

Responses to 6/6/02 preliminary questions on ISS utilization management

Received 6/20/02:

It is surprising that NASA is going through yet another exercise relating to the possible establishment of an NGO (non-government organization) to manage the research utilization aboard the ISS. I am aware of at least two prior studies, one conducted by the National Research Council (Institutional Arrangements for Space Station Research, 1999, National Academy Press) and the other performed under a contract to Computer Sciences Corporation (International Space Station Operations Architecture Study, 2000, MOBIS Contract GS-23F-8029H Report), that have examined these issues in detail. My responses to the questions below are from the standpoint of a potential ISS user who is familiar with these two reports. The original questions taken from the e-mail I received are italicized and followed by my responses.

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1. To what extent should an ISS utilization management organization be responsible for evaluating and prioritizing proposals for research, technology development, and commercial development to be performed aboard the ISS?

Not at all. Research solicitation, evaluation and selection should continue to be a headquarters function. Research solicitations are typically (with the exceptions of solicitations such as the recent International Announcement of Opportunity for ISS flight research) categorized according to disciplines within the physical and life sciences and are for either ground-based or flight research. Headquarters personnel have a greater perspective of the “big picture” and, with proposal-evaluation assistance from outside peer reviewers, are in the best position to select those projects that contribute best to NASA’s mission.

2. To what extent should an ISS utilization management organization provide a capability for developing instrumentation and other hardware, and furnishing supplies, necessary for research, technology development, and commercial development to be performed aboard the ISS?

The ISS utilization management organization should be a single point of contact for an investigator or commercial entity whose research is to be done aboard the ISS. Whether this organization does hardware development in-house, works with an existing NASA Center or with the PI through an outside vendor should be decided on a case-by-case basis, depending on the research requirements and the most efficient and cost-effective way to proceed.

3. To what extent should an ISS utilization management organization provide planning and support for samples and specimens (both living and non-living; reactive and inert) to be used in research, technology development, and commercial development aboard the ISS?

I am not entirely clear on the issue here. It seems that the PI will maintain this responsibility until the time that such samples need to be integrated into the experimental package and/or launch vehicle. After the completion of integration, some agency within NASA must take over to provide the necessary support for the experimental package.

4. To what extent should an ISS utilization management organization be responsible for allocating ISS resources (laboratory space, electricity, crew time, etc.) to individual projects for research, technology development, and commercial development to be performed aboard the ISS?

It seems that that an agency charged with “utilization management” must have a fair amount to say about the allocation of such resources in order to maximize the utilization of the ISS. Of course, these must be merged with vehicle requirements for maintenance, etc., but research should be recognized as a top priority of the ISS and vehicle-related activities should be planned accordingly, as long as safety is not compromised.

5. What are some of the differences that should be considered in managing research, technology development, and commercial development aboard the ISS?

The 30-30-30-10 (physical sciences—life sciences—commercial—‘other’) guidelines, which I presume are still in place, should be implemented loosely in order to maximize return from the ISS. The metrics by which this “return” is judged need to be both subjective and objective, e.g., the flight of ten simple, commercial packages is not necessarily ten times as valuable as the completion of one scientific investigation yielding truly surprising results. The Hubble Space Telescope Science Institute has successfully implemented a flexible resource-allocation scheme that has met with the approval of the external research community.

6. What other types of planning or support should an ISS utilization management organization conduct for research, technology development, and commercial development aboard the ISS?

I do not understand the meaning of this question—what is the meaning of “other types”?

7. How should NASA ensure that the ISS utilization management organization is accountable to the ISS user community, and the general public, in its performance?

The ISS utilization management organization must be led by a director with stature in the external research community. Its reputation would be enhanced by either proximity to or affiliation with a first-rate research university. Employees of the organization should be free to propose research projects of their own in response to NASA Research Announcements, as are current employees of NASA centers. Allowing employees of the organization to participate in research as more than mere facilitators will help to attract better employees.

8. *What limitations should NASA impose on activities of the ISS utilization management organization?*

The ISS utilization management organization should not, as stated in response to question 1 above, solicit, review or select the research that is to be done aboard the ISS.

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Received 6/25/02:

1. *To what extent should an ISS utilization management organization be responsible for evaluating and prioritizing proposals for research, technology development, and commercial development to be performed aboard the ISS?*

The current system for handling proposals for research and technology development appears to be working well. NASA Headquarters personnel are doing a good job and use outside reviewers as needed for projects. No need to change this, and an ISS utilization management organization should NOT get involved.

2. *To what extent should an ISS utilization management organization provide a capability for developing instrumentation and other hardware, and furnishing supplies, necessary for research, technology development, and commercial development to be performed aboard the ISS?*

Can't answer this in general, depends on the project and should be evaluated for each case.

