



## From the desk of Lesa Roe

Welcome to the inaugural edition of the Payloads Newsletter. My expectation is that this quarterly publication will provide a forum for the timely dissemination of information important to ISS Principal Investigators (PIs) and Payload Developers (PDs). The better this newsletter serves you, our customers, the more successful we all can be in making your ISS experience satisfying and fruitful. So, from the beginning, I invite you to comment on this publication with ideas for improving the communication to better fulfill your needs.

Our initial concept provides several recurring columns and at least one special feature article. The regular features will include the "Customer Corner" in which we will discuss our customer interface improvement efforts. Customer Corner is expanded for this first publication as it addresses the basic purpose of our newsletter, improved communications between the Space Station Payloads Office and the participating PIs/PDs. "Science On orbit" will list the complement of research on Space Station and the "Next Increment Preview" will status the preparation for upcoming research experiments. In "ISS Assembly" we will keep you up-to-date on ISS development with schedules of coming events that may affect ISS resources and otherwise impact research capability. Postflight

interviews with ISS crew will be highlighted in this column. "Operations" will explore crew training and operations preparation as well as the on-board operations. Realtime feedback from the flight crew will be anticipated in these reports. We intend to include a "Look-Ahead Schedule" to capture approaching meetings and events that are important to ISS users and an "ISS Accommodations" chart to share a metric that we use to indicate the level of support that ISS is providing for research utilization. I will add my comments in this column each month and we anticipate a lively "Letters to the Editor" section that will capture your reactions to the newsletter. [Send e-mail to editor, Mick Culp, at [mculp@ems.jsc.nasa.gov](mailto:mculp@ems.jsc.nasa.gov)]

Although we have made great strides in improving individual areas of the ISS payload integration process, we are not where we want to be from an end-to-end payload process perspective. The

“Be assured we are continuing to seek efficiencies in our processes and eliminate unnecessary activities.”

timing is right for overall process improvement with the

beginning of our new integrated contract on October 2002. This new contract will provide the first opportunity to have end-to-end operations, integration, and engineering under one contract (see "IPIC Awarded" on page 6). I have kicked off a focused effort looking at the end-to-end payload integration process utilizing "lean six sigma" tools to help us come to a quick value stream process. The first of three key sessions was completed on September 27. This session focused on the PI/PD interface to the payload integration process. Several Payload

Developers participated in this session and we greatly appreciate their time and valuable inputs. The second session focused on the internal payload end-to-end integration process with an emphasis on removing non-value added steps in the process and streamlining the process as a whole. This session was completed on November 1. The third session will be focused on end-to-end data management with an emphasis on reducing unnecessary data input from the PIs/PDs and simplifying the input process. This session will be complete on November 22. We will communicate the outcome of this extensive effort to the PI/PD community in the November/December 2002 timeframe.

For those of you who have been working with us for some time, I hope you see changes for the better in our initiatives to improve the end-to-end integration process, to reduce integration schedule duration and to reduce requirements to fly research. Be assured we are continuing to seek efficiencies in our processes and eliminate unnecessary activities. With your help and with expanded communication, we can make great strides in process improvements.

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# Customer Satisfaction and the International Space Station

by Doug Sander

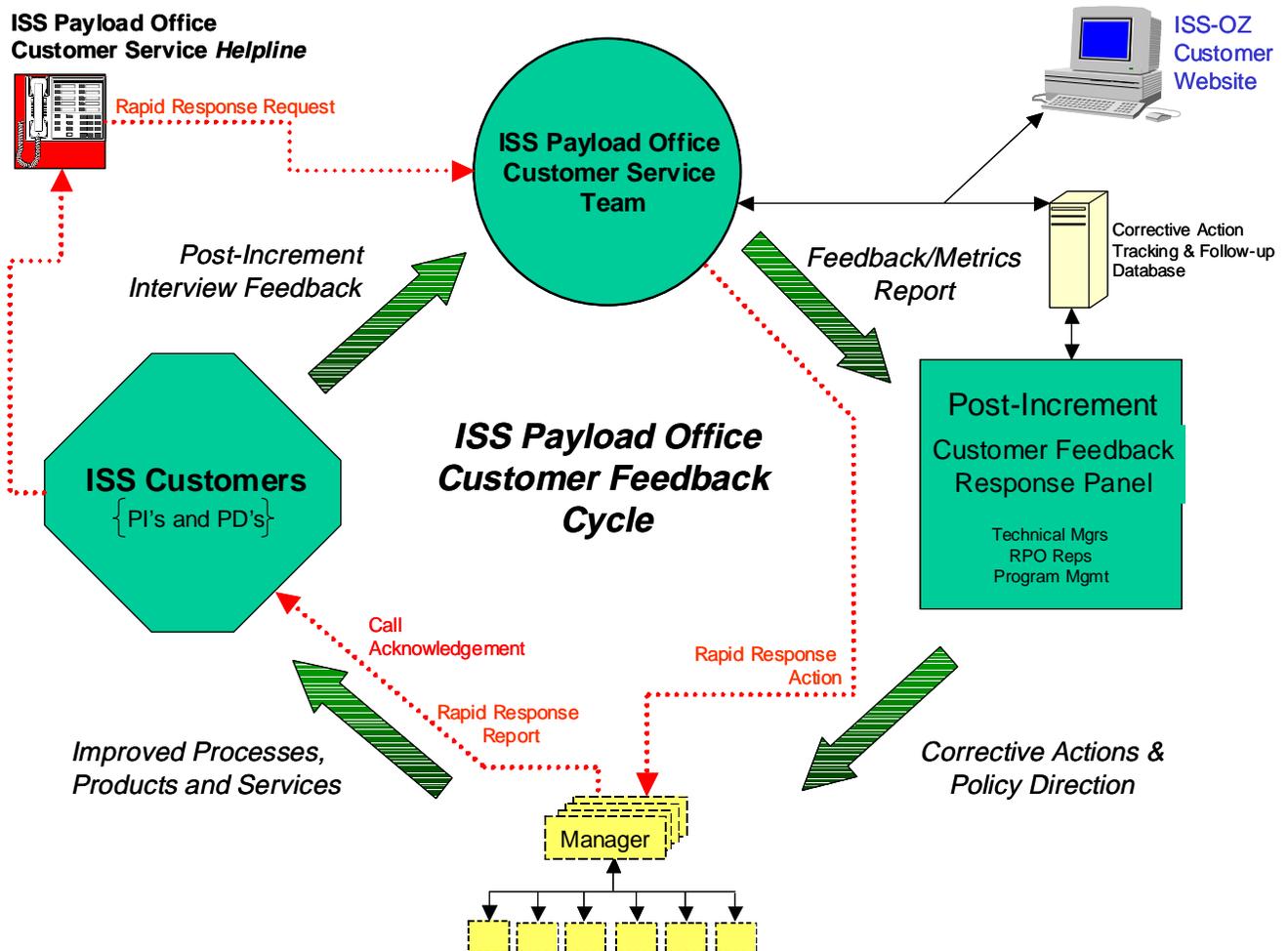
*Welcome to the Customer Corner! This is the first installment of a regular feature of the newsletter devoted to Customer issues, concerns, and NEWS. Since this is the introductory issue, let me introduce myself as the Payloads Office Manager of the Customer Service Team.*

