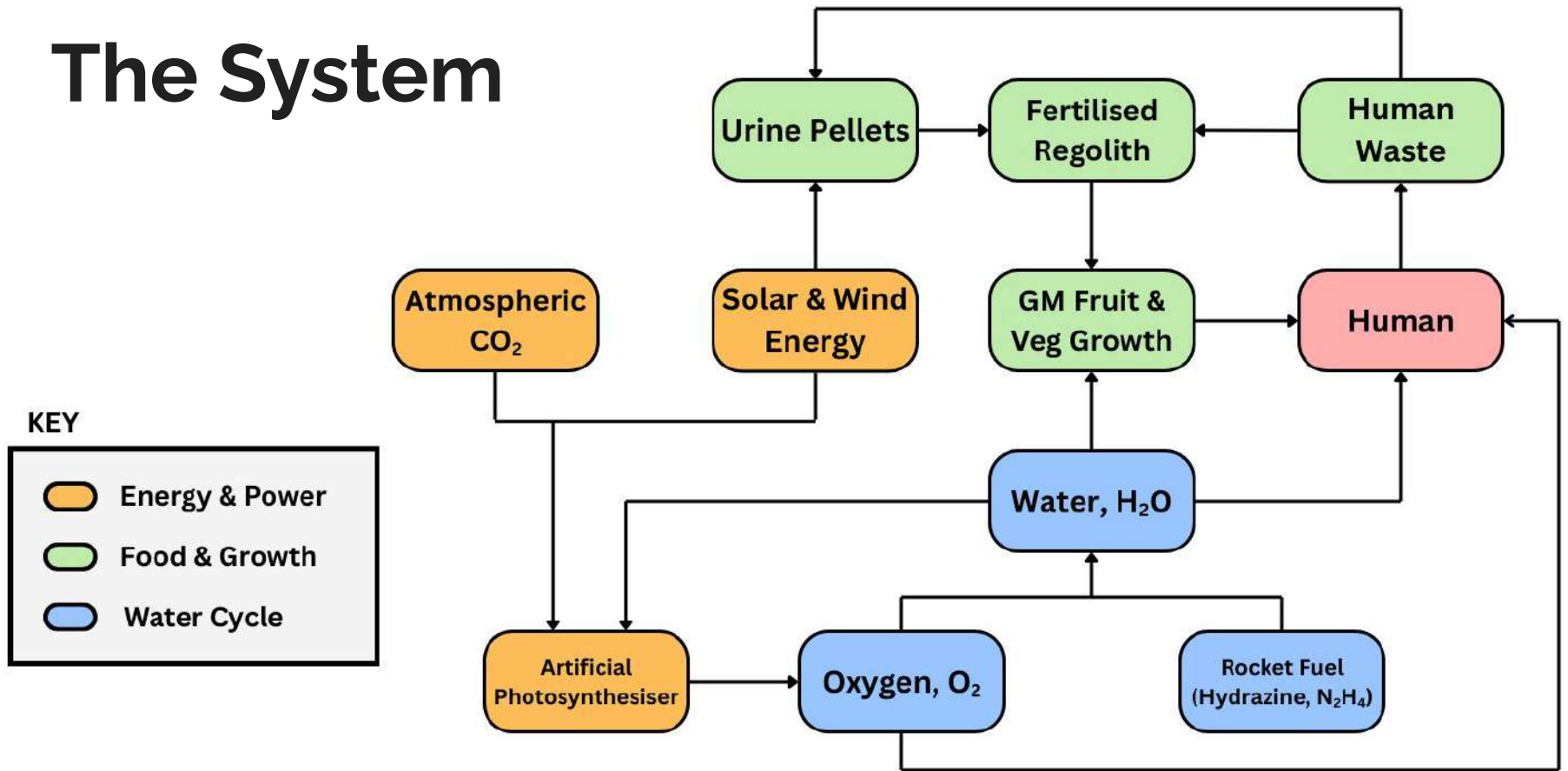
Decision Matrix

Selected & Weighted Criteria:

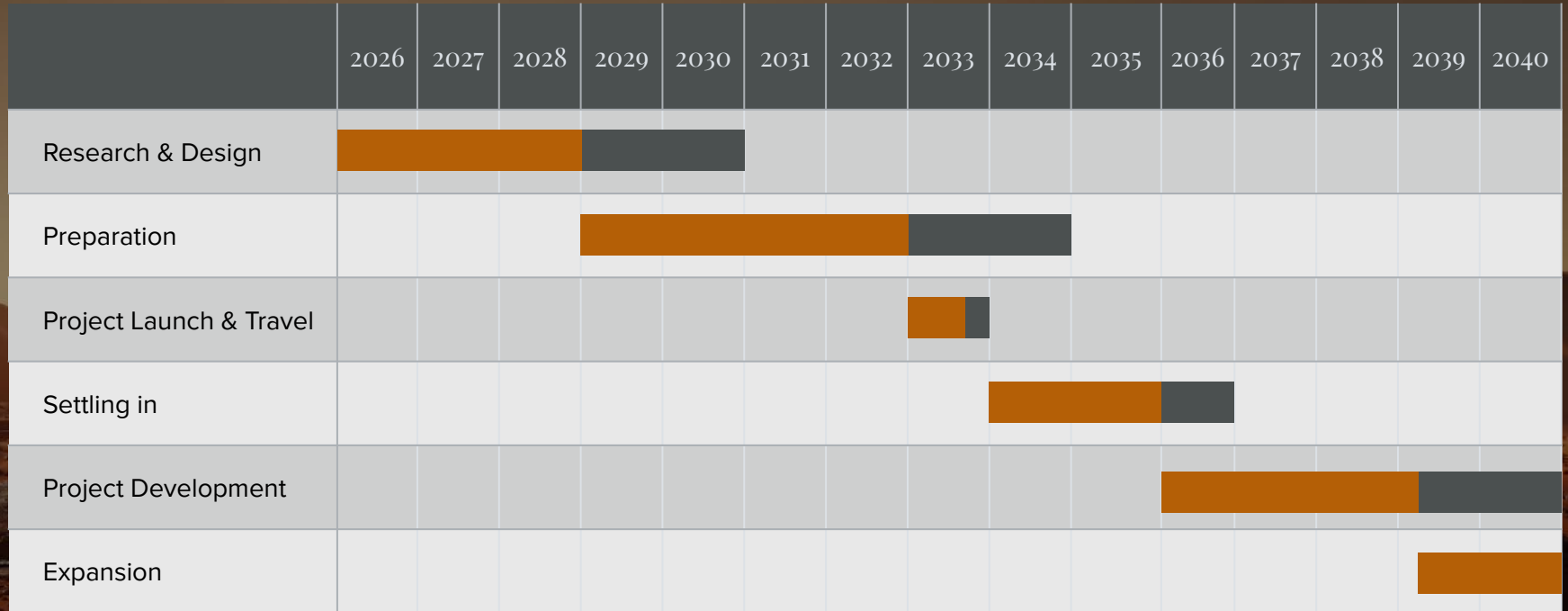
Self-sustainability (4); Repairability (3); Scalability (3); Efficiency (3);
Durability (2); Cost-effectiveness (1)



The System



Projected Timeline



Contingency



Projected

Risks & Mitigations

Risk	Impact	Mitigation	L	S	RR
Data Breach and Cyber Attack	Mission delay	Encrypted communication, regular integrity checks	1	3	3
Human error	System damage, resource loss	Automation where possible, simulation-based training beforehand	3	2	6
Equipment Failure (mechanical, radiative, dust, underperformance)	Disruption to closed loop system, threat to mission success	Have backup and fail-safe systems, sensors and warning alarms	4	5	20
Isolation, confinement	Poor decision-making, degrading mental health	Communication with Earth, psychological screening, group missions	3	3	9
Overspending, unknown costing	Incomplete mission, degrading stakeholder relationships	Stick to budget, use of minimal resources	4	3	12

Sustainability and Inclusivity

Inclusivity *improves performance* and reduces stress

- Cross-training reduces pressure
- Frequent contact with Earth ensures wellbeing
- Adaptable suit designs consider all needs

Sustainability is the solution to *long-term* life on Mars

- Closed loop resource harvesting
- Recycling water and oxygen for fertilisation, and human consumption

Cyber Security

Cyber Security *protects lives*, not just data

- End-to-end encrypted communication
- Air-gapped life support systems
- Backup systems with manual override

The background of the slide is a high-resolution image of a desert landscape, likely Mars. It features rolling sand dunes in the distance, a flat foreground covered in small rocks and pebbles, and several larger, dark, angular rocks in the mid-ground. The sky is a uniform, hazy orange-brown color, suggesting a thin atmosphere. The overall lighting is soft and even, typical of a hazy day on a planet.

Questions?