3. *To what extent should an ISS utilization management organization provide planning and support for samples and specimens (both living and non-living; reactive and inert) to be used in research, technology development, and commercial development aboard the ISS?*

Don't have a clear picture of how it works now.

4. *To what extent should an ISS utilization management organization be responsible for allocating ISS resources (laboratory space, electricity, crew time, etc.) to individual projects for research, technology development, and commercial development to be performed aboard the ISS?*

Necessary to some extent, but must coordinate with research priorities and quality.

5. *What are some of the differences that should be considered in managing research, technology development, an commercial development aboard the ISS?*

Don't have a clear idea of the considerations special to ISS.

6. *What other types of planning or support should an ISS utilization management organization conduct for research, technology development, and commercial development aboard the ISS?*

Don't know

7. *How should NASA ensure that the ISS utilization management organization is accountable to the ISS user community, and the general public, in its performance?*

Project selection should be as transparent as possible and use peer review. The ISS organization should not be involved. The ISS managers should have good research credentials and communication skills, and offer advice when needed.

Received 6/26/02:

1. *To what extent should an ISS utilization management organization be responsible for evaluating and prioritizing proposals for research, technology development, and commercial development to be performed aboard the ISS?*

An ISS utilization management organization should not be involved in setting priorities in any way. Requests for proposals, the evaluation of proposals, and their selection are inherently governmental functions. Civil servants working at NASA's Headquarters and supported by peer review processes that they oversee, have established and maintained a reputation for objective balancing of NASA's missions and scientific integrity. They are not distracted by considerations of profit, job security, personal gain (the salaries of nearly all managers are capped) and favoritism. They handle confidential information while effectively maintaining its security. Occasionally, government-operated facilities develop unique commercial potential. In such cases, civil servants defend the public's interests while fostering the commercial applications. NASA's history provides some (rare) examples of public-private "partnerships", overseen by civil servants, that have exploited the (limited) commercial potential of NASA-developed facilities. Examples outside of NASA include the operation of nuclear reactors, particle accelerators, and advanced "light" sources for multiple scientific and commercial customers.

2. *To what extent should an ISS utilization management organization provide a capability for developing instrumentation and other hardware, and furnishing supplies, necessary for research, technology development, and commercial development to be performed aboard the ISS?*

Instrumentation and hardware should be developed in response to needs established either by user communities organized into ongoing disciplines or by well-publicized, *ad hoc* workshops. When needs are recognized by NASA's management, the development should be encouraged, overseen, and funded by NASA's management using mechanisms such as Requests for Proposals and competitive awards. The processes of procuring technically demanding services should not be delegated to a non-governmental ISS management organization.

3. To what extent should an ISS utilization management organization provide planning and support for samples and specimens (both living and non-living; reactive and inert) to be used in research, technology development, and commercial development aboard the ISS?

Like instrumentation, hardware, and supplies (Question 2), planning and support for specimens is a generic problem, insofar as it applies to more than one investigation. However, the problem is discipline specific, or even sub-discipline specific. It is important that such needs be dealt with from a large-scale perspective; however, it is equally important to avoid self-perpetuating organizations whose functions are to support facilities for which there is little or no demand. Discipline Working Groups and *ad hoc*, well-publicized workshops are effective mechanisms for identifying real needs. Requests for proposals and competitive awards are mechanisms for satisfying the needs. After investigators or contractors deliver hardware and supplies, the NASA infrastructure must oversee the integration of hardware and its support by mission specialist activities.

4. To what extent should an ISS utilization management organization be responsible for allocating ISS resources (laboratory space, electricity, crew time, etc.) to individual projects for research, technology development, and commercial development to be performed aboard the ISS?

Allocation of ISS resources is fundamentally a political question. Guidelines must be developed and ratified, either formally or informally, by Congress. Once the guidelines are in place, a benevolent dictator must make sure that they are enforced. It's not clear how an NGO would manage this function better or worse than civil servants. One could argue that civil servants are, by law, responsible to Congress. In contrast, an NGO has a non-public board of directors. In practice, it's not obvious that an NGO would behave very differently from an NGO as a benevolent dictator.

5. What are some of the differences that should be considered in managing research, technology development, and commercial development aboard the ISS?

A plausible model for commercial development aboard the ISS is one of the user facilities at nuclear reactors, particle accelerators, ultraviolet light sources, and other national laboratories. At such facilities, both commercial and non-commercial user groups either purchase time at incremental costs or develop their own beam lines, detectors, etc. The users, whether publicly funded or commercially funded, are expected to obtain (via grants or investors) only incremental funding. They are not expected to fund the development and operation of the facility. Even when particular detectors, etc are commercially funded, the commercial user has agreements with the overseeing government or NGO that facilitate sharing the commercially developed facility with non-commercial users.

6. What other types of planning or support should an ISS utilization management organization conduct for research, technology development, and commercial development aboard the ISS?

