

USER WORKSHOP ON UTILIZATION MANAGEMENT CONCEPT DEVELOPMENT FOR THE INTERNATIONAL SPACE STATION ¹

Doubletree Hotel, Cocoa Beach, FL

July 11, 2002

Introduction (Mr. Uhran)

Mr. Mark Uhran, HQ, welcomed attendees to the User Workshop on Utilization Management Concept Development for the International Space Station (ISS). The purpose of the User Workshop was to allow the end users of the Space Station a forum to provide input on how NASA should proceed in the future regarding ISS utilization.

Vision and Guiding Principles (Ms. Kicza)

Ms. Mary Kicza, HQ, presented the vision and guiding principles for Utilization Management. She indicated her keen interest in hearing what the user community had to say and what their concerns were throughout the day's proceedings. She clarified that NASA is not in a blackout period with respect to the alternative approaches to implementing ISS utilization.

Safety is the highest priority at all times. The organization must be aware of and responsive to user strategic goals and objectives. High quality basic and applied research must be paramount in the endeavor. Responsibility for managing ISS utilization does not require that the organization manage other ISS activities. The research community should have substantive and continuing involvement in all phases. The organization must be flexible and capable of adapting over time. In those cases where the organization has the responsibility for selecting research, basic and applied research must be selected on the basis of scientific and technical merit as determined by peer review. Over the next decade, the ISS is expected to be used as a laboratory and test bed to support research in many areas, including: basic and applied research in the biological and physical sciences; development of new knowledge and technologies; the exploration and development of space; research of commercial significance; space science and Earth science research; and research of significance to other government agencies. The specific goals and objectives associated with ISS utilization will be aligned with the strategic plans of the sponsors of research.

Ms. Kicza invited thoughtful consideration of the strategic vision and guiding principles and encouraged feedback from the community.

Background and Status of Utilization Management Concept Development (Mr. Uhran)

Mr. Uhran reviewed the background of the Utilization Management Concept Development "Blue Team" and its current status. NASA received specific statutory direction in the Authorization Act to enter into agreement with an NGO for ISS research utilization and commercial

¹ Transcript provided by Ms. Paula Frankle, Workshop Recorder.

management. However, the Appropriations Act required NASA to submit a comprehensive proposal for managing the ISS science program prior to the establishment of any NGO. Numerous Agency studies have been performed which address numerous organizational structure and implementation options. The Blue Team was established in March 2002 to examine detailed options for management of ISS research. The Blue Team's objective is to complete the concept development task by the end of August to support the Agency in sending a report to Congress in the September timeframe.

Functional Scope of ISS Utilization (Ms. Henderson)

Ms. Robin Henderson, MSFC, discussed the functional scope of ISS Utilization. She showed a list of 21 functions and their definitions that reflect the total scope of activities associated with ISS utilization. The functions have connectivity, and this drives the complexity. This list was used during the working group sessions later in the day.

Objectives and Process Complexity (Ms. Hanson)

Ms. Roselle Hanson, KSC, discussed the objectives and the process complexity. The Blue Team has been working since March with three high level objectives: to facilitate the pursuit of flight research; to optimize research opportunities within the current capabilities of ISS and with future enhancements for greater capabilities; and to increase the long-range productivity of research and development. Ms. Hanson showed a top-level flow of ISS utilization. She described the Level 1 ISS utilization flow (as subsets of the top level flow): for selection, formulation, and manifesting; post experiment selection; post-manifest baseline; and non-hardware related activities.

Overview of Responses to Prior Questions (Mr. Beck)

Mr. Dave Beck, HQ, provided an overview of responses to eight prior questions that the Blue Team had received after soliciting responses from the user community. These questions were:

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?

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?

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?

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?

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

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?

