



FIG WORKING WEEK 2023

28 May - 1 June 2023 Orlando Florida USA

Protecting
Our World,
Conquering
New Frontiers

Creating a Land Tenure Reform System for Mars

Wednesday, 31 May 14:30–16:00

Roshni Sharma, on behalf of the
FIG YSN VCSP e-Volunteering Team



Organized By



Diamond Sponsors



Agenda

1. Overview of the VCSP
2. Overview of the Event
3. Outcomes of the event
4. Interactive audience discussion:
 - a. How do similar scenarios play out on Earth?
 - b. Why is it important to explore these themes in the face of climate change, COVID-19 and a changing society in 2023?
 - c. What is the role of surveyors in protecting the planet?



FIG WORKING WEEK 2023

28 May - 1 June 2023 Orlando Florida USA

Protecting Our World, Conquering New Frontiers

The Volunteer Community Surveyor Program

- NEED TO ADD STUFF

Organized By



Diamond Sponsors



The scenario...

The year is 2050, and humans have succeeded in interplanetary travel and the development of life support systems to allow the settling of neighbouring planets. With a growing population, and no near-term solutions to the devastating impacts of climate change, rapid efforts are being made to settle Mars. An intrepid band of citizens have made the journey and are in the process of developing the building blocks for a new society of Mars Humans to grow roots there. Technology has been developed to allow our societies to survive in 'bubble' civilisations with shelter from the harsh solar radiation. Within these bubble cities, we are able to generate atmosphere and have adapted to the different gravity levels to be able to grow food and sustain ourselves. Life is different to that on Earth, but still good.

As they draw on their key expertise - health, agriculture, surveying, civil engineering, etc. - and explore options to settle the Martian surface (the flat lands), these early colonisers are greeted by a pre-existing Martian civilisation already living within the subsurface system of caves and runnels. Early communications are open and friendly, enabled by a novel translation system that works seamlessly, so there is no language barrier.

The Earth settlers are keen to ensure that past colonisation mistakes on Earth are not repeated, and so it is up to the land tenure team to discuss and negotiate land for the settlers and to undertake proper safeguarding reviews to ensure minimal negative impacts on martian populations. Initial discussions with the Martians are promising: they are willing to allocate portions of the flatlands to Humans.

What we asked participants to do

- Define what the problem is that is necessitating the introduction of a land administration system
- Define what you feel the key needs of a land administration system need to be
- Consider the process of allocating land and future distribution of land, taking into account land use planning and the different needs of urban and rural environments across the flat lands and the caves
- Consider the process of allocating land, and future distribution of land, taking into account land use planning and the different needs of urban and rural environments
- In response to the provided challenge questions and scenario, provide a series of recommendations

Socio-Political Situation

The Martian Empire is a matrilineal society, with a matriarch at the head of the society. The social system is closely intertwined with the political system, as the five major clans are represented on the Martian council that advises the Matriarch-Empress (called Matriarch from here on). The Matriarch is not considered as the absolute leader of the community, but is a first among the equals of the members of the Martian Council, which acts as the main decision-making body that advises and consents to the decisions of the Matriarch.

Land in the Martian society is a social-spiritual bond among the living Martians, as well as a link to their ancestors and the future generation. The five major clans control the five main habitable cave systems on the planet, largely independent of each other. There are a number of other minor clans, which are not on the Martian Council, but derive their right to occupy their current space in the major cave systems and other minor cave systems from their affiliation with one or more of the major clans. Though very hierarchical, the vertical mobility within the Martian Empire is solely based on a meritocratic system. Hence there are no royal families, but becoming a member of the Martian council is dependent on an individual and a clan's ability to expand and grow. The social relations among the clans, together with the abundant cave space led to the Martians implicitly agreeing on their boundaries, without any way of recording the extent of the boundaries.

The allocation of the space in the cave systems is controlled by the clan matriarchs in consultation with the family leaders within the clan. The inheritance system in the Mars system is based on the coparcenary inheritance system, where the properties are held jointly, but separately used by the offspring of the females or female relatives of the deceased, and considered a community asset, unless designated for use by a single community members. Though this allows for an almost egalitarian inheritance system, but has ended up dividing up the space in the caves and the outlands into almost unusable spaces due to the population increase. Furthermore, due to the limited habitable caves, as a result of climate change impacts, increase in population, as well as the zeal to occupy more space to increase the power of their family, Martians have moved out of the caves to settle on the flatlands, which are conducive for life. The rules regarding the Martians' access to, use of, and enjoyment of the lands are based on dynamic, un

The Martian society recognises two genders, male and female, one of which a Martian must identify with and form a partnership with another Martian to be viewed as mature and be considered an "Adult Martian". The decision-making power within the clans lie in the hands of the clan councils made up of all the adult Martians.