What is the question?

7. How should NASA ensure that the ISS utilization management organization is accountable to the ISS user community, and the general public, in its performance?

The Director of the ISS utilization management organization must have stature in one of its communities of users. An external visiting committee that represents all of its user communities should review the operation of organization frequently. (The National Academy of Science manages annual reviews of the NIST laboratories, an organization of 3000 people. The Academy could review an ISS utilization management organization, whether the organization were NASA Headquarters or an NGO.) The functions of the ISS management organization should be reviewed less frequently, perhaps at intervals of five years. At similar intervals, the question of which organization manages ISS utilization could be revisited. If this were done in an orderly, planned way, it would enforce accountability (rather than panic) in the organization being reviewed, no matter whether the organization was NASA Headquarters or an NGO.

8. What limitations should NASA impose on activities of the ISS utilization management organization?

The ISS utilization management organization should not solicit, review or select the research that is to be done aboard the ISS.

Received 6/28/02:

... I don't see any clear reason to change things. My proposal was evaluated fairly, and by people who were clearly quite expert. The support I have received from ..., both with regard to science, and necessary paperwork, has far exceeded anything I expected. From my point of view, it would be impossible to improve on what has happened so far, but very easy to make it worse. Thus I ask NASA to be careful in changing the current system.

Received 7/1/02:

1. To what extent should an ISS utilization management organization be responsible for evaluating and prioritizing proposals for research, technology development, and commercial development to be performed aboard the ISS?

Unlike a research management organization with a scientifically narrow focus, like the Hubble Institute, the scope of the research disciplines that could be potentially involved in ISS precludes having a resident staff diverse enough to itself provide a quality peer review and prioritization of the whole breadth of proposals that might be expected. The peer review process per se should depend on an ad hoc

group to set relative priorities within scientific and technical disciplines. The NGO can have a role in apportioning the resources among the various disciplines. Presumably this would happen on the advice of a blue-ribbon science advisory board.

Once the relative priorities are established on scientific merit, there will be a role for NGO employees to play in optimizing the mission complement, considering the funding and resources available.

No evaluation or prioritization should be levied against commercial development proposals. Commercial priorities should be established by the extent to which commercial companies are willing to back activities with monetary contributions. The commercial allocation ought to be put up for auction, with the highest bidder receiving the highest priority. Applied research pursued by the Commercial Space Centers or others, if it does not have monetary backing from commercial users, ought to be competed with other research and not privileged because it has potential for sponsorship in the future.

2. To what extent should an ISS utilization management organization provide a capability for developing instrumentation and other hardware, and furnishing supplies, necessary for research, technology development, and commercial development to be performed aboard the ISS?

The described capability is currently resident in contractors and should properly remain there. The NGO should not use its privileged position to compete with contractors any more than the government should. Furthermore, it would be wasteful to retain the size and breadth of expertise needed to meet all contingencies. The NGO can serve a quasi-governmental function of specifying, selecting, executing, and monitoring contracts.

The NGO can serve a key role in promoting the efficiency of the hardware development process by 1) promoting a healthy competitive environment among hardware providers (not consolidating this work), 2) being an honest broker between hardware developers and government organizations such as MOD that levy requirements that add cost and time to payload development and integration.

3. To what extent should an ISS utilization management organization provide planning and support for samples and specimens (both living and non-living; reactive and inert) to be used in research, technology development, and commercial development aboard the ISS?

Because the nature of the sample / specimen appropriate for a particular piece of hardware will be determined by technical factors associated with the hardware, the support of the samples / specimens should be done by the hardware provider. For example, a materials science specimen may need thermal modeling and/or ground testing before the time-temperature parameters for the flight sample can be established. This task could be efficiently executed by the hardware builder but would require extensive and expensive documentation and a cumbersome handover before NGO employees could execute it with the same finesse. The designer of a cell-culturing apparatus would be well positioned to specify and assist preparation of samples, including any

activation or inerting. Indeed, if the hardware designer anticipates a role in this activity, it would have an incentive to make design decisions that facilitated efficient sample / specimen handling later.

4. To what extent should an ISS utilization management organization be responsible for allocating ISS resources (laboratory space, electricity, crew time, etc.) to individual projects for research, technology development, and commercial development to be performed aboard the ISS?

As discussed in the answer to 1. above, the NGO staff has an appropriate function in aligning prioritized research to take maximum advantage of the available resources. However, the detailed mission planning and configuration has been performed successfully by contractors for Shuttle research missions. Since there is proof that this function can be performed by contractors, the NGO should not use its privileged position to compete with contract labor.

5. What are some of the differences that should be considered in managing research, technology development, and commercial development aboard the ISS?