Customer Service Team!? This is a government program, how could this be? The ISS Payloads Office Manager, Lesa Roe, started all of this in February when she decided to put a full-court press on ISS customer satisfaction. Why, you ask? Well, to be perfectly blunt, many of our customers (and when I say customers I mean Principal Investigators [PIs] and Payload Developers [PDs] ) are very unhappy and the feedback we've received from various external and internal surveys shows this.

Lesla decided to assign several of us (both civil service and contractors) to take on the challenge of moving the ISS

Program culture toward a payloads customer focus—no small task. Since then, several ISS Payloads Office contractors (Roy Christoffersen, Roger Weiss, and others), with help from the Research Program Offices and our implementing organizations at MSFC and KSC, have been busy organizing to measure customer satisfaction, gather your comments and suggestions, and take action to improve our processes, products and services. In order to minimize the hassle of customer surveys, we are consolidating our efforts down to a Payloads Office (OZ) Customer Service Team interview and the existing KSC survey. We have

**continued on page 3**



*The Customer Feedback Cycle shows the flow of customer comments into the ISS Program and how they drive process improvement.*

## Customer Satisfaction (continued)

also highlighted customer satisfaction in our contract with Boeing. The new ISS Payloads Integration Contract has customer satisfaction included as a key evaluation factor of contractor performance and will drive award fee.

This summer we have focused on the way we solicit your feedback and measure your opinions. Our goal is to establish a more methodical, scientific measurement process in order to recognize trends and fix only those things that are broken. We will measure your overall satisfaction with the ISS as a research platform and (if I may be so bold) your customer loyalty—that is, would you recommend ISS to a colleague? Our aim is to take our first measurement following Increment 5 and set this as our baseline. From there we intend to take a consistent measurement every Increment to determine trends in Customer Satisfaction. Our “survey” will really be an interview of 30 minutes or less conducted over the phone. We will send out the interview “script” beforehand to help facilitate the interview.

We look forward to hearing your comments both negative and positive and any constructive suggestions you have for improvement of our processes, products and services. The ISS Payloads Office Customer Feedback Cycle (*see figure*) details the process. We will take your feedback, analyze it,

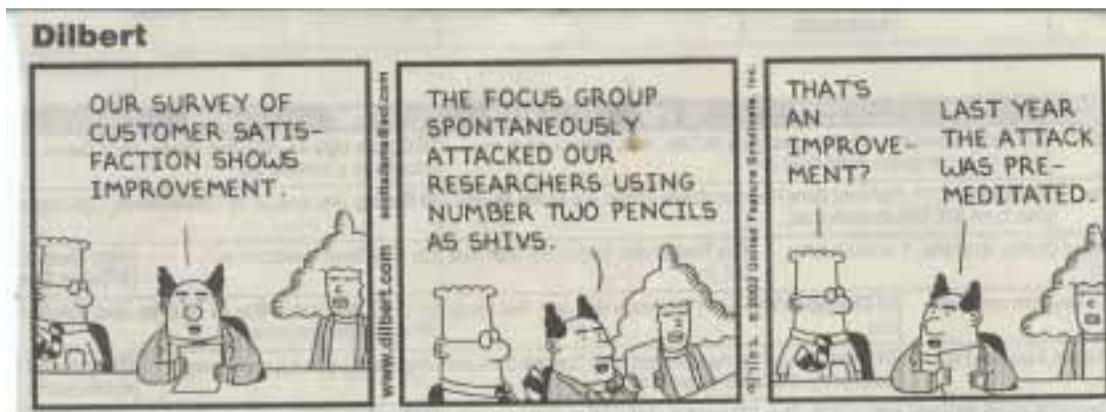
and provide it to the Customer Feedback Response Panel. They in turn will decide how to act on it, provide policy direction and issue corrective actions to the implementing organizations. The results will be communicated to you via our OZ Customer Web site (under construction), this newsletter, and direct e-mail or phone. Your feedback will also be communicated to ISS Program Manager, Bill Gerstenmaier, and to the NASA Associate Administrator for the Office of Biological and Physical Research (Code U) in our Quarterly Customer Satisfaction Metrics Report.

