

The Moon Base programme implies a complexity that mankind never faced during past space missions. The scope is to settle a colony in a remote location, to perform advanced scientific activities along extended periods, with obvious risks and uncertainties due to the partially unknown environment. This involves:

- The design must comply with serious safety impacts and System reliability requirements;
- A reliable rescue strategy must be defined to timely react to unpredictable emergency conditions, notwithstanding the Moon Base distance from the Earth;
- An extensive approach is required to properly select, prepare, manage, transport, deploy, start-up and maintain the Moon Base in working order, for a long period of time;
- Complex analyses are required to identify Mission Support objectives and priorities, to coherently define the Moon Base expected independence (personnel skill and workload, tools, spares) and external support strategies;
- An assessment process is required to optimize support objectives, dependability requirements, mission targets according to economical and technical constraints.

The Moon Base programme then requires not only a sophisticated System design, but a specific additional effort must be spent for Logistic Engineering and Logistic Support definition, development and management.

Modern approaches to System/Mission Support are based on Logistic Support Analysis (LSA) and Integrated Logistic Support (ILS) models,

developed by USA DOD (Department Of Defense); such models provide powerful approach to Logistic Support definition, planning, management, implementation and acquisition by the user. Although they normally apply to Defense context, such models are successfully adopted by an increasing number of organizations, to effectively manage Logistic Support requirements for non-military complex programmes.

The ECSS (European Cooperation for Space Standardization) space standards issued by ESA-ESTEC, in particular, explicitly refer to USA DOD MIL-STD-1388-1A (LSA) and MIL-STD-1388-2B (LSA Record). The ECSS also endorse and tailor fundamental methodologies issued by DOD to standardize specific Logistic disciplines which are closely related to LSA and ILS activities, namely:

- RAMT (Reliability, Availability, Maintainability, Testability);
- FMECA (Failure Modes Effect Criticality Analysis);
- Safety and Hazard Analysis;
- Configuration Management;
- PHST (Package, Handling, Storage and Transportation).

Further studies and techniques must be integrated with the above mentioned disciplines, namely:

- Human Factor Analysis.
- Support Facilities Analysis.

Some basic guide-lines to effectively manage LSA/ILS processes are:

- They must initiate since the early phase of the mission concept definition, in order to influence design concepts when they are not yet consolidated;

- They must be integrated within the System design process to fully achieve mission objectives;
- They must take into account the user needs, operating environment, constraints, capabilities and resources;
- They must cover the complete System life cycle, up to the disposal phase.

A key point for Logistic Support success is the Logistic Management, which must be established since the early phase of Mission design. It must be based on a continuous data acquisition process and correlated analysis phases, since LSA/ILS processes efficiency closely depends on the capability to follow System requirements evolution and timely track System design upgrades. Experimented CALS methodology should be tailored to establish an efficient data and process management.

Great care shall be devoted by Logistic Management to early define Logistic policy/methods and generate/diffuse coherent specifications, dedicated to Logistic Engineering disciplines full harmonization within the complex programme framework.

An extensive assessment activity will be necessary to verify the availability of applicable methodologies/tools and to track their evolution along the Programme life cycle, so as to identify all tailoring/innovation needs and coordinate proper solutions.

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Se.Te.L. was established in 1973, to provide methodologies, tools, advanced services and integrated solutions for Logistic Support Engineering.