When technology and/or commercial development are essentially applied research, they should be treated and competed as research and not given any privileged status. If / when such development activity attracts any level of commercial sponsorship, it should compete to purchase access in a pool set aside for commercial applications. Competition should be on *price only* because price is an absolute and unarguable statement of the commercial value of the work. No non-commercial organization like the NGO is in a position to assess commercial value.

6. What other types of planning or support should an ISS utilization management organization conduct for research, technology development, and commercial development aboard the ISS?

The NGO is in a position to do what NASA cannot: jumpstart space commerce. FAR [editorial note: Federal Acquisition Regulation], territoriality, and policy restrictions have precluded NASA from taking effective steps towards establishing the environment for space commerce. The NGO should embrace the mandate to manage station utilization in a way that promotes "the economic development of Earth orbital space" as mandated by Congress. It could do this by

- patronizing commercial service providers, those businesses that have invested private funds in developing and offering the services of space-qualified research facilities,
- privatizing government research facilities so that the responsibility for operation, upkeep, and upgrades is transferred to private hands, and
- establishing a level playing field for commercial service providers to compete for every job every time, with entrepreneurs and operators of privatized equipment competing as equals.

7. How should NASA ensure that the ISS utilization management organization is accountable to the ISS user community, and the general public, in its performance?

The NGO will receive its funding through an appropriation, presumably funneled through NASA. It will be accountable to NASA for requesting funding and reporting results; a wide variety of metrics are available to demonstrate research effectiveness (e.g. refereed publications per \$M). NASA and the NGO together will be accountable to Congress, and through them to the American people. It would not be difficult to establish customer satisfaction ratings for flight investigators.

8. What limitations should NASA impose on activities of the ISS utilization management organization?

The NGO should not use its privileged position to compete with profit-making organizations for work that can be done by them.

The NGO should not develop internal research interests that set up a conflict of interest with the external research community.

The NGO should be structured to avoid developing a bias to certain scientific disciplines. It should strive to be a honest, neutral manager of all research disciplines. This will in general argue against keeping a staff of PhD's, who will necessarily have prejudices in favor of their discipline. The staff should have adequate scientific / technical expertise to manage the utilization but no personal stake in the success of one discipline over another. The NGO should look upon itself as a research *management* [editorial note: italicized in original document] organization, rather than a research [editorial note: italicized in original document] management organization.

NGO procedures should be structured in such a way as to insulate decisions on the prioritization of research activity from personalities within the institution. You should seek to avoid a situation in which ISS research direction is driven by personal zeal rather than scientific merit. ISS must be treated as a *national* asset responding to a *national* constituency rather than as the parochial province of the institute and a coterie of insiders.

The NGO must **never** seek revenues by providing valuable services to commercial users of space. The development of a robust commercial environment requires that such a role be filled by commercial companies. The NGO may gain incidental revenue by selling ISS access to commercial concerns as a means of prioritizing commercial use of space, but if uses its privileged position to target revenue that could be earned commercially, it will have a strong, negative impact on the development of space commerce.

Received 7/1/02:

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Question #1 – Evaluating and Prioritizing Proposals

We support the key finding of the National Research Council in its assessment of the NGO Baseline Concept, "Institutional Arrangements for Space Station Research." The NRC report

indicates “for the near term, headquarters should retain responsibility for the coordination of research planning with other federal agencies and the international partners and should continue to solicit research proposals, conduct peer reviews, and select and prioritize investigations for research payloads for the ISS. The NGO would play a key role in assisting headquarters in these activities...”, i.e., in the overall strategic planning and in the solicitation and review of the research proposals.”

The NRC report goes on to say that this role could be expanded as the NGO transitions to its steady state and it points out other areas wherein NASA and other federal agencies have given responsibility to third parties – such as research organizations and universities – for comparable functions.

We believe that at the outset, the NGO and NASA should partner in this regime, but that over time, these functions should migrate to the NGO once the capability of the NGO has been demonstrated.

It should be noted that considerable progress has been made towards enhancing the roles and responsibilities of the leading space science institutes in NASA -- the Hubble Space Science Institute and the Chandra Observatory.

It also should be noted that NASA Headquarters recently entered into a substantial agreement with Global Science and Technology to oversee the peer review process for a wide variety of NASA research programs funded by NASA Headquarters. Thus, NASA is already using external capabilities to accomplish a key task related to NASA-funded research. This experience should be applied to the ISS NGO.

Question #2 – Capability for Developing Instrumentation and Other Hardware

We believe that as access to the space station increases, on-orbit research capabilities increase, and the number of nodes, labs and attached payload sites on orbit increases, the requirement to develop instrumentation and other user hardware will also increase. The NGO should strive to increase the base of support for these activities and to facilitate innovative approaches to the provision of space-based research assets. Ideally, in the future, the NGO should be able to provide a suite of user services and capabilities that are responsive to user needs. Make-buy-lease decisions for these assets will be made in a business like manner.

