

6. PRACTICAL ASPECTS

This section establishes a provisional operational baseline as reference in comparing the suitability of the various options. The baseline is comprised of an operational concept and the functional requirements, expressed in terms of the needs of all stakeholders.

6.1. Operations Concept

The NGO is assumed to be entirely self-sufficient providing for its own facilities, infrastructure support, human resources, and personnel management. It serves to provide liaison between all ISS users — scientists, technology developers, and commercial firms — and the ISS and STS operations/management organizations, as well as, interfacing with NASA, Congress and the press. It is assumed that NASA and the NGO are cooperative partners, not contractor and customer, in the utilization task of the ISS. It maintains a public outreach program, including a major Website, for educating and involving the public in the accomplishments of the ISS. Further, it is proactive in promoting opportunities using the ISS and in developing new sources of funding independently of NASA. The NGO is assumed to be fully responsible for selecting (via a peer review process it underwrites) experiments and for providing and managing grants to successful proposers. The appropriate steering councils within the NGO provide the priorities and allocations with NASA enjoying a predefined ISS resource allocation as its payment for granting exclusive ISS utilization control to the NGO through a reverse CAN procedure. The NGO serves as the source of planning information to NASA for future ISS requirements or enhancements.

The NGO represents a one-stop, all inclusive source of information and expertise that is available to experimenters to a) design their payload to interface properly with the STS delivery system and the ISS payload accommodations, b) operate or control their payloads from their home institutions, and c) receive experiment data electronically. Experimenters are presumed to be inexperienced. It is assumed that the NGO staff does not perform experiments as an IR&D activity.

Engineering staffing levels at the NGO presume that ISS users accomplish all design, development and analytical integration at their home institutions. NGO staff is assigned to each project to assure that appropriate interfaces, reference data, and integration requirements are provided from the start of the project. Engineering expertise is made available for a) critical review junctures for the project and b) during actual experiment integration testing. The NGO maintains a significant simulation capability that can be downloaded to the experimenters but the assumption is that the ground based integration facility is located elsewhere, say, at KSC. The NGO maintains an information system to support all engineering development work.

Operational procedures and a generic experiment command capability is maintained and updated as required by the NGO to enable remote operation of experiments. Some payload control facilities are available at the NGO for use primarily during emergency situations or when communication failures arise. In general, experimenters operate from their home institutions or through the ISS astronauts. For experiments involving real-time operators onboard ISS, the NGO coordinates training with JSC and supports the development of special flight support equipment. The NGO arranges for secure communication connectivity between the user's institution and their experiment. All real-time (or recorded playback) data are processed within the NGO to remove communication artifacts followed by retransmission to the user. In the process, all data transactions are logged and archived for reference and accounting. Except for short term data buffering, experiment or science data are not archived at the NGO.

The NGO maintains the database of experiment resource requirements, operational schedules and critical interface constraints to facilitate rapid reallocation of ISS resources due to experiment state change. The timeline is made available for NASA scheduling functions.

6.2. Interface Requirements

Table 6-1 identifies the key interfaces with the NGO and the nature of the interactions. The comparable Work Breakdown Structure derived from the Reference Model is given in Appendix A.

Table 6-1: Interface Requirements

General Public	<ul style="list-style-type: none"> The ISS NGO shall: Administer education and public outreach activities Provide web based tracking device Provide general information on current experiments
Users	<ul style="list-style-type: none"> Manage and support peer review of proposals Manage awards and grants Maintain and provide general contract terms for use by experimenters Provide status and performance characteristics of the ISS payload accommodations Publicize opportunities and publish AO's
Stock holders	<ul style="list-style-type: none"> Maintain financial records, annual reports Hold meetings, elections of board of directors Establish strategic financial goals Maintain financial accounting system
Congress	<ul style="list-style-type: none"> Maintain or improve hierarchy in national funding priorities Promote legislation to enhance operations Report on accomplishments Respond to inquiries
Press	<ul style="list-style-type: none"> Hold briefings on new experiments

