ZIN Technologies

Sept. Financial Review

Oct. 15, 2012

NASA GRC SpaceDOC

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101 Fluids and Combustion Facility, MIP & TSC

ZIN Manager: **Michael Johanson**
ZIN Engineering Lead: M.O'Toole
ZIN Operations Lead: T. Wasserbauer
ZIN Integration Lead: C. Rogers

NASA Program Manager: Tom St'Onge
NASA Project Manager: Bob Corban (Kevin McPherson)

SpaceDOC 101 encompasses the International Space Station (ISS) Fluids and Combustion Facility (FCF) Project and its initial payloads, Light Microscopy Module (LMM) and the Multi-user Droplet Combustion Apparatus (MDCA) have been launched and the flight units are installed on the ISS. The Flight units on the ISS, as well as the units on the ground (Ground Integration Units and the Engineering Development Units) need to be operated and maintained. This Delivery Order is for the operation of the FCF racks on orbit and on the ground, resolution of any anomalies, evaluation of trends, software upgrades, hardware obsolescence evaluation, new hardware development to support future capabilities, verification, and training the crew and operators on the hardware/software. Also, as new payloads are developed for the FCF, analytical modeling and engineering analysis of the interface will be required.

The CIR Flight Unit, along with MDCA, was delivered to the ISS by STS-126 (November 2008). The FIR Flight Unit along with the LMM were delivered to the ISS by STS-128 (August 2009).

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Issues and Concerns

101 Fluids and Combustion Facility, MIP, TSC, LMM, MDCA

Issue	Potential Impact	Action Plan	Resolution Date
Crew Time Availability	Delays in science data	Temporarily suspended the requirement for PaRIS operation during CIR/FLEX science runs. This eliminates 20 minutes of crew time per test day. Initial science run without PaRIS showed no significant issues	**TBD**
CIR ICM Communications	Loss of primary FLEX2 science instrument	No repeat loss of communications has been exhibited by the DCM since the initial anomaly Ground spare has been assembled and tested. Manifest is ATV4 scheduled for launch in April 2013 No on-orbit spare	**TBD**

Monthly FCF Highlights

- **FLEX2 Science Matrix**
  - **Continued the FLEX2 Quiescent/Convective Matrix**
  - **September total is 9 downlink test point ignitions**

- **ACE Science**
  - **Prepare draft operations inputs for the ACE-M-1 experiment expected to begin after launch of SPX2 in Jan 2013**

- **Safety**
  - **Prepared and reviewed CIR Flight Safety Re-Certification**
  - **Submitted SPX2 Nominal Load Safety Package to PSRP**
  - **Released SPX2 Nominal load MIUL**
- **Integration**
  - **Coordinated manifest list, safety package, MIUL and ship dates for the SPX2, ATV4 and HTV4 launches**

- **LMM GIU**
  - **Completed troubleshoot and repair to the filter cube motor**
  - **Completed troubleshoot of the turret motor. Sensor replacement is in process**

- **Hardware deliverables**
  - **Completed vibe and EMI tests of the MDCA color camera spare**
  - **Completed vibe and EMI tests of the spare ICM**
  - **Initiated assembly of the spare IPSU Remora**
  - **Completed assembly of the DCM**
  - **Completed assembly of the focus prism module**

2012 Deliverables List

101 Fluids and Combustion Facility, MIP, TSC, LMM, MDCA

Deliverable	Planned	Actual	Note
Smoke Detector spare	Feb-2012	4/2012	
ATCU Fan Assemblies (2) spares	Apr-2012	4/2012	
ATCU Fan Filter Electronics Box spare	Apr-2012	4/2012	
EEU spare	Apr-2012	4/2012	
GCIP flight unit	Jun-2012		Assembly and test completed. Verifications in process, delivery for ATV-4 (Dec)
MDCA Avionics Package spare	Jun-2012		Assembly and test completed. Verification closure planned November
CIR Windows (2) spares	Jul-2012	3/2012	
LMM Control Box spare (No Environmental)	Jul-2012		Out of plan board vibe required. Assembly completed planned December
QD Lubrication Kit (if required)	Jul-2012		Concept coordinated with ISS Qdirt. Final design pending program feedback
IPSU spare - Remora	Sep-2012		Assembly re-phased per technician workload. Expected completed is December
Focus Prism spare	Nov-2012	10/2012	
DCM spares (2)	Nov-2012	10/2012	
ICM spare	Nov-2012	10/2012	
MDCA Color Camera spare	Nov-2012	10/2012	
GIU LCTF	Dec-2012		
Common IAM spare	Dec-2012		

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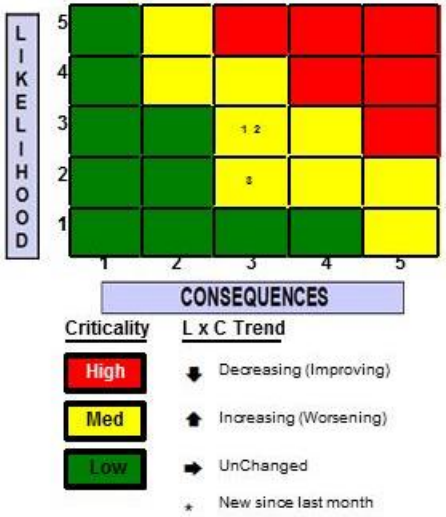
Risk Matrix - FCF

