LUNAR SURFACE INTERACTION OPPORTUNITIES. J. K. Schingler[1], J. Bell[2] and L. Elkins-Tanton[2], [1]Open Lunar Foundation, jessykate@openlunar.org, [2]Arizona State University, jim.bell@asu.edu, lelkinst@asu.edu.

Introduction: Most current and planned lunar surface missions are self-contained in terms of their physical presence and operational strategies. But future sustained science and exploration operations on the Moon will eventually require the provision of in situ services and utilities, and an associated higher level of coordination between and amongst robotic and human actors alike. For example, as specific local sites of interest for prospecting and habitats are identified and populated by missions, we will see increasing physical and temporal concentration of activity. Desirable sites for landing and operations could produce contention among different mission teams; or, if planned in advance, such local concentrations of activity could instead create new opportunities for service provision and infrastructure development. In all cases, physical interaction or coordination among assets on the lunar surface will rely on the ability to operate within specific technical/engineering standards and norms of behavior.

Although much work is going into individual mission planning and broad architectures such as Gateway, we contend that the lunar community ought to begin thinking about lunar surface interaction as a distinct capability in need of development, both to avoid conflict and to accelerate activity in support of sustained presence.

First Generation Interaction Requirements: This paper outlines a number of scenarios involving interaction requirements that the authors believe will be advantageous to crewed lunar surface teams and their sponsors. These first-generation interaction requirements will include activities such as proximity operations for surveying and prospecting, power generation and delivery services, communications protocols and relays, data storage and transfer, and infrastructure and traffic control activities associated with landing pads. We describe potential approaches to developing and testing these capabilities. Importantly, the adopted approaches must also include establishment of norms of behavior and notification, test and validation campaigns, and the design and adoption of physical standards for inter-vehicle interfacing, on board sensors, and algorithms.

We close by looking at ways in which different mission classes and planned lunar surface activities could provide opportunities–and challenges–for development. Notably, successful surface interaction will be supported by the broadest possible participation of governmental and private lunar entities alike. As a special complement to the generally larger and lower-cadence governmental efforts, the growth of commercial services by private actors with higher-frequency mission cadences and multiple payloads could create a unique platform to prepare for advancing these capabilities.