To meet this responsibility and accomplish its mission, we concur with the NRC Report that the “NGO should disburse funds not only to research investigators but also to research support organizations, such as research hardware developers, payload integration contractors, and operations support management.”

Question # 3 -- Planning and support for samples and specimens

We believe that the NGO should play a key role in the planning and support for samples and specimens, as well as in the data sampling, handling, storage, archiving, and retrieval.

Although this question has been narrowly tailored, we would like to note that the proposed NGO should play a key role in the planning and support of all payload science data, not just specimens and samples, and for all phases of the program – pre-launch, on-orbit operations, and post-launch.

Included in this list of activities would be the formulation of the specific experimentation plan, the identification of required consumables and perishables, the identification of hardware and software processing to accommodate the experiment, any requirements for late access or early retrieval of the samples, specimens or data – be that electronic data, software or hardware – and the necessary handling procedures for proprietary research activities.

Question #4 – Allocation of Resources to Individual Projects

We concur with the finding and recommendation of the National Research Council and ISSOAS reports that the NGO should have the authority and responsibility for allocating U.S. on-orbit user resources in consultation with the ISS Program Office. This would include U.S. facilities and U.S. assets on the international partner research facilities. Resources would include budget, crew time, bandwidth, experiment equipment, support services, power, etc.

We also believe that the NGO should act as the users interface with the ISS Program Office for real-time allocation decisions that affect scheduled users, as well as for re-planning activities required because of operational changes.

Toward this end, we support the premise that the NGO should be able to identify and make preliminary resource allocations to each individual project.

Question #5 – Differences in Managing Research, Technology Development, and Commercial Development

User requirements can vary depending on whether the space station is being used for research, technology, or commercial development, and the existing processes and procedures for the different categories of payloads represent this fact to some degree. In particular, issues concerning payload cycle time to orbit, cost, hardware/software development, on-orbit resource requirements, use of commercial vs. government services, flight and re-flight guarantees, crew training requirements, access to research data, intellectual property protection, acceptable level of risk, publication requirements, archiving of data, etc., can vary. The goal would be to establish a uniform set of baseline requirements and then to delete those requirements that are not legally required and do not provide value to the customer's requirements.

We would also like to insert a caveat; today, the ISS user community is a very limited group. As the community expands, and the range of users increases, the number of issues is likely to increase. Clearly, the processes and procedures for basic research will not be the same as for a commercial experiment – nor will the resource requirements. Having an experienced team will be critical to the evolution of the NGO and its ability to deal with the full range of customers.

However, for all users, there are some things that are common. The creation of a one-stop shop, the streamlining of processes and procedures, the reduction of the time and cost to orbit, and greater certainty concerning access to space, are universal requirements. Having all users enter the system by the same door will allow the utilization management organization to coordinate approaches, minimize discontinuities, and define transitional interfaces in an efficient and effective manner. It will enable better interfaces among the user, the ISS Program Office, and the NASA user organizations, and it will enable a better interface between the ISS Program Office and the user community. It is, therefore, strongly recommended that the NGO be the one-stop shop for all users of U.S. assets and have management responsibility for all space station users.

Question #6 – Other Types of Planning or Support

As noted in the Introduction, we believe that the NGO, in partnership with NASA, should transition from an organization that supports the current NASA space station utilization management processes and procedures to one that can lead on behalf of the Agency and truly represent the needs and interests of the user community in the internal management processes and procedures.

Toward that end, the NGO should provide planning and support for a significant number of the functional areas identified in the various space station reports. Most closely aligned with our thinking are the key recommendations contained in the NRC and ISSOAS reports.

We believe that over time the bulk of ISS user functions should migrate to the NGO to ensure the creation of a highly effective, user organization and that eventually, the NGO should bear responsibility for the overall planning and support of space station utilization. Clearly, if the leadership and staff of the NGO are more engaged in the processes and procedures, it will be easier for them to understand the overall requirements and to streamline these activities and better align them with user needs and interests.

If the NGO is not given the authority, responsibility, resources and status to deal with these issues on behalf of users, it will be an ineffective, unnecessary layer in the system. Based on survey data we compiled, it is clear that users are frustrated that their prior calls for reforms and process improvements have not been heard despite the number of reports that validate these issues and concerns. If you are a space-based researcher and read the “International Space Station Payload Operations Concept and Architecture Assessment Study” that was released in February 2002, you are not startled to read that “reflight of a STS or Spacelab Payload on ISS is 2 to 4 times more difficult than the original flight,” “ISS requirements are too demanding,” “enforcement of requirements is too strict,” “there are too many repetitive reviews,” “the processes are too complicated and inflexible,” “we need to drastically simplify ISS requirements on the order of Spacelab, STS, Spacehab, and MIR” because you have experienced many of these problems first hand. The time has come to try something new and innovative and to put utilization of the space station on an equal footing with the development of the ISS.