	<ul style="list-style-type: none"> Provide releases regarding accomplishments Respond to inquiries
Staff	<ul style="list-style-type: none"> Manage hiring and benefits program Provide logistics and facility maintenance Provide computer and network maintenance Provide security Provide training Support software procurement and development Provide procurement support
P/L Operations Team	<ul style="list-style-type: none"> Provide payload operators if requested Provide operations and interface documentation Participate in and certify operational procedure development Participate in and certify integration testing of payloads Arrange and provide training Provide connectivity to remote facilities for data, voice and video Provide command and control facilities for payload operations Provide for an interface to ISS simulators for training Process and distribute downlinked data Archive event log information Maintain directories or catalogues of operational data Maintain and distribute operational reference database
Payload Developers	<ul style="list-style-type: none"> Provide technical interface definitions and specifications Maintain manifests and schedules Provide for an interface to ISS simulators for payload development Support payload analytic integration Maintain and disseminate data and communication standards
Program Office	<ul style="list-style-type: none"> Provide status against predefined metrics Maintain and report budget Provide long term planning information regarding utilization Provide utilization statistics
ISS operators	<ul style="list-style-type: none"> Serve as the primary interface between ISS operations and experimenters Participate and support payload integration Coordinate experiment and/or payload scheduling and rescheduling Support anomaly analysis, diagnosis, and correction Maintain and provide payload resource requirements database Maintain payloads interface specifications
ISS management	<ul style="list-style-type: none"> Provide short and long term utilization plans Support ISS utilization planning
STS office	<ul style="list-style-type: none"> Maintain payloads interface specifications Support payload integration testing Provide monitoring and control of payloads in Shuttle Coordinate development, test, and integration of payload handling equipment Support analytical integration of payloads Maintain payload manifest schedule Negotiate manifest changes
Venture capitalists	<ul style="list-style-type: none"> Maintain and provide business plan Support development of experimenters business plan Maintain contact list Review and approve contract between experimenter and VC Administrate trust fund

Board of Directors	Provide performance and financial status reports periodically Report on NGO personnel performance
Support contractors	Oversee budget and performance Provide technical management
International partners	Maintain and support revisions to MOU Provide facilities and administrative support to the international office at NGO Participate in reallocation of resources

6.3. Comparison of Characteristics

Table 6-2 is a sample listing of a multi-dimensional characterization or attributes of the NGO implementation approaches. In themselves, they do not represent a quantifiable set of metrics for selection but help to differentiate among the approaches.

Table 6-2: Implementation Summary

	Govt Sponsored Enterprise	Cooperative	Govt Corp	State sponsored Authority	Independent Consortium	NASA Institute	NASA Division
	An organization, chartered and franchised by the government that uses private funding to perform the tasks associated with ISS utilization	An organization established under state law and funded by members who are involved in like activities with equal management rights; franchised by the government.	A federally funded entity established by Congress to perform the ISS utilization task.	An organization partially or wholly sponsored by a state legislature with or without a NASA franchise.	An organization of public and private entities that cost shares with the government; management oversight is provided by members	A government related entity funded and established specifically to perform the ISS utilization task and associated R&D.	A branch of an existing NASA organization, reporting to NASA management, and staffed by civil servants, to perform the ISS utilization task.
Example	Fannie Mae	INTELSAT	COMSAT, IDRC AMTRAK	Florida Spaceport Authority	Analogous to USRA	GISS , NASA Astrobiology Institute	
NASA participation	No	Yes - voting	Yes - Nonvoting	Board membership	As partner	Direct control	Direct control
New Facilities	Yes	Yes	Yes	Yes, state provided	Not necessarily	Not necessarily	On-site at Center
Independent user access	Yes	Yes; possibly different rates	Yes	Yes	More difficult	More difficult	More difficult
Mgmt Structure	Internal BOD	Member "governing council"	Appointed BOD	Appointed BOD	Consortia member BOD	Contractor BOD w/NASA oversight	NASA mgmt
Independent Oversight	Per terms of franchise	Per terms of franchise	Congress	Per terms of franchise	Per terms of franchise	Peer group	NASA Centers plus peer
Non-recurring Cost	None to NASA	Member funded	Federal funded	NASA partially subsidizes	NASA partially subsidizes	Existing facility?	Existing facility
Recurring Cost	User pays	Members and users pay	User pays	State and NASA subsidized	User pays and NASA subsidizes	NASA pays	NASA pays
Regulatory constraints	Standards of incorporation	Standards of incorporation	Federal level w/waivers	State level	Federal level w/waivers	Federal level	Federal level
Impact on NASA	Loss of control	Loss of control	Loss of control Problematic I/F	Adverse politics	Less control	Problematic I/F with CDC's	Growth of ops responsibility