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

The first four questions addressed the different functions that Ms. Henderson presented. The fifth question asked about some of the difference between managing research, technology development, and commercial development. The sixth question was more broadly focused, inviting other ideas. The seventh and eighth questions dealt with the limitations that NASA should impose on the organization and the overall accountability of the organization. Eight responses were received from the user community prior to the conference, the first response having been posted to the website: <http://spaceresearch.nasa.gov/common/docs/ngo/response.pdf> on June 24th, 2002. Summary copies of the responses were provided to the attendees with instruction that further responses may be submitted to: dbeck@hq.nasa.gov

Mr. Beck highlighted excerpts from some of the responses which had been received. There were different points of view that were in contrast to one another. Mr. Beck gave the example of one respondent suggesting that the NGO should lead, coordinate, and/or develop the instrumentation and hardware that benefit the overall utilization effort while another respondent felt that the processes of procuring technically demanding services should not be delegated to a non-governmental ISS management organization.

Open Questions (Ms. Kicza)

Ms. Kicza noted that the Blue Team was getting a clearer understanding of all of the elements of utilization that needed to be considered including the workforce, budget, and facilities associated with utilization.

She said that there were a wide range of alternatives for moving forward with a non-governmental organization and that she has asked the Blue Team for an objective evaluation of the advantages and disadvantages. Ms. Kicza then took questions from the user conference attendees.

Comment. Paul Neitzel, Georgia Tech: Those of us in the external community have the impression that NASA will keep studying this until it gets the answer it wants. One area of concern is the selection of research. The community strongly feels that this is a NASA Headquarters function.

Q. Bill Carswell, University of Alabama, Huntsville: With respect to commercial research, you state that it should be reviewed with similar standards of quality. How do you define commercial? What standards should it be approved by?

A. Ms. Kicza: A for-profit endeavor. Commercial has a different set of criteria upon which they base decision. A significant part of that is market driven. For that reason, it would be inappropriate for the decision to be based on scientific merit.

Q. Richard Bailey, NASA – JPL: Echo the concern with science selection. The original three goals were to reduce time to flight, simplify things for the PI, and increase opportunities for flight. The NGO processes that were discussed never addressed these goals. Is the NGO still focused toward these goals? Are we taking an approach to do what is best for research on Station, or have we already decided on the answer.

A. Ms. Kicza: We hear different things from different parts of the community. Selection decisions have traditionally been made at HQ. Decisions on selections for use of the Hubble Space Telescope are not made at HQ. Are all selection decisions necessary within the government? We are looking at these questions. We have not already decided on the answer. The objectives are still valuable. We want an open dialog on the range of possibilities. It is important to examine the range of options and look at the advantages and disadvantages.

Comment. Larry DeLucas, University of Alabama, Huntsville: The decision should be a HQ function, but that function now is completely dysfunctional. This has been a problem for a long time and it must be fixed for the research community.

Q. Marty Kress, Battelle: We need an optimal organization for facilitating utilization. Part of the discussion should be the pros and cons of the three options that are on the table (no NGO, and NGO, and some other arrangement). How do we optimize the skills and talents?

A. Ms. Kicza: We need to put the four options on the table.

Comment.. Simon Ostrach, Case Western Reserve University: What are the government prerogatives? As a first step, it is important to define the prerogatives of the Agency. Right now, everything seems to be up for grabs.

Q. Nick Kanas, University of California, San Francisco: What mechanisms do you see to safeguard the objectivity of the peer review panels?

A. Ms Kicza: The peer review process is already contracted out and there are current safeguard in place. In the case of the Space Telescope Science Institute, there is an overarching steering committee and advisory committee associated with the Institute to ensure the checks and balances.

Q. Ethan Schreier, Associated Universities: The issue in the selection is fair and open peer review and there are many mechanisms for doing that. The question is: is the research selected by a fair and open peer review using the research community? We know that there are many responses from the community, not just eight. How will they get incorporated and how will the decision be made where there is such a span?

A. Ms. Kicza: In terms of previous input, the Team has used that as the starting point. Those have not been ignored. In terms of the decision process, a report will be delivered in August. We will engage senior management in a dialog and may engage the advisory structure. In the report to Congress, if there is additional time needed, it will be identified. The intent is to potentially engage in an RFI process to formally solicit input on the options being considered. In the event that there is a procurement there will be a draft and an opportunity to answer questions. The community itself is anxious to move on. A lot of input must be obtained relatively quickly, and we must move out relatively quickly, but with a process that allows sound decisions

Q. Kim Jessup, Georgetown University: We have heard that US lab management might not be in the NGO; please elaborate.

A. Ms. Kicza: This is a misunderstanding. There is an entity engaged in building the ISS. If an organization is doing the utilization, it doesn't need to also be building the carrier.

