

## UCL Collaborative Social Science Domain

### Social Science Plus Pilot Project Outcomes Report

**Project Title**

Off-world living analogue pilot projects: determining their value for the far and near future

**Amount**

£10,000

**Academic Year**

2021-22

**Social Science Principal Investigator**

Dr. [Aaron Parkhurst](#), Associate Professor, Biosocial and Medical Anthropology, Anthropology, Social and Historical Sciences, SLASH

**Co-Investigator(s)**

*Non-Social Scientist Co-Investigator:*

Dr. [Daniel Brayson](#), Post-doctoral Researcher, Developmental Neurosciences, Population Health Sciences, LMS

**Second Co-Investigator**

Professor [Andrew Edkins](#), Professor of the Management of Complex Projects, Bartlett School of Sustainable Construction, Bartlett, BEAMS

**Early Career Researcher**

[Myles Harris](#), PhD student, Institute of Risk and Disaster Reduction, Earth Sciences, Mathematical & Physical Sciences, BEAMS

**Project outline**

The Off-world Living Analogue pilot project was a multi-disciplinary collaboration between scholars in the social-sciences, space industry, built environment, and in cardio vascular health to explore cultures and fostering of well-being in future off-world settlements. The project promoted members of the space research community to consider and design for what it might mean to 'thrive', rather than simply 'survive' in harsh environments, with limited resources, and under dynamic and uncertain environmental conditions. Workshops were held to present prototypes and models of these designs and to hold applied debate on future analogue and habitat construction and development. These were then used as evidence and seed for larger grant proposals to explore analogue missions as novel methodology in the social sciences. Specifically, the project asked:

- What constitutes, ethnographically, the notion of 'thriving' as humans develop Lunar and Martian settlements and think critically about off-world futures?
- What constitutes, ethnographically, sustainability off-world, in the allocation of resources, limited built-environment, and fragile environments?
- How can the study of 'thriving' off-world inform and help one commit to ethical engagements for living on Earth in uncertain planetary futures?

## **Main findings**

The project led to the development of 12 pilot analogues and models that each contributed to the theme of sustainable 'thriving' and well-being off-world, and explored perspectives from engineering, fine art, architecture, music, psychiatry, pharmacy, and anthropology. These models included:

- Engineering projects for recreation in off-world environments, including micro gravity playscapes to test crew dynamics, cognitive and proprioceptive adaptations in regularly changing gravitational environments, and Anthropological theories of play. Other engineering models included new exercise projects for Martian gravity in the form of modular trampolines, and recommendations for an analogue/extreme environment medication kit.
- Projects in the arts included a pilot design of a digital, multi-modal, and modular instrument for off-world travel and settlements, building off the history of musicality in space. It also included photography collections to send to habitats, and a tech demonstration of using dead material and foreign soils for casting, make usable memorial objects.
- Models included architectural renderings of Martian habitat design features such as staircases for Martian gravity, architectural building materials made from Martian regolith, arts packages for isolated living, and funerary protocols off-world in different environmental contexts.
- Other contributions included new psychiatric models of isolated-long distance living, systems engineering for new off-world greenhouses, and consultancy models for social and environmental adaptations based on refugee and asylum seekers lived experience.

All these models were used to deconstruct the concept of thriving, and to help develop research platforms for supporting well-being in future analogue missions for human space flight missions, fidelity experiments, and evidencing analogues as critical social science methodology.

## **Detail:**

- **the extent to which you achieved the aims of your pilot project as detailed in your original application**

We enthusiastically achieved the aims of our pilot project. The workshops afforded potent opportunity to unpack how different perspectives understand the notion of 'thriving'. We set up a community of research at UCL in partnership with the UK and European Space Agencies, and with the British Interplanetary Society, to consider individual and social well-being in off-world projects, and we used the pilot as evidence for substantial funding opportunities for future research. The pilot also serves as a basis for a public facing online exhibition as well as a physical catalogue of the pilot models, and an initial position publication in development for the British Interplanetary Society.

- **describe any barriers that you encountered**

As with much interdisciplinary work, barriers often include epistemological differences in the ways that concepts are understood. In this case, however, such disciplinary mindsets were encouraged as core to the pilot. The challenge then for social scientists is to weave together sometimes disparate ideas into common threads.

### **Key achievements and impacts (academic and non-academic), media coverage, etc**

- The project has culminated in a public-facing digital exhibition of the micro-analogue prototypes and models, currently in the final stages of development. This exhibition will also produce a physical catalogue of the material culture project.
- We held a large public workshop on the micro-analogue pilot, in partnership with the British Interplanetary society. Members and participants included directors of the BIS, academic directors of the European Space Agency, engineers from UCL, Kings, and Cranfield University, members of International Architecture firms, lecturers from the Mullard Space centre, and UCL's Phd community in UCL's space domain.
- The pilot was also advertised and incorporated into the United Kingdom's entries for 2022 International Space week. It was presented to members of industry at the International Astronautical Congress in Paris.
- An academic peer reviewed article on the theme of 'thriving' off world, and its implications for ethics on Earth as teased out in the workshops is currently in progress. We have been invited to submit the article to JBIS.

### **Detail your plans for external funding application(s) (funder, scheme, date of application, amount, outcome (if known) etc)**

The pilot project has already helped inform the submission of a large ESRC grant, fully submitted through JeS UCL on October 24<sup>th</sup>, 2022. The grant is titled: *Space Analogue Missions as Earth-Bound Methodology: Developing social landscapes to meet the challenges of the future*. Principal Investigator : Dr Aaron Parkhurst, with co-I David Jeevendrampillai and Myles Harris (ECR on this pilot project). The grant is for £939,001 and is submitted as part of the ESRC highlight notice 2022: *Embedding Methodological Development in Research Practice 2022*. The pilot will also serve as evidence for a Leverhulme grant under a similar theme to submit this winter, along with two separate small grants to the UK space Agency and the European Space Agency to fund analogue methodology and research.

### **Next steps**

We have already applied to the ESRC for larger research funding. The next stage is to apply to the Leverhulme for Anthropology based analogue research. We will also apply to the UK Space agency "Enabling Technologies" funding scheme, and to ESA for their £175k science funding. We hope to have the first publication from this project with the JBIS in early 2023, along with publishing the online exhibition in the new year. The data from this project will be incorporated into plans for a Space Health Research UK space Analogue 2-week research mission, scheduled for August of 2023.