Many businesses provide customers with a phone number that connects them directly with a representative who can help solve a problem or answer a question. The ISS Payloads Office plans to introduce our version, called the ISS Payloads Office Customer Service Helpline, this February. If you have had an unsatisfactory experience with our processes, products or services that your Payloads Integration Manager (PIM) can't address, you will have another avenue to pursue a remedy. Or, if you have not yet been assigned a PIM and are perhaps just looking for answers or guidance, the Helpline staff will work with you. When you call, the Helpline Representative will listen to your situation, provide you with a solution or answer if possible, or issue a Rapid

Response Action to the appropriate Manager. That Manager is then expected to acknowledge your call within 24 hours and contact you directly with a solution or an action plan soon thereafter. All calls will be logged and the Helpline staff will follow-up to insure each Rapid Response Report is completed. We hope this service isn't needed too often, but it's there to help you get the job done. Look for more details in this newsletter and on our Web sites when the ISS Payloads Office Customer Service Helpline is activated.

I'm excited about where we are headed. The ISS Research Program government/contractor team is committed to making your experience of building, integrating and flying research aboard the International Space Station positive and fruitful. We are putting in place the tools to learn from you and from our own experience; hone our processes, products and services through continuous improvement; and measure our success – research achievement in space and delighted ISS customers.

In future Customer Corner installments look for tales of heroic customer service, failures (learning experiences), and improvements in our processes, products and services. Drop me an e-mail ([douglas.r.sander@nasa.gov](mailto:douglas.r.sander@nasa.gov)) if you have customer service experience you would like to put in the limelight.



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# Science On Orbit: Opportunities for Improved Use of ISS

by Vic Cooley, Lead Increment Scientist

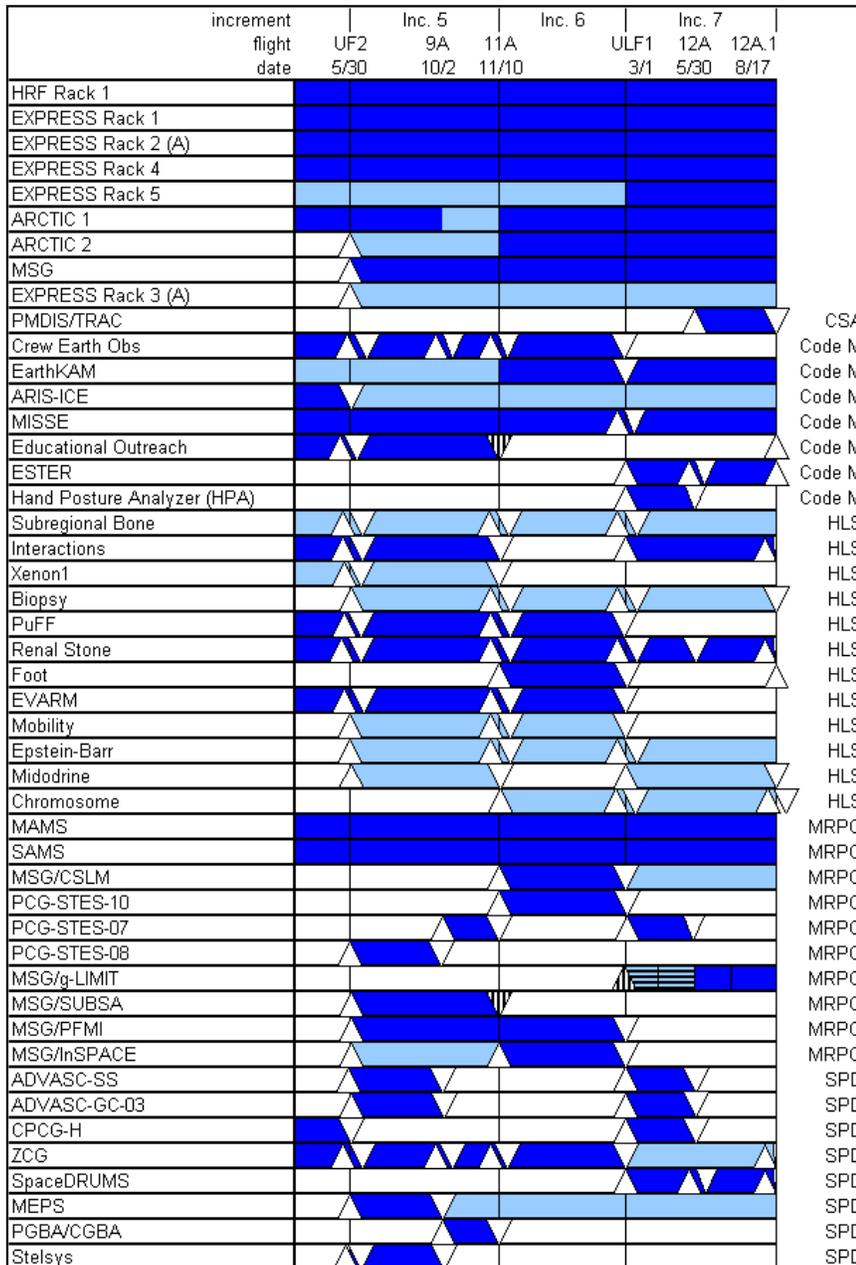
There are 25 investigations in operation during Increment 5. These can be viewed in the accompanying chart, which shows all facilities and investigations which are operational for at least one stage during Increment 5, 6, or 7. Darker shading indicates investigations which are operational, whereas lighter shading indicates either Human Life Science investigations which do not require on orbit crew time, or investigations which may have hardware on orbit but are inactive for the indicated stage. Striped bars or

triangles indicate a payload is ready and waiting to be manifested for flight.