Q. Doris Hamill, Spacehab: What is the appropriate way to provide feedback in a more thorough way?

A. Ms. Kicza: We have been meeting with individuals about this and are willing to engage in one-on-one dialog.

Q. Sherwood Anderson, Marshall Space Flight Center: What process are you using to take into account where the current system is headed. We are getting better on what we are doing and this should be taken into consideration.

A. Ms. Kicza: We will ask the Team to make sure that we update with the latest information. We have established a good track record that we should not throw away.

Q. Ray Askew, Texas A&M: The idea of an NGO has been around for a long time. Most of it was driven by what was perceived as dissatisfaction by the customers by the way they were served by the Shuttle program. The user community has felt that it has not been served as a customer. There was evidence that the system was “broken.” Is this the reason that we are pursuing the NGO?

A. Ms. Kicza: In terms of the Shuttle experience, absolutely. There are some significant problems that we are facing on Space Station that need to be addressed. In terms of what aspects need to be maintained, it is NASA’s responsibility to set the strategic course to accomplish the Agency’s vision and mission. The Agency has a responsibility to ensure that the mission is appropriately supported. There are inherent governmental responsibilities – decisions of a fiduciary nature. The Agency must maintain an appropriate level of competency to make the decisions of a fiduciary nature. The amount of work needed to maintain competency is a subject for debate.

Q. Rich Nygren, Astrium: The emphasis on the functions changes with the configuration of the ISS. How will the NGO decision be timed? How will this relate to the international partners?

A. Ms. Kicza: The ISS is in an evolutionary mode. There will be an evolving nature on how he capability is used. There may be an evolving or changed scope for an organization. It might be influenced by performance. Regarding the international partners, they are interested on how we move forward. Before we move forward with decisions, we will engage in discussions with our partners. We do not want to inhibit international cooperation or the ability to cooperate on a research basis.

Q. Rolando Branly, Association of Small Payload Researchers: If payload development and experiment development is engaged with a commercial aspect but has a need for a government function, what is the opportunity to get government funding? People in smaller universities want to get in and they can’t get in.

A. Ms. Kicza: Don’t try to “back-door” the system. Don’t try to do scientific activity by doing it through a commercial activity. We are concerned about research going through the commercial end because it compromises the scientific peer review process. We realize the concern. The REMAP pointing out the situation very clearly.

A. Mr. Uhran: There are two methods to get in: through the Space Act Agreement (no government subsidization); and through the Commercial Space Centers (for some degree of government funding). NASA’s greatest challenge is trying to manage the diversity across the user community.

Q. Angela Wray, Lockheed Martin Space Operations: Is the budget allocation and cycle up for grabs as part of this discussion?

A. Ms. Kicza: In terms of budget development, we will be utilizing the input from REMAP as well as the input from the study effort regarding proceeding with ISS utilization.

Q. John Cox, Computer Sciences Corp.: Do you have a process after looking at the options? Do you have a way to look at it to say that it will be successful, as opposed to being a fragmentation or series of contracts?

A. Ms. Kicza: we are developing evaluation criteria to assess the various options. There is a process. It will change over time. One of the reason for today is to get input on what is working, so that we don't throw the baby out with the bath water. Over time, based on feedback, we will continue to refine the plan.

Working Group Organization and Charge (Dr. Pellis)

Dr. Neal Pellis gave instructions to the working groups whose members were chosen randomly during the morning registration period. The working groups were to first use the 21 ISS utilization functions provided earlier and identify those functions which worked well and which needed improvement; then they were to recommend how to achieve the needed improvements. Second, the working groups were to identify which functions could be performed under an alternative management structure.