Question #7 – Ensure the Accountability of the NGO

The accountability of the NGO can and should be determined from several different vantage points. However, from the vantage point of NASA, the accountability of the NGO to the users and public should be based on the performance of the NGO in the overall management of the NGO and its assets, management of the space station user resources, process improvements that reduce the time/cost to orbit, customer satisfaction, expanded base of customers, upgrades to overall suite of user assets and quality of services, ability to attract external investments, optimal use of government, industry and the research communities ground-based and space-based research assets, attraction and retention of qualified staff and personal.

We believe that the proposed NASA procurement mechanism can foster and promote the necessary blend of performance and outcome measures to assess the overall performance of the NGO. To ensure that outcome, we would highly recommend that the Agency issue a draft RFP for comment and review.

However, we would like to note that the key accountability of the NGO is to the users of the space station.

As for the general public, the NGO, along with other entities, would ultimately be assessed by the public's awareness of the value of on-orbit research and its impact on their overall quality of life and the ability of the U.S. government, industry and the university research community to meet critical R&T requirements.

As for specific recommendations concerning provisions to be included in the procurement, we would like to defer until such time as a NASA concept and proposed implementation plan has surfaced. At present, there is not enough detail available to make concrete recommendations.

However, we believe in general, based on the Federal Acquisition Regulations for R&D Contracting, (FAR – Section 35), the Agency should consider the offeror's understanding of the scope of work, the approach proposed and the merit of the ideas and concepts, the availability and competency of the proposed team, the offeror's experience, pertinent novel ideas, the availability and access to key research facilities, the management capability of the team, as well as past experience and performance with the creation of user institutes and the operation of national user facilities.

The Agency should also give the bidders maximum flexibility to bring new and innovative ideas to the table. To the extent possible, the proposed RFP should not be prescriptive but should incentivize the bidders to be creative and to propose new and existing ideas and concepts, as well as innovative institutional arrangements and financing mechanisms.

To assist interested parties in assessing this opportunity, the proposed RFP for the NGO should plan for the goal state of the Institute and should include a well-defined roadmap or transition plan with progress milestones clearly depicting the path and timeline from where we are today to where we want to be tomorrow.

Question #8 – Limitations on the NGO or ISS Utilization Management Organization

Based on its concept of the NGO, we concur with the findings of the NRC and ISSOAS reports that at the outset, NASA should be responsible for the strategic functions associated with ISS utilization management, and NGO should be responsible for all of the tactical activities.

In effect, we support a commitment to creating a highly effectively and visible user organization. For those strategic activities under NASA Headquarters guidance, the NGO should still have active engagement and participation. As the NGO evolves into a steady state operation, other functions could fully migrate to the NGO, with only the very top level, strategic functions remaining with NASA.

At the same time, artificial limitations should not be placed on the NGO under the heading of "inherently governmental functions" that only NASA civil servants can perform.

As the final NGO concept emerges, it is critical that the division of responsibilities between the NGO and NASA be very precise and any, or all limitations, be clearly called out in the proposed RFP. This means that at the outset there needs to be a clear specification of the NGO's responsibilities and authorities, as well as a clear indication of the interfaces with NASA.

Equally specific transition plans and milestones will need to be issued. All of these factors point to the need to issue a draft RFP and provide interested bidders with the opportunity to provide substantive inputs.

We believe that the ultimate goal is to create a highly effective user-organization that can deal with all user-related issues and concerns. Toward that end, we believe the focus should be on transferring as much responsibility to the NGO as possible.

In conclusion, the final NGO concept proposed by NASA should be responsive to user needs and requirements. It also should be seen as the standard of excellence for research institutes in terms of its overall authority, responsibility, institutional structure, management flexibility, science and technology management, and control of critical user resources. For the NGO to succeed, NASA must be a reliable partner and enter into the agreement with a firm commitment to shift the utilization management function to the user community. Based on our assessment, the timing is right to start the transition to the NGO and to shift responsibility for space station utilization management to a university/not-for-profit research organization. If we start today, payloads that fly in the 2005-06 timeframe would be subject to a totally different environment than today, a user focused environment where user requirements are of paramount concern and the focus of activities.

Received 7/2/02:

1. *To what extent should an ISS utilization management organization be responsible for evaluating and prioritizing proposals for research, technology development, and commercial development to be performed on the ISS?*

Response / Comments

Prioritization of research, technology development, and commercial development should be a major function of any NGO, if the NGO is going to be able to effectively manage and optimize ISS utilization. Proposals for ISS utilization should be evaluated by an impartial peer review process that fairly represents the appropriate research and technology communities. The recommendations of this peer review process, combined with NASA's policy guidance, would allow the NGO to prioritize the proposals.

