

Goal 10: Standardization



Ensure the development of international standards as a key instrument for the application of the lunar sustainability goals.

Goal 10 addresses the need for standards to be adopted for lunar exploration, with associated targets and drivers listed in Table 4.11. There are two aspects to consider for standardization: (1) the identification of applicable technology, and (2) the scope of participants in the standardization process. It is necessary to promote cooperation between various space and non-space actors to adopt consolidated standards, and ensure sustainable development of systems on the Moon. Standardization is also a key instrument for long-term international collaboration while ensuring Open Access (Goal 1).

- The Open Stand movement, endorsed by representatives of the Internet Society, formulated principles for standardization processes that involve cooperation, transparency, inclusiveness and openness (Open Stand, 2017). These principles can be applied in other fields and should become guidelines for further consolidated standardization efforts on the Moon, supporting the implementation of sustainable approaches. The main benefits they identified for open standards are illustrated in Figure 4.12.
- As identified in Diogo Coutinho's "Interface Standardization for the Moon Village" (Coutinho and Welch, 2018), functional systems that can be targeted are:
 - Energy generation, storage and distribution systems
 - Communications and navigation
 - Transportation
 - Prospection and research system procedures for sampling recollection, facilities for sample analysis and treatment, regolith sintering and water extraction
 - Other systems such as life support, food production facilities, language, sign, symbols and human interfaces
- There are Standard Development Organizations (SDO) that have been working with space related standards since 1982 such as the managing of communication and data system standards to enhance interoperability for spaceflight (CCSDS, 2017).
- NASA and ESA both have their systems and specifications repositories for space activities (ESA, 2019e), which are mostly used on a local scale. Others are exclusively for national use and are imposed through governmental standards (Defense Standardization Program, 2017).
- Technologies developed using only male test subjects may pose safety risks to women and underrepresented groups. Therefore, making sure standards are developed in accordance with Goal 3: Diversity and Opportunity is desirable for a sustainable approach to lunar activities to ensure design considerations are made for diverse people (Criado-Perez, 2019).

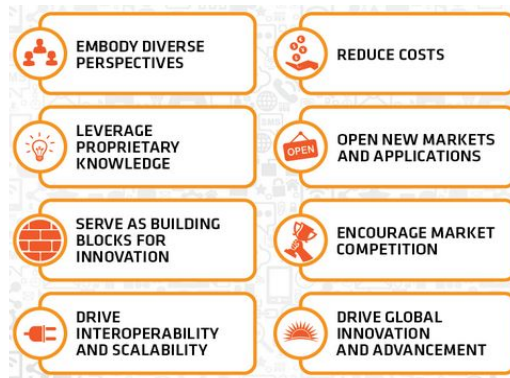


Figure 4.12. Infographic from Open Stand highlighting the main benefits of open standards (Open Stand, 2017).

Table 4.11. Targets and drivers for Goal 10: Standardization

Targets		Drivers	
10.1	Standardization of technology.		Standardize energy generation, storage and distribution systems through the establishment of Moon-specific parameters and the joint work with organizations such as the International Electrotechnical Commission (IEC) and the International Organization for Standardization (ISO) that have been involved in the standardization of electrical interfaces on Earth.
		10.11	
			Standardize satellite infrastructure and constellations for the coverage of the entire lunar surface for navigation and communication applications.
		10.12	
			Commit to the technical standards established by the Consultative Committee for Space Data Systems (CCSDS) for data exchange interfaces for video, voice, telemetry and commands.
		10.13	
10.2	Ensure that all standards are compatible with Goal 3: "Diversity and Opportunity".	10.14	Standardize transportation infrastructure and interface compatibility in cislunar space and on lunar surface.
		10.15	Standardize prospection methods, sample retrieval procedures and on-site research facilities.
		10.16	Standardize of life support systems and human interfaces.
			Ensure that the standardization of technology and medicine does not result in discrimination with regards to the health, safety and performance of astronauts.
10.3	Promote the use of standards as a mean to reaching Goal 1: "Open Access" and Goal 4: "International Cooperation".	10.21	Support the development of bias-free scientific data sets and research in order to ensure accuracy in the development of standards.
		10.22	
		10.31	Commit to developing standards in collaboration with a wide and diverse range of actors.
		10.32	Ensure that standards will be used without discrimination towards non space faring entities.