FIG WORKING WEEK 2023

28 May - 1 June 2023 Orlando Florida USA

Protecting Our World, Conquering New Frontiers

Economic System

The Martians live in a largely welfare state. As the politico-social ties to the land, the fruits of the land are regarded as community property. Their notion of property is that land and its resources belong to all, and so all must equally enjoy it.

Organized By



Diamond Sponsors



Scenario Update 1

The geography of Mars is shaped by various landforms and surface features that are distinct to the planet. Here are some key aspects of Martian geography:

- Volcanoes: Mars is home to some of the largest volcanoes in the solar system, including Olympus Mons, which is over 13 miles (21 kilometers) tall and is about three times the height of Mount Everest, the tallest peak on Earth. These volcanoes are part of the Tharsis volcanic plateau, which is a prominent feature on Mars' surface.
- Plains: Mars has extensive plains known as lava plains or basalt plains, which are flat regions covered with solidified lava flows. These plains, such as the Tharsis volcanic plateau and the Elysium Planitia, cover large areas of the Martian surface and provide relatively flat terrain.
- Canyons: Valles Marineris is a system of canyons on Mars that is over 2,500 miles (4,000 kilometers) long, making it one of the longest canyons in the solar system. It is much larger than the Grand Canyon on Earth and contains a complex network of valleys, cliffs, and plateaus.
- Impact Craters: Mars, like the Moon and Earth, bears the scars of meteorite impacts. The planet is covered with impact craters of various sizes, ranging from small, simple craters to large, complex craters with central peaks and multiple rings.
- Polar Ice Caps: Mars has ice caps at its poles made of water ice and carbon dioxide ice, similar to Earth's polar ice caps. These ice caps, particularly the northern polar cap, are important sources of water and have implications for land use and resource management on Mars.

Overall, the Martian geography is characterized by diverse and unique landforms, which would need to be taken into consideration in the design of a land tenure system for Martian residents, while also respecting their land practices, heritage, and values.

Prompt: How will your group take into account the physical environmental features (such as those listed above) as you think about the design of a land tenure system for Earthers to coexist peacefully with Martians?

Scenario Update 2

One interesting fact about land on Mars is that it contains the largest volcano in the solar system, called Olympus Mons. This giant shield volcano measures about 13.6 miles (22 kilometers) high and 370 miles (600 kilometers) in diameter at its base. For comparison, this is almost 3 times taller than Mount Everest, the highest peak on Earth. Despite its immense size, Olympus Mons is believed to be geologically inactive and has not erupted for billions of years, due to the lack of tectonic activity on Mars.

Olympus Mons is a massive shield volcano located on the western side of the Tharsis volcanic plateau, which is situated near the Martian equator. It is approximately 22 kilometers high from its base, which would be 2.6 times higher than Mount Everest, the highest mountain on Earth. Furthermore, its diameter measures around 600 kilometers, which is roughly the size of the state of Arizona in the United States. Compared to other volcanic mountains in the solar system, Olympus Mons is unique because its slopes are very shallow, with an average gradient of only 2-3 degrees. This is much less steep than most mountains on Earth or elsewhere, due to the low density of the red planet's crust and mantle. Thus, it appears to be a broad, shield-shaped mountain rather than a steeply pointed peak.

Martian society across the red planet hold Olympus Mons in very high spiritual regard, believing that it is the Sacred Mother who was responsible for the start of their civilisation, and the source of the minerals which their food sources are based on and that gives them life. Indeed, each Martian cave which acts as home for a familial lineage of Martians typically holds a small shrine that points to the direction of Olympus Mons, no matter where on the planet the family are located.

Prompt: Olympus Mons is a significant geographical feature on Mars - it is valued for the Martians across the red planet as a sacred site. How will your group take into account the spiritual meaning that the volcano holds for the Martians?