2. *To what extent should an ISS utilization management organization provide a capability for developing instrumentation and other hardware, and furnishing supplies, necessary for research, technology development and commercial development to be performed aboard the ISS?*

Response / Comments

The NGO should lead, coordinate and/or develop, as appropriate, instrumentation and hardware that benefit the overall utilization effort. This could include re-use equipment, common racks and facilities, common integration and/or interface hardware, and residual hardware storage and modification/re-use hardware. It could also support individual users as requested and necessary, helping them develop, re-use, and/or procure H/W components to meet their scientific goals and optimize the use of the ISS environment.

3. *To what extent should an ISS utilization management organization provide planning and support for samples and specimens (both living and non-living; reactive and inert) to be used in research, technology development, and commercial development aboard the ISS?*

Response / Comments

The NGO should facilitate common processes and/or capabilities for handling samples and specimens preflight, on the shuttle, onboard the ISS and as they are returned to the investigators, as appropriate.

4. *To what extent should an ISS utilization management organization be responsible for allocating ISS resources (laboratory space, electricity, crew time, etc.) to individual projects for research, technology development and commercial development to be performed aboard the ISS?*

Response / Comments

All resources necessary for research utilization, beyond those required to safely operate and maintain the ISS, should be allocated by the NGO. This will allow the NGO to implement the overall utilization priorities throughout the flight preparation, planning and execution processes and allow the optimization of the overall research program.

5. *What are some of the differences that should be considered in managing research, technology development and commercial development aboard the ISS?*

Response / Comments

The NGO will need to recognize, respect, and facilitate the diverse ISS user communities, their differing motivations, and their differing needs – for commercial competitive rights, patents and intellectual property rights, and research rights. The NGO will also need to recognize the diverse needs of the international partners, of ISS visitors, etc. In addition, commercial development projects may have access to resources beyond those available to government-funded research and technology development, and the NGO will have to take national priorities into account in the relative prioritization of publicly and privately funded projects.

6. *What other types of planning or support should an ISS utilization management organization conduct for research, technology development, and commercial development aboard the ISS?*

Response / Comments

Beyond carrying out the specific 20 functions listed in the previous NASA report, the NGO will have to simplify integration and use of the ISS, make it more productive to a larger community, and provide a utilization advocacy function for the ISS program.

7. *How should NASA ensure that the ISS utilization management organization is accountable to the user community, and to the general public, in its performance?*

Response / Comments

The NGO management organization must be focused on the needs of its constituent communities. The utilization community must participate in the governance of the NGO. The NGO must be responsive to research community oversight and review and to NASA. NASA should set high-level policy and ensure that the NGO manages ISS utilization to meet the public interest.

8. *What limitations should NASA impose on activities of the ISS utilization management organization?*

Response / Comments

The ISS utilization management organization should be an asset to the utilization community. The NGO must have sufficient scope of responsibility and authority to effectively manage the research utilization of the ISS, to optimize ISS utilization efficiency and productivity, and to support the community. NASA should minimize limitations that would negatively affect the ability of the NGO to carry out these tasks.

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1. To what extent should an ISS utilization management organization be responsible for evaluating and prioritizing proposals for research, technology development, and commercial development to be performed aboard the ISS?
 - The UMO should have the end objective of evaluating and prioritizing proposals with respect to their scientific, technical, and research project management merit;
 - Initially, retain the NASA Enterprise peer reviews with the UMO managing the process and providing recommendations;
 - Transition to the UMO having full responsibility for the review and prioritization of proposals and funding allocation for U.S. research (anything less makes the UMO just another committee with no real influence);
 - In parallel, create an ISS User's Committee (similar to the Hubble STUC), which would include NASA, to provide expert advice and input on overall national research priorities with emphasis on space research.
2. To what extent should an ISS utilization management organization provide a capability for developing instrumentation and other hardware, and furnishing supplies, necessary for research, technology development, and commercial development to be performed aboard the ISS?