There are currently five EXPRESS racks, one Human Research Facility, and the Microgravity Sciences Glovebox (MSG) in the U.S. Lab providing interfaces and services to most of the investigations. One of the more interesting recent developments is a request by the Zeolite Crystal Growth (ZCG) PI to use the work volume of the MSG to enhance the observation of a crew operated mixing operation. This represents a shared use of facilities and



MSG: work volume in stowed position



cooperation among the contributors. The lighting and cameras of the MSG work volume would enhance the crewmember's observation as well as provide for ground observation by the PI and ground scientists. This shared use of facilities makes our laboratory a richer facility for completing science, and makes the ISS more like a ground laboratory.

Awareness of the tools and laboratory facilities available on the ISS and a system for planning and coordinating shared use of those tools and facilities will allow more efficient use of the ISS as a science platform. Timely requests for such shared use will result in efficient integration.

Another development pertaining to Increments 6 and 7 is that the crew time available currently exceeds our requirements. This is mainly due to the extension of both increments. The opportunity exists for additional, science-productive activities to be added to the Increment 6 and 7 timelines, but no additional upmass is available. The sharing of facilities and the availability of crew time are two valuable opportunities.

# 18 Months and Improving.....

by Lesa Roe

Just over 18 months ago we were getting the U.S. Laboratory on orbit and starting to utilize it with our first rack, the Human Research Facility-1. A lot has changed since then. We have completed all multiuse hardware development, including 8 EXPRESS Racks (5 now on orbit), 96 ISIS drawers, 75 Middeck Lockers, 4 EXPRESS Transport Racks, the Active Rack Isolation System, and the Minus Eighty degree Laboratory Freezer for ISS (MELFI). All of our ground facilities are complete and fully operational: Payloads Rack Checkout Units have been delivered to the Glenn, Marshall, Johnson and Kennedy Centers; the Payloads Operations Integration Center is fully opera-

tional with Telescience Resource Kits (TReK), Voice over the Internet, all Telescience Support Center connectivity, and data storage management (2 years); 12 Suitcase Test Emulators for payloads; 10 Suitcase simulators (EXPRESS); 2 EXPRESS Flight Checkout Units; and the Payloads Test and Checkout System is fully operational with connectivity to POIC & PD sites. We have one common requirements document for hardware/software interface compatibility in the Multi-Purpose Logistics Module (MPLM), U.S. Lab, Japanese Experiment Module (JEM), Columbus, and Centrifuge Accommodation Module (CAM). We have U.S. rack tests established for Columbus and JEM to

mitigate risks for our racks that will be located in the partner modules.

In addition to all of this capability, we've been working to make the process better. The chart below indicates some key changes we have made.

We now have a new CD Information Guide for ISS Payloads users. This guide links to a Payloads Web site which provides documents and information you will need to get your science integrated on the ISS. Additional Web site tailoring is underway to make it a one stop information source for all ISS Payloads users.

We will continue to make you aware of our progress in this continuous process improvement effort.

Increment 2	Increment 5
I-18 month preliminary verification submittal	I-7.5 months verification submittal only ➤25% verification requirement reduction in work
No defined resources	Fenced resources established ➤Middeck Lockers: 5/Flight ➤Middeck Power: 500 W ➤Crew Time: 20 Hours/Week ➤Crew Training: 400 Hrs/Increment (plus training inside 4 months) Crew time steering team ➤Crew day ➤Soft commit planning Middeck team (thermal, volume, power)
2 CoFR reviews I-19 month procedures baseline ➤I-21 month submittal	1 CoFR review I-5.5 month procedures baseline ➤I-12 to 14 month submittal
I-18 month planning data submit	I-12 month planning data submit
Separate processes for procedures, displays, training	Integrated training/procedures/displays processes ➤1 stop for PI/PD
2 training organizations (JSC, MSFC) Integrated trainer required for complex payloads Training submittal I-24 to 21 months ➤Supported I-18 month crew training (new payloads)	Added crew procedures engineer to help PDs with procedures  1 training organization (MSFC) Eliminated integrated trainer requirement Training submittal I-14 to 12 months ➤Support I-9 months crew training (new payloads)
3 contractors performing Payload Integration (Engineering, Mission Integration & Operations) ➤USA ➤Boeing Prime (NAS 15 10000) ➤Boeing Huntsville (NAS 8 50000)	1 contractor now responsible for Payload Integration (Engineering, Mission Integration & Operations) ➤End-to-end accountability (IPIC) ➤Eliminate hand-offs

# Next ISS Increment Preview: Increment 6

by Benjamin Pawlik, ISS Increment 6 Payloads Manager

## Mission Integration - Balancing Resources

One of the most difficult parts of the job of the ISS Payload Mission Management is to provide the payload community with the latest information on manifesting, stowage, assembly sequence, launch issues, etc. There is a constant battle among all users of the ISS for a portion of the limited resources available: upmass, volume, crew time, communications resources, and power. Schedule constraints may also affect how and when activities are performed. And finally, changes to mission events, such as delayed launches, control center availability, or hardware failures, will affect payloads.

The challenge of the mission integration group is to somehow accomplish the payload requirements within this dynamic environment and allow some flexibility to the payloads to make changes to their operations as

driven by science results or mission events. It is a balancing act, which may not always be accomplished smoothly.

## Payloads requirements - The PMIT Web page

So where, today, does your payload stand? Is all of your hardware manifested to arrive on orbit and return at the appropriate time? What are the currently planned launch dates?

Whatever details I supply in this newsletter will likely change by the time you read this. In an attempt to inform the payload community of the latest information, the Payloads Mission Integration Team (PMIT) has provided several links within its website (shown below) to detailed information on manifesting, prioritization, and Increment boundaries.

