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TOWARDS A COMMUNITY-DRIVEN LUNAR REGISTRY OF ACCIDENTS AND ISSUES

Abstract

Interest in lunar exploration is at an all time high as evident from the large number of government and commercial programs such as the Lunar Gateway, Artemis, NASA Commercial Lunar Payload Services, and Chinese Chang'e aiming at the Moon. These future missions not only focus on going to the Moon, but also building infrastructure for sustained presence and the formation of a cis-lunar economy by 2050 if not earlier.

But if our own experiences exploring Earth in the past (and recent lunar missions like the Intuitive Machines IM-1 mission) are any evidence, sustained presence in such a harsh environment will inevitably involve learning from our achievements and failures, not as lone actors but as a community. While some safety lessons could be considered proprietary knowledge, there is still a need and an opportunity to share knowledge about accidents and issues between actors, in the hope of preventing similar issues in the future specially as we move to building shared infrastructure used by different actors on the moon.

This paper presents the results of an Open Lunar Foundation fellowship where we explored how this safety and mission assurance knowledge sharing could be achieved and amplified in consultation with various government, industry and academic actors. At its core, our proposed concept is a community-driven Lunar Registry of Accidents and Issues, where different stakeholders can share lessons learned, malfunctions and other safety information relating to their lunar infrastructure, resources, and missions with each other. A database structure will be presented highlighting the type of information that will be gathered from different parties, along with interoperability requirements (to enable data from non conformance systems to be fed to this registry), and anonymization policies that reduce risks for the party sharing information. The legal issues of implementing such a solution i.e. privacy and confidentiality will be explored, alongside a proposed model for governance of such register.

Beyond the form and function of this Registry, the paper will outline concepts on how the collective knowledge contributed to the registry by various stakeholders can be used in conjunction with recent advances in automated analysis to identify trends in mishaps or close calls which are then used by the community to extract lessons learned and flag potential issues in future missions.