- The UMO can provide a large measure of support and efficiency in support of researchers by acting as a source of common equipment;
 - Based on their across the board support of research and technology projects, the UMO should develop, maintain and continually update a listing and the requirements and specifications of hardware and software commonly required by users;
 - Based on the situation, the UMO could contract for and maintain an inventory of lab support equipment hardware and software for common use;
 - The UMO could maintain a listing of approved vendors that maintain an inventory of qualified, including re-qualified, equipment that can be contacted by the users;
 - In some cases, major items of experiment support equipment could be funded by the UMO and remain on the ISS for use by different users.
3. To what extent should an ISS utilization management organization provide planning and support for samples and specimens (both living and non-living; reactive and inert) to be used in research, technology development, and commercial development aboard the ISS?
- The UMO should exist to provide knowledgeable assistance and the benefit of experience to all users of the ISS so consultation would be available in all areas of planning and support – a part of the single point of contact organization concept;
 - The planning and support should be part of a greater UMO payload science data management plan and approach;
 - Because the UMO must have funding control for U.S. research, if planning and support for samples and specimens is provided by the UMO, a careful decision must be made whether to fund the specific research project or develop a common set of services to be provided to all users with that need;
 - In general, if there is a frequent need for a category of planning or support, the UMO should provide a common, coordinated source of that service;
 - The UMO planning and support should extend to data handling, sharing, storage and retrieval processes and procedures.
4. To what extent should an ISS utilization management organization be responsible for allocating ISS resources (laboratory space, electricity, crew time, etc.) to individual projects for research, technology development, and commercial development to be performed aboard the ISS?
- Within the block allocations and any constraints that are provided by the ISS Program, the UMO should be responsible for the allocation of ISS resources to individual projects;
 - Without resource allocation evaluation and resolution, the UMO cannot play a meaningful role in research project prioritization;
 - The UMO should be party to the strategic and tactical resource availability discussions and determination within the Program and its operations elements

- The UMO must also participate in the ISS systems capability and technology upgrades configuration management processes in order to assist in the most effective decision making;
 - Basically, the UMO should be responsible for performing resource trades affecting research whether the resources are in the form of funding or ISS capability.
5. What are some of the differences that should be considered in managing research, technology development, and commercial development aboard the ISS?
- While the entry paths, the level of assistance needed, the funding and resource requirements, the desired schedules, and the specific working interfaces may vary greatly, it is important that the essential requirements and processes are defined in terms of the streamlined baseline and are clear and understood by all users;
 - The unique needs of classes of projects or research within discipline or application groupings can be flexibly accommodated by UMO support teams specializing in those areas;
 - The “standard” testing, integration, certification, and operations development process requirements should be thoroughly reviewed at the outset for applicability to the specific projects. All unjustified or non-value added steps and requirements should be deleted up front. This step is necessary regardless of the success in streamlining the standard processes;
 - Fair and uniform treatment while considering the specific needs of each research project is very important;
 - It may be advisable to dedicate a specific portion of ISS resources to “fast track” projects such as repeat experiments or commercial projects which usually have compressed schedule requirements;
 - Basic research may accept a longer schedule while research with future program application will have milestone requirements;
 - Proprietary data protection is a critical requirement in many cases.
6. What other types of planning or support should an ISS utilization management organization conduct for research, technology development, and commercial development aboard the ISS?
- The UMO must foster and continually pursue open dialogue with the NASA Enterprises, other government agencies, universities and industry in order to be aware of the most critical areas of research and technology that might be supported by the ISS;
 - Again, the user committee mentioned previously can be of great value in assessing research possibilities;
 - The UMO support teams specializing in discipline or application areas can also be a primary source of research, technology and commercial areas of interest as part of a national space research program;

- Development by the UMO of discipline “research campaigns” across increments, offering a logical sequence for pursuing the major challenges in disciplines or applications, and provide a planning baseline structure for examination by potential users;
 - These multi-increment research campaigns can provide the basis for an overall planning and support strategy which would then be translated into program objectives, technology needs, and funding requirements;
 - The UMO should sponsor elements which emphasize educational and public outreach and benefit from the international interfaces;
 - The STScI strategic plan is a good example of planning supporting program and technology direction.
7. How should NASA ensure that the ISS utilization management organization is accountable to the ISS user community, and the general public, in its performance?
- The ISS Program and the UMO must be partners with the UMO responsible and accountable for utilization. The UMO’s customer is research, not the ISS;
 - The partnership of NASA and the UMO must feature the open and constant communication of objectives, planning and performance that ensures accountability;
 - The proposed ISS Utilization User Committee provides a mechanism for user community evaluation and input;
 - The communication of ISS utilization performance to the general public is a challenge that does not have a simple solution but effective media usage is imperative to retain and build support for the program. The involvement of recognized researchers, the inclusion of key universities, and education outreach will assist greatly.
8. What limitations should NASA impose on activities of the ISS utilization management organization?
- ISS utilization function responsibilities should transition to the UMO only when there is a proven capability and management team capable of satisfying the requirements;
 - This question highlights the requirement for a definitive function and responsibility/accountability transition plan with measurable performance measures and a planning schedule tied to Program milestones. The NASA and UMO responsibilities must be clearly and completely defined at every major transition point. Overlaps and uncertainties will be apparent to users and cause a lack of confidence in their support from the UMO;
 - Budget and resource limitations cannot be avoided but the NASA and UMO negotiations should be open and the results mutually understood and adhered to;
 - The nature of this question underscores the importance of NASA and the UMO operating in a true partnership to achieve the fullest possible utilization of the nation’s investment in the ISS.

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