## Increment 6 Today

As I stated earlier, by the time you read this, all of the particulars on

Increment 6 requirements and constraints are likely to be overcome by events. What will not change, however, is the commitment of the ISS Payloads Office to protect the resources available to payloads, to attempt to expand the available opportunities, and to lessen the constraints on payloads in order to allow additional science operations on the ISS. The Payloads Office has been one of the primary forces in reducing the rigidity of the planning and processing templates for the Shuttle and ISS. But, there is still a long way to go in increasing the flexibility of both the Program and payload communities to quickly and productively respond to changes. Let us know of your ideas on how all of us can better implement science requirements on Increment 6, and subsequent Increments.

<http://iss-www.jsc.nasa.gov/ss/issapt/payofc/OZ2/pmi.html>



# Frequently Asked Questions on Payload Manifest and Schedule

## 1. What payloads are approved for manifesting on a particular flight?

The Web site section labeled “Annex 5 Payload Tactical Plan” contains links to the PMIT and Payload Control Board (PCB) approved manifests through Increment 9. The Research Planning Working Group (RPWG) develops the initial baseline manifest for the Increment, and after PCB approval all changes are coordinated through the PMIT.

## 2. What is the difference between the PCB-approved Documents and the PMIT-approved Documents?

The PCB represents the final Board authority for approving implementation of the RPWG requirements. All changes which occur after PCB approval, whether implemented at the request of the RPWG, or because of requirement changes which do not impact RPWG allocations, are reviewed and approved via the PMIT.

## 3. Do I need to wait for PCB approval, then, before I implement activities for payloads only listed on the PMIT-approved manifest?

No. You typically do not need to wait for PCB approval to implement PMIT approved manifests with the exception of changes that result in an increased cost to the ISS Program, or which result in an increase of on orbit resources beyond previous agreements within the Annex 5, or other payload requirements agreements.

## 4. Where should I look first to see the “latest” manifest data on a particular flight?

Look first at the PMIT-approved Updates section of the Web page to get the latest manifest data. This section includes the last PCB-approved manifest, and also approved Change Evaluation Forms (CEFs) through the date indicated on the Web page. To see if any changes have been approved by the PMIT after that date, or to see which changes are in work, you can go to the link labeled “CEF Status Summary” which is in the “Latest Flight and Manifest Data” section of the PMIT Web page.

## 5. How can I tell if my payload is “above the line” or “below the line” on a particular flight manifest?

Payloads which are identified with a “C” prior to their name in the manifest are considered “candidate” payloads, and will only be added to the flight if additional resources become available. When payloads are moved “above the line”, either through reprioritization of existing payload resources or the release of additional resources by the Shuttle or ISS Programs, a CEF will be initiated to remove the “C” designation.

## 6. With so many variables on Increment duration, launch vehicle processing impacts, and other Program issues, how do I know what the latest launch dates are?

The PMIT page provides a link to a Web site managed by the Flight Program Working Group, which is responsible for coordinating launch dates and Assembly Sequence changes among the ISS Program, Shuttle Program, and International Partners. The link titled “Reference Assembly Sequence Overview” contains the latest launch information available.

## 7. How do I get this information if I can’t access these web pages?

Your Research Program Office (RPO) representative has access, and will be able to provide this information to you. Your RPO representative may also be able to get you access to some of the available pages if you currently cannot view them. If you do not know your RPO

representative, contact your Payload Integration Manager (PIM).

## 8. Occasionally I hear talk of changing payload allocations on a particular flight. How and why does this occur, and when should PIs/PDs be concerned?

Payload allocations are derived early in the mission planning process, and the RPWG builds a baseline payload manifest based upon these initial allocations, and the accumulated payload requirements to date. Developing a good manifest for a mission is an iterative process, since all constraints and requirements typically become better defined only as the launch date approaches. The RPWG is constantly reviewing options if payload resources become reduced or increased and is always looking for the Payload Developers (PDs) to ensure that their resource requirements are as well defined as possible. In the event of a definite change in available resources, the RPWG will inform the payload community and develop an updated manifest. The changes will be submitted to the PMIT via a CEF, and the PMIT-approved changes will be incorporated into an updated Annex 5 manifest. The best action that the PDs can perform is to ensure that the manifest data and launch requirements of their particular payload are as accurate as possible.



*Cosmonaut Mikail Turin operates the H-Reflex Experiment*

# Payloads Operations

by Tim Horvath

Having completed 2 years of crewed operations it is clear to us in the operations community that we've made great strides in working with you, our payload customers, as well as other organizations in the program. As we continue to learn, it's important to look at the payload operations concepts upon which ISS is built, such as distributed operations and telescience. Together, we have validated these concepts and shown them to be not only practical but also successful and efficient. We realize we have more lessons to learn and hope to mark and measure improvements on an ongoing basis.

Increment 1 marked the start of crewed payload operations on ISS. With only a few experiments and a handful of hours of crew time, we struggled to "make ends meet" and accomplish some of our goals. Increment 2 was characterized by hardware checkouts, including major systems on the U.S. Lab, EXPRESS Racks, the Human Research Facility (HRF) Rack, plus the challenges of actually implementing the processes and procedures we had on the drawing boards for so long. We went through



*Human Research Facility installed in U.S. Lab*

payload operations growing pains in building a trust relationship with Mission Operations and the ISS crew, as well as accomplishing research intermixed with hardware and software problems. When you look back and think about bringing on a brand new vehicle, new payload racks, new payloads, and new ground facilities our overall success was outstanding.