Scenario Update 3

The red planet has a central core made of iron and nickel, surrounded by a less dense silicate mantle and crust. Unlike Earth, there is very little geological activity on the Martian planet, and there are no tectonic plates or convection in the mantle. Earth differs from Mars in terms of elemental composition in several ways - Mars is rich in iron oxides, and has about twice as much iron than Earth's mantle does. The most abundant elements in Mars's crust (which sits on top of the mantle) are silicon, oxygen, iron, magnesium, aluminium, calcium and potassium. Still present but less abundant are titanium, chromium, manganese, sulfur, phosphorus, sodium and chlorine, as well as some boron.

Hydrogen is present as water in ice form and in hydrated minerals, and carbon is present as carbon dioxide in the atmosphere and in solid form (dry ice) at the poles.

As Earthers are exploring Mars, they realise that it is becoming increasingly desirable to be able to extract some of these elements and minerals to be able to facilitate technologies on Mars that they had become used to on Earth. Particularly valuable are oxygen (for creating false atmosphere to allow breathing outside of a space suit), hydrogen and oxygen (for water production), nitrogen, phosphorus and potassium (to use to create fertilisers to grow plants and facilitate agriculture), sodium and chlorine (to make table salt to add to food), as well as other metals (to use to create infrastructure).

The native Martians have a different way of thinking about these natural resources, using iron ore as a food source, from which they tend to excrete and discard other minerals. The waste-products they produce aren't of value to them, but are a potential valuable source of minerals and elements for Earthers.

Additionally, many of the more rare elements tend to be found within or near the caves as deposits, however these caves are where the Martian families and societies live, and they are not interested in sharing these spaces in any way with the Earthers. They are happy for the Earthers to live on the surface, or to dig underground areas in non-caved areas, however.

Prompt: What sorts of things will the Earthers need to think about to be able to sustainably use Mars's natural resources, while also respecting the ways that the native Martian civilisation use these resources? How can they co-exist as peacefully as possible together?

Scenario Update 4

Matrilineal societies exist on planet Earth too, and in them, societal power is held by the females within a family. This includes power to things like ownership of land and property, as well as family-related power (in that when marriage occurs, it is the men who relocate to the house of the woman whom they are marrying, and the family name and title pass down to daughters rather than sons). Matrilineal societies are not, however, a direct contrast to many patriarchal societies which we see in modern-day Earth - in many instances of today's matriarchal societies, decision-making requires consensus based on principles of mutual responsibility (such as the Minangkabau in Indonesia), rather than autocratic leadership. In other matriarchal societies, it is the youngest daughter who inherits her mother's wealth and property and who is head of the family (such as the Khasi people of Meghalaya, India). Other present-day matriarchal societies include the Haudenosaunee society in North America, the Bribri society in Costa Rica, and several communities in Africa's 'matrilineal belt'. There are also other societies that do not fall into gendered binaries, such as the Australian Aboriginal and Torres Strait Islander People, who have various gender arrangements which empower men, women and children in their nomadic ways of living.

Prompt: The Martian society we are encountering in this hypothetical scenario hold a strong matrilineal culture, and we encourage you to be creative to come up with what this looks like. How would this contrast to the dominant patriarchal lens that many Western societies today hold? What tensions would arise, and what opportunities might there be?