Each working group was instructed to select its own facilitator, note taker, and presenter. Working groups would have until 3:00pm to discuss ISS utilization management after which they would return to the plenary session. Each working group would then have approximately 25 minutes to present a summary of their discussion.

Reports from Working Groups (Pink, Green, Yellow, Blue)

Pink Group

Julianne Zimmerman, Payload Systems Inc.

Definition of “what works”: The current configuration is understandable, stable, conducts its activities in a timely manner, is cost effective, meets objectives, and applies the program equally among the constituent communities. In general, regardless of whether NASA continues in its role or not, the right incentives need to be in place to satisfy qualitative measures. Fear of failure is a general problem and needs to be resolved to allow utilization to be effective. Budget needs to be allocated effectively and efficiently and follow priorities consistently. There needs to be a consistent vision, mission, and strategy for all of the activities.

Specifically, what is going well:

- science peer review is going well, but commercial review is not well established;
- payload processing requirements and safety are well substantiated, but are encumbered by overhead – too many people and too many organizations;
- too many entities believe they are part of the critical path;
- mission management is well understood, but with low efficiency;
- principle investigator research is generally a good experience – getting data, having the freedom to publish and interact, and is in good shape.

Specifically, what is not working:

- excessive duplication of activity;
- poor overall planning and execution of requirements;
- ground systems neglected at every level;
- a general trend toward increasing redundancy of activity, particularly in areas of payloads analysis and crew training requirements;
- public outreach is horribly lacking (and when well done tends to be on a local basis);
- NASA as an agency does not do a good job of explaining the Station;
- some functions are wholly abandoned, but even in the worst cases there are some high points of localized successes.

With respect to the second question, almost any of the functions could be transferred, but those that could not be transferred, at least initially, are 0 and 2. These must at least begin as government responsibilities.

General recommendations: There is a wide range of credible scenarios that could be successful given the following: the right incentives, removal of fear of failure, consistent allocation of budget; and definition of vision, mission, and strategy. If these steps are undertaken, the existing organization or a new organization would have the tools it needed to be successful.

Questions/comments: Fear of failure; there is a general feeling that the investigation cannot be carried forward if there is a single small failure. Conversely, there is a reluctance to admit when things don't work. Both need to be fixed.

Green Group
Ron Davidson, Guigne International

Our group process was first to define our assumptions. We then took an initial straw vote by function. We identified what improvements could be made for 8 of the 21 functions that we felt were “broken” and then identified which functions we felt should be performed by an alternation management structure.

Assumptions:

- Objective is to maximize the use of ISS resources to do research;
- Present functions are similar to Shuttle/Spacelab;
- Any new utilization organization will be phased in over time;
- Any new organization will have to cover more than just OBPR research;
- Any new organization will eventually need to be international;
- ISS is a dynamic lab, not a static platform (new hardware, crew, investigations change);
- NGO is used in a broad sense.

What is broken (by function number):

- Function 1
 - Needs to shorten cycle time;
 - Multiple layers of approval;
 - Research utilization needs to be managed by a research advocate;
 - Needs to have science control resources;
 - Needs a single focal point;
 - Should be done by an NGO? Yes
- Function 2
 - Utilization community needs to be involved in the process.
 - NGO would need to have influence in this process.
 - NGO could do strategic planning/proposing; the tactical process is a government function (POP, budget, etc.).
 - Duplication of hardware and software development should be reduced.
 - Should be done by an NGO? Parts of this should be
- Function 4
 - Sufficient detail of requirements is determined by ISS.
 - Establish PIs requirements and determining their feasibility are 2 functions.
 - Can't use a standard template for all PI interfaces.
 - Should be done by an NGO? Yes
- Function 5
 - Standardization of system.
 - Risk can be safety, business, research.
 - Cost, schedule, risk should be done by the same process.
 - Too many of these assessments are being done/duplications of reporting and effort.
 - Should be done by an NGO? Yes

- Function 10
 - Need s integrated plan on what ground facilities are needed now and in the future for research, this can be recommended by an NGO.
 - Should be done by an NGO? In general, No

- Function 13 (but hard to identify what isn't working now)
 - Has strategic and tactical and operational aspects.
 - More user involvement in the process will lead to greater ownership of the decision.
 - Project scientists can represent PIs, but number of layers should be reduced.
 - Facilities that do not have a facility scientist should have one.
 - This is a complex issue and is hard to identify how to improve on the current complex situation.
 - Should be done by an NGO? Yes

- Function 14 (not “broken,” but problems were identified)
 - Data from principal investigators/payload developers should be requested only once (too many multiple requests for data).
 - Reduce personnel to essential functions only.