Increment 3 was a big step forward, with more complicated and time-critical experiments as well as two more EXPRESS Racks. Major payload milestones included a rack rotation to allow Commander Frank Culbertson to repair the Active Rack Isolation System (ARIS) rack, and a shift in the continuously powered rack from EXPRESS Rack #1 to EXPRESS Rack #4. Increment 4 extended our reach in more ways than one. It was the longest increment to date and included both new and reflight research. It accomplished ground-breaking human research on the radiation environment both inside the ISS and outside during EVAs. It also validated the idea of astronaut-harvested plant samples on ISS with both the Advanced Astroculture (ADVASC) and Biomass Production System (BPS) payloads.

Increment 5 continues the push for increased payload ops on ISS. The Microgravity Science Glovebox (MSG) facility was installed and is being well-used, and EXPRESS Rack #3 (another ARIS rack) was installed, with checkout scheduled for Increment 6. Increment 5 also tackled the challenge of visiting crew payload ops in the U.S. Lab, as the European Space Agency has sponsored four experiments to operate in MSG during the Soyuz-5 taxi flight which arrived in late October.

Looking towards the future, our near-term goals are to continue raising the bar for payload operations on Increment 6, 7, and 8. We encourage you to contact the appropriate Lead Payload Operations Director with any concerns or ideas you have or just to find out the latest news.

Increment 6 – Lamar Stacy ([lamar.stacy@msfc.nasa.gov](mailto:lamar.stacy@msfc.nasa.gov), 256-544-2220)

Increment 7 – Carmen Price ([carmen.price@msfc.nasa.gov](mailto:carmen.price@msfc.nasa.gov), 256-544-3021)

Increment 8 – Eric Melkerson ([eric.melkerson@msfc.nasa.gov](mailto:eric.melkerson@msfc.nasa.gov), 256-544-3869)

Increment 9 – Pat Patterson ([pat.cooney@msfc.nasa.gov](mailto:pat.cooney@msfc.nasa.gov), 256-544-2046)



*EXPRESS Rack 3 with ARIS*

## Increment 6 Status

We're on schedule to support the 11A launch on November 10, and the increment concludes with ULF-1. All payload procedures and operations documentation have been baselined. Some major increment milestones include a U.S. EVA on December 5 and the Progress-10 launch on February 2. Increment 6 will also see an upgrade of EXPRESS Rack software and the installation and checkout of ARIS hardware on EXPRESS Rack #3.

Finally, an ongoing study with the power folks at JSC/Mission Operations Directorate (MOD) has the potential for restrictions on power availability during

**continued on page 9**

11A joint operations, and during the high beta angle period around Christmas. This could mean restrictions on rack and payload power; we'll pass along more information as it becomes available.

### Increment 7 Status

The launch of ULF-1 is currently scheduled for March 1, 2003, the 12A launch is scheduled for May 23, 2003, and the Increment concludes with the launch of 12A.1 in July. The final Payload On orbit Operations Summary (OOS) will be published on January 2, 2003. Some on orbit milestones include the initial installation and checkout of three new facilities: Window Observational Research Facility (WORF), Minus Eighty degree Laboratory Freezer for ISS (MELFI) and HRF-2.

### Ground Systems Status

The Payloads Operations Integration Center (POIC) has transitioned to the Build 6 Software Series release in support of 9A Flight Operations. Within this software release:

The redesigned Payloads Information Management System (PIMS) greatly improves system performance and elevates the PIMS user interface to current industry standards, greatly improves system reliability, and provides for significant cost reductions in the operations and maintenance of the POIC. Various user-requested enhancements were incorporated.

The Payload Data Services System (PDSS) 2-year data storage capability is online for user-retrieval of ISS payload telemetry via file transfer or playback, improving user access to science data.

The Enhanced HOSC PC (EPC) 1.5 software was released improving system performance and reliability. We are currently looking at strategies for providing the EPC software to the remote payload community.

The Internet Voice Distribution System (IVoDS) is now the operational mission voice system for POIC remote users. There are currently three remote facilities using IVoDS for Increment 5: University of California at

San Diego, the University of Wisconsin, and Northeastern University. We expect four or five more users will be added for Increment 6. The number of network outages reported by remote users has been reduced through an IVoDS Server software upgrade and better information exchange between NISN and POIC Ground Systems personnel. We are working with the user community to insure a smooth transition from the existing voice unit to the IVoDS PC-based service.

The Telescience Resource Kit (TReK) Release 2 Software is scheduled to be operational at the end of September 2002 and will add programmatic remote commanding capabilities and multiple telemetry enhancements. For a detailed list of TReK Release 2 capabilities please visit the TReK Web site:

<http://trek.msfc.nasa.gov>

NASA is developing a plan to better protect all ITAR and EAR data according to recently issued NASA Headquarters directives. Due to these directives some of our payload community users have experienced service disruptions on systems supporting operations preparation and mission-related activities. We would like to apologize for this inconvenience and are working to minimize the disruptions in the future.



TReK workstations in use

### Examples of humor in uplink to ISS crew

*“Hardware is the part of the computer that can be kicked.”*

- Jeff Pesis

*“If it squirms, it's biology; if it stinks, it's chemistry; if it doesn't work, it's physics; and if you can't understand it, it's mathematics.”*

- Magnus Pyke

The 5th Wave By Rich Tennant



# ISS Assembly

by Ned Penley

Often, performing research on the ISS during assembly is likened to trying to live in a house as it is being built. While we still have a long ways to go, we have come along considerably. Recently, the ISS Program Manager, in conjunction with each International Partner, baselined the plan for construction of the remaining structure of the ISS.