FIG WORKING WEEK 2023

28 May - 1 June 2023 Orlando Florida USA

Protecting Our World, Conquering New Frontiers



Organized By



Diamond Sponsors

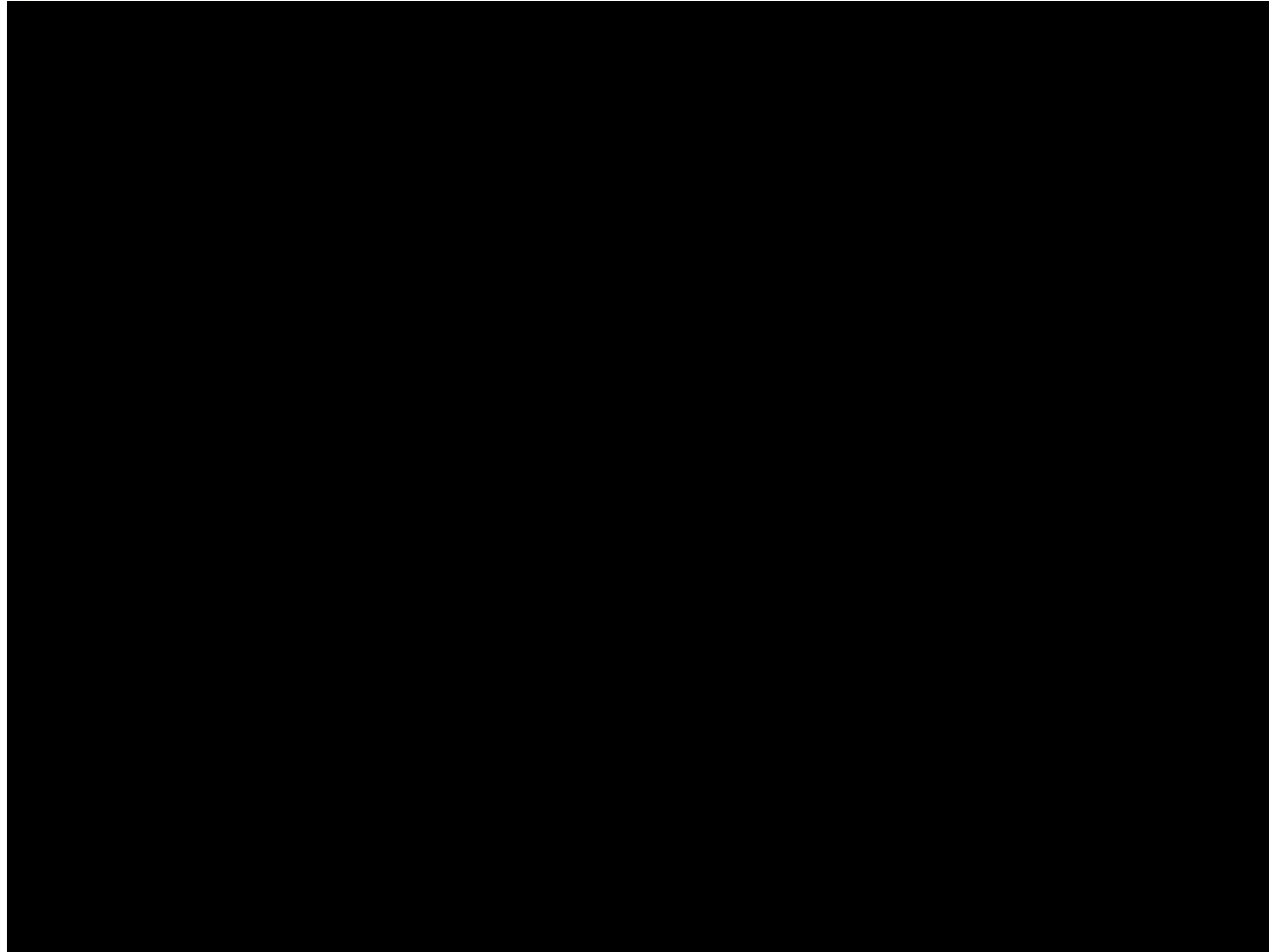




FIG WORKING WEEK 2023

28 May - 1 June 2023 Orlando Florida USA

Protecting Our World, Conquering New Frontiers



Organized By



Diamond Sponsors



What participants suggested...

- **Development of a legal framework:** The legal framework should be developed to guide the implementation of the new land administration system. This framework should be based on principles of equity, fairness, and transparency and should take into account the needs of marginalised communities.
- **Establishing property rights:** To ensure equity in land administration, clear and enforceable property rights must be established. This can be achieved through the creation of a comprehensive land registry and the development of procedures for the registration of land titles.
- **Creation of an effective dispute resolution mechanism:** A fair and efficient dispute resolution mechanism is critical to ensuring the equitable administration of land. The mechanism should be accessible, affordable, and impartial and should take into account the needs of marginalised communities.
- **Introduction of the "Slave trade" approach:** This involves humans getting to understand the needs of Martians then using them as a benefit to win them over.

What the Judges said about the participants' submissions

- The reports acknowledge the importance of skills and expertise
- The reports mentions the need for collaboration, education/capacity building, and sustainability
- The reports includes transportation and emphasizes respect for Martians
- There are good outlines of the process to obtain Martian permission
- There are some creative approaches and unique perspectives mentioned.
- Some valuable insights and considerations are provided

Interactive discussion

- How do similar scenarios play out on Earth?
- Why is it important to explore these themes in the face of climate change, COVID-19 and a changing society in 2023?
- What is the role of surveyors in protecting the planet?