- Function 18
 - Several dimensions here: educational material for schools, public information for researchers, going to Congress for larger budget (lobbying can't be done by NASA).
 - Allocate 1-2% of annual budget for this (increase, not re-allocate from existing funds).
 - Should be done by an NGO? Yes

- Function 19
 - Need to solicit P3I ideas from PIs and station operators.
 - Need a budget for this.
 - Should be done by an NGO? Yes

Conclusions: All of the functions were either broken or needed some improvement. There is a process that is changing things, but there are still things that are broken. A full day/week could be spent on each one. These are big issues and there is much at stake.

Questions/comments: Ground facilities broken: it would be done better in prioritization of the work. Currently, multiple centers may do the same thing.

Yellow Group
Bill Carswell, University of Alabama, Huntsville

The group struggled with whether it was broken or could be improved. The ISS is still growing, and when it reaches maturity, some of these problems may diminish or go away. Which functions could be performed under alternative management structure? The group considered those that should NOT be done by NGO: policy, safety of the crew and vehicle (process must be established by NASA, but could be done by contractors). Other than that, everything else could be done by an alternate management structure.

What is not working:

- Selection to flight is too long
- Integration template is too long
- Instability in the budget is not a good thing
- Changing programs and focus
- PI left out of the process
- Not enough money
- Lack of reliable, routine access
- Trying to plan to a moving target (changing designs, schedules, etc.)

Comments (by function number):

- Function 0
 - The long term strategy is dependent on funding. Funding, priorities, and commitment need to be stable.
- Function 1
 - For the most part, research utilization is working.
- Function 2
 - Stability is needed (broken).
- Function 3
 - An “A” for this; peer review seems to work well, though timeliness could be improved.
- Function 4
 - Basically works but with a lot of room for improvement.
- Function 5
 - Not broken, but too early to judge.
- Function 6
 - Broken; the process is too long and expensive.
 - Suggestions for fixing: Space Station and Payload people need to take a little more risk with mission success (not safety) which could save money and time. Need to develop a users guide for payload developers and standardize the payload development process.

- Function 7
 - Room for improvement; process for re-flying flight hardware is egregious.
- Function 8
 - Not qualified to judge this; too early to judge.
- Function 9
 - Not qualified to judge this; too early to judge.
- Function 10
 - Not qualified to judge this; too early to judge.
- Function 11
 - Not qualified to judge this; too early to judge.
- Function 12
 - Broken; safety and operations needs to get involved early in the payload design process so that the payload is designed safely, uniformly, and operates well from the beginning.
 - Need to staff up the safety office; need a training facility for introducing principal investigators to the safety process.
- Function 13
 - Works.
- Function 14
 - Appears to be transparent to users, so it works.
- Function 15
 - Seems to work.
- Function 16
 - The principal investigators is too far removed from the process in many cases.
- Function 17
 - A lot of discussion about this, but the system is in place to do this.
- Function 18
 - Broken; need better educational material to get into the hands of teachers; principal investigators need to do more than just give a picture and paragraph to the PR person.
 - NASA has just made education and outreach a very high priority, and this is good.
- Function 19
 - Broken; no money; upgrades should be driven by user input but process is not in place.
- Function 20
 - Broken; there is a good archival system in place but no one uses it.

With respect to question 2, establishing the processes for policy and safety are NASA responsibilities. There was a question about whether the “heartbeat of the Space Station” should be given to another entity. Some of the things that an NGO could do would be to consolidate and pull together things that are done by many groups in NASA. However, it should not introduce more layers or make things more complicated for the PI.