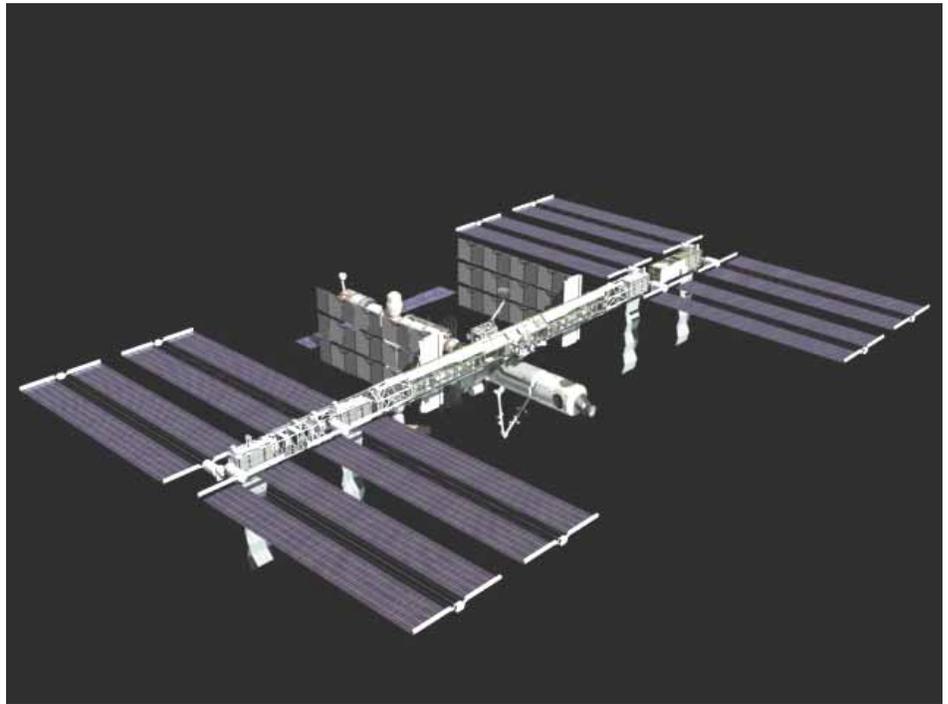
During the year of 2003, you will see the ISS truss built and all of the additional solar arrays and thermal radiators placed on the ISS. This will provide the necessary additional power for supporting systems and the additional research in the International Partner labs. Building the truss represents the most challenging part of the ISS assembly. It requires very crew intensive extravehicular activity (EVA), and uses just about every bit of the shuttle upmass capability. As the EVAs are carried out and the solar arrays are added to the power system, we will see some power outages required for safety and implementation reasons during these operations. As the truss is built and solar arrays are added, you will see the overall power capability for ISS payloads increase from about 12 kW now, to over 40 kW. Useability of this power capability will occur after the International Partner laboratories arrive.

## U.S. Core Complete

The "U.S. Core Complete" milestone includes the addition of Node 2 to the ISS in February 2004. Node 2 contains the docking ports for addition of the International Partner Laboratories. Node 2 also adds more stowage for the ISS. This allows launch of two more research racks on the next flight (ULF2) in July 2004.

## IP Core Complete

After Node 2 is added, the ISS Assembly focuses on deployment of the International Partner laboratories. The European Space Agency's Columbus Module will be added in October 2004. The overall internal research volume will increase from 12 research racks to 22 racks. Five of the additional 10 rack locations are allocated to the U.S., and



*US Core Complete*

we can begin filling these locations on the next flight in January 2005.

The new assembly sequence includes a significant change from previous sequences by including a slip of the Japanese Kibo Pressurized Laboratory and Exposed Facility. Unfortunately, the Japanese budget situation delayed these elements by roughly 18 months. The main downside to U.S. researchers from this is that it will put considerable pressure on the stowage capability of the ISS in the late 2005, early 2006 timeframe. On the other hand, this slip allowed some acceleration of unpressurized flights, allowing the Alpha Magnetic Spectrometer an earlier flight, as well as deployment of the first EXPRESS Pallet in late 2005 (1 year earlier than previously possible). When the Kibo module is delivered in July 2006, the overall rack availability will increase from the 22 research racks to 32 racks. Again, five of the additional 10 rack locations are allocated to the U.S., bringing the total U.S. volume to 22 racks.

The next major milestone is delivery of the Centrifuge Accommodation Module in April 2007. This module will provide critical research capability to the fundamental biology community as well as needed stowage volume for the entire pressurized research community.

## Shuttle Flight Rate and Increasing ISS Capability

The assembly sequence and available launch upmass capability for research are strongly driven by the frequency of Shuttle flights. The flight rate is the subject of great discussion at present. The new assembly sequence is built around a flight rate of 4 shuttles per year. If the shuttle flight rate is increased, the assembly sequence will be modified and our capability to deliver research hardware will be accelerated.

Additionally, ongoing discussions with the International Partners are in place to consider options for increasing the capability of the ISS to enable more crew time for research. These option paths will be reviewed at a December meeting of the heads of all the space agencies participating in the International Partnership.

We look forward to the coming years of the ISS as we all deal with the incredible challenges of building this complex laboratory.

## IPIC Awarded

by Doug Sander

The ISS Payloads Office just completed the procurement process for the International Space Station Payloads Integration Contract (IPIC), a 2-year, sole-source contract (with 1-year extension option) worth about \$200 million that consolidates three earlier contracts for the same work. NASA Systems, a Houston-based business unit of Boeing Integrated Defense Systems, was awarded the contract designed to cut costs and reduce payload processing time by optimizing

payload engineering and operations and streamlining the team structure. "Our focus will be to provide better value and service to the NASA customer, improve the interfaces with the payload developers and owners, and enhance science and technology research efforts aboard the International Space Station," said Rick Golden, Boeing IPIC Program Manager.

Of the three previous contracts, Boeing held two and United Space Alliance held one. About 400 people in

Houston and Huntsville, AL., will work on the contract. Boeing's partners and subcontractors include Teledyne Brown Engineering, United Space Alliance, Cimarron, Barrios, Muniz, Pace & Waite, Applied Research and Engineering Science (ARES), GEO Control, Systems Studies & Simulations, Inc.

IPIC will serve as a "bridge contract" to the follow-on Payload Mission contract aligned with the results of the NASA HQ ISS Utilization Concept Development Team.



*EGN-STES, first U.S. Payload*



*Advanced Astroculture*



*Materials ISS Experiment, first attached Payload*



*The heartbeat of Payloads Operations*



**Mick Culp, Editor**  
**ISS Payloads News**

**Name the Newsletter**

You have no doubt noticed the generic title for this newsletter. We decided to entertain your suggestions to make the title more meaningful. Please submit your clever ideas for a name for this communication from the ISS Payloads Office to the Principal Investigators and Payload Developers. The final name selection will be made by Lesa Roe and will be announced in the February newsletter.

# Letter from the Editor

**Letters to the Editor**

In the future, this column will be "Letters TO the Editor" and will compile the most thought provoking comments received from you. This can be an effective way for you to point out areas where we do not provide sufficient information to PIs/PDs as they enter the ISS Program.

**Future Features**

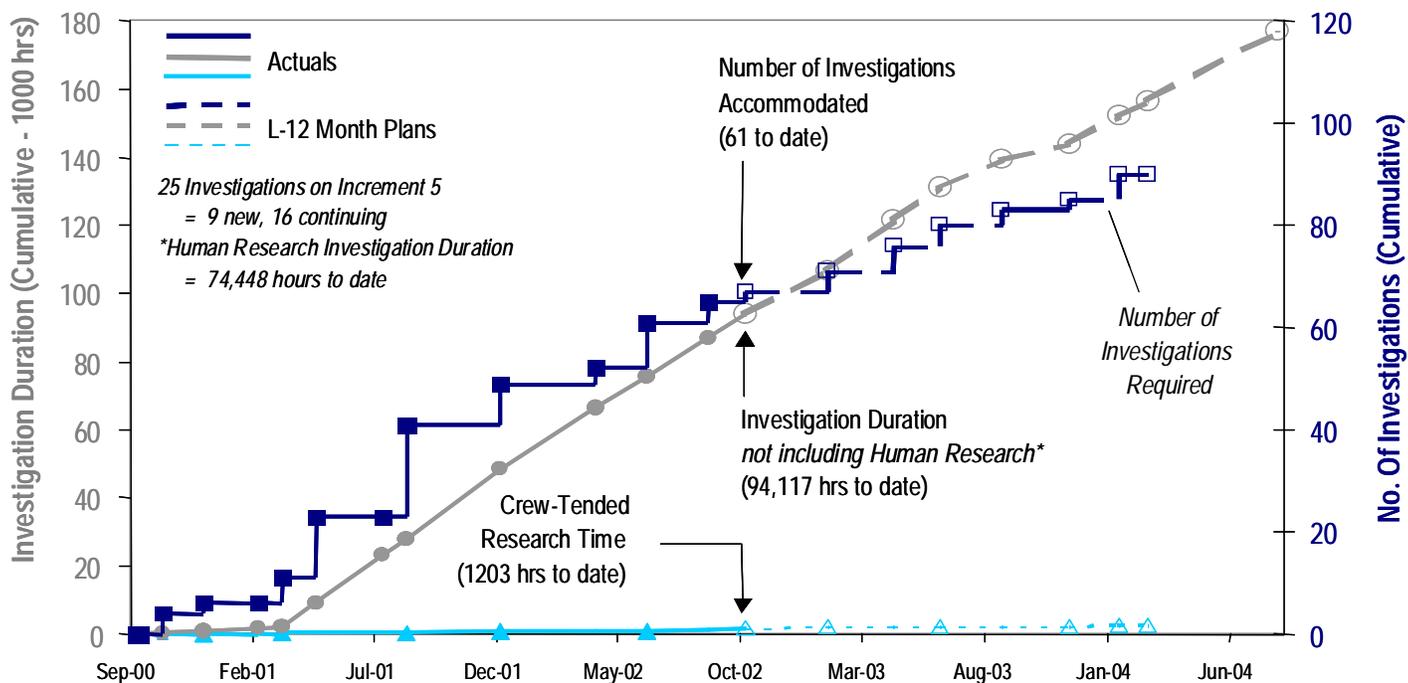
Feature articles selected for the newsletter are intended to provide information about ISS interfaces that will help future investigators and developers. We envision some articles explaining ISS integration and/or operations processes that directly impact you. Others may be articles by research

projects that have on orbit, ISS experience and can share lessons learned. Certainly, we will monitor the responses to this column to determine what you think are useful discussions.

"Letters to the Editor" can be e-mailed to [mculp@ems.jsc.nasa.gov](mailto:mculp@ems.jsc.nasa.gov). Ideas can also be discussed by phone: Mick Culp 281-244-8469.



## ISS Research Accommodations



This chart is often used by the ISS Program and HQ to help demonstrate the state of accommodating research on the ISS. The "Investigation Time" (continuous curve) shows that 94,117 hours of onboard research was accomplished, in addition to the nearly 75,000 hours of human research on the crew, through September 30 of this year. The lowest curve accumulates the crew-tended research time and demonstrates that during that same time period only 1203 hours of research required crew involvement. This emphasizes the success that research designers are achieving in automating experiment performance. The graduated "Number of Investigations" curve indicates a total of 61 investigations were accommodated through September 30. This chart will be a regular feature of the newsletter.