Conclusions: The flow charts of ISS utilization on pages 28, 29, etc. of the processes that take place that involve these 21 functions are not very accessible to a PI. The PI sees the system as a series of events: idea, design, development, fly, analyze results and write a report. Those flow charts need to reflect this view.

Blue group
Ray Askew, Texas A&M

Very heterogeneous group of people in blue group – contractors, potential bidders, past researchers, potential researchers, advocates for change, advocates for status quo. We spent time getting each individual's view of what might be wrong. One view is that the experience in the system, e.g., JSC, for the users is that the programs have not been responsive at a sufficient level to the users. Another view is that many researchers in the Spacelab commended NASA for its thoroughness and completeness. There is a diversity of inputs from the research community. The Space Station program itself is embryonic. An individual has gathered data from experimenters on the Station in its 16 month lifetime. Their experiments worked and they got results; however, they wrote pages of critique on the program at this point – about overall inefficiencies, e.g., cost to the project to get payload developed, both in time and money.

Functions that don't work: The system does work (we have experiments on Station), but there are endemic features to each that results in delays, additional cost, etc. They are at different levels in the organization. In general, the feedback about station operations is that there are a lot of endemic problems associated with getting payloads developed and flown. Many trace to the interfaces between functions. When something is done and satisfied for one office, it doesn't always satisfy the next office. This leaves the impression that the organization is not interfacing well with itself at all levels.

Functions that need improvement: The lines of responsibility for the functions at times become too dispersed and are subject to multiple interpretations, e.g., the first time through doesn't get all of the things that need to be addressed.

What can be done to achieve improvements: You should be able to say to the existing structure that certain things are not working well and need to be changed. Advisory groups have fed recommendations back to the program office, but things didn't change. One thing that might cause change to occur is to provide incentives for improvements (not just change). Clearly identify what you want to end up with, and if you are not getting there, be clear where you want to be. If reached, there is incentive; if not, there is disincentive. With any large organization which has an adversity to risk that might result in bad PR, there is a great disincentive to accelerate processes, to try to make things move faster; there is a great incentive to do things three or four times. If you are going to improve matters and address specific problems, you likely will have to have some incentives in to do that. All things do not need to operate at 100% reliability. This may be a reasonable approach.

Identify which functions could be performed under an alternative management structure: what could be performed is likely all of it except 0, 2 and perhaps part of 3. No entity other than the government should be setting policy. The problem is whether there is an acknowledgment by NASA that there are broken things in the system. The research community does not feel that it is a wanted customer. If this is the case, can the existing organization help that community? The question is: Is NASA amenable to transforming itself to look at the researcher as truly the customer? There is not unanimity as to whether the functions should be transferred. Some felt that the problems cannot be transformed by NASA and must be taken out to another

organization. A fraction of the research community feels that there are too many inefficiencies in the system; others believe that the direction that the program has taken shows that the agency is moving forward and should be given a chance. There seems to be a division among the players as to which direction to take.

Thoughts relative to the type of organization that could meet the disparate needs:

We did address this recognizing the diverse utilizers of the ISS. We feel that if an NGO is put together properly to take into account the different constituencies, it could do all of the functions.

Closing Remarks (Dr. Pellis)

The ISS is up there. We are confronted with the challenges to have a viable user community, a viable venue for the conduct of research, and a meaningful outcome that will find answers that advance science. Suggestions on the fixes will become very useful. Despite the fact that ISS is embryonic this is not the first time that NASA has flown an orbital laboratory. We must stick to the course on trying to truncate and condense the process that is required to get from the ground to orbit. We need to take a hard look at how the timeline does not fit with the graduate student timeline. We need to look at the ISS as an in-place laboratory facility in a different way from what we have done over the past 20 years. We need to start to perform enough quality research to qualify this venue as a credible research environment. The user's guide is a good idea. There is an archive in place. We need to look at the archive concept a little better; not every specimen can be archived, but we need to begin to look at this. We need the integration process in "PI language." With the analysis and recommendations we can begin to prescribe a strategy that can take the problems to a new benchmark minimum. The outcome is at high risk if we don't take action to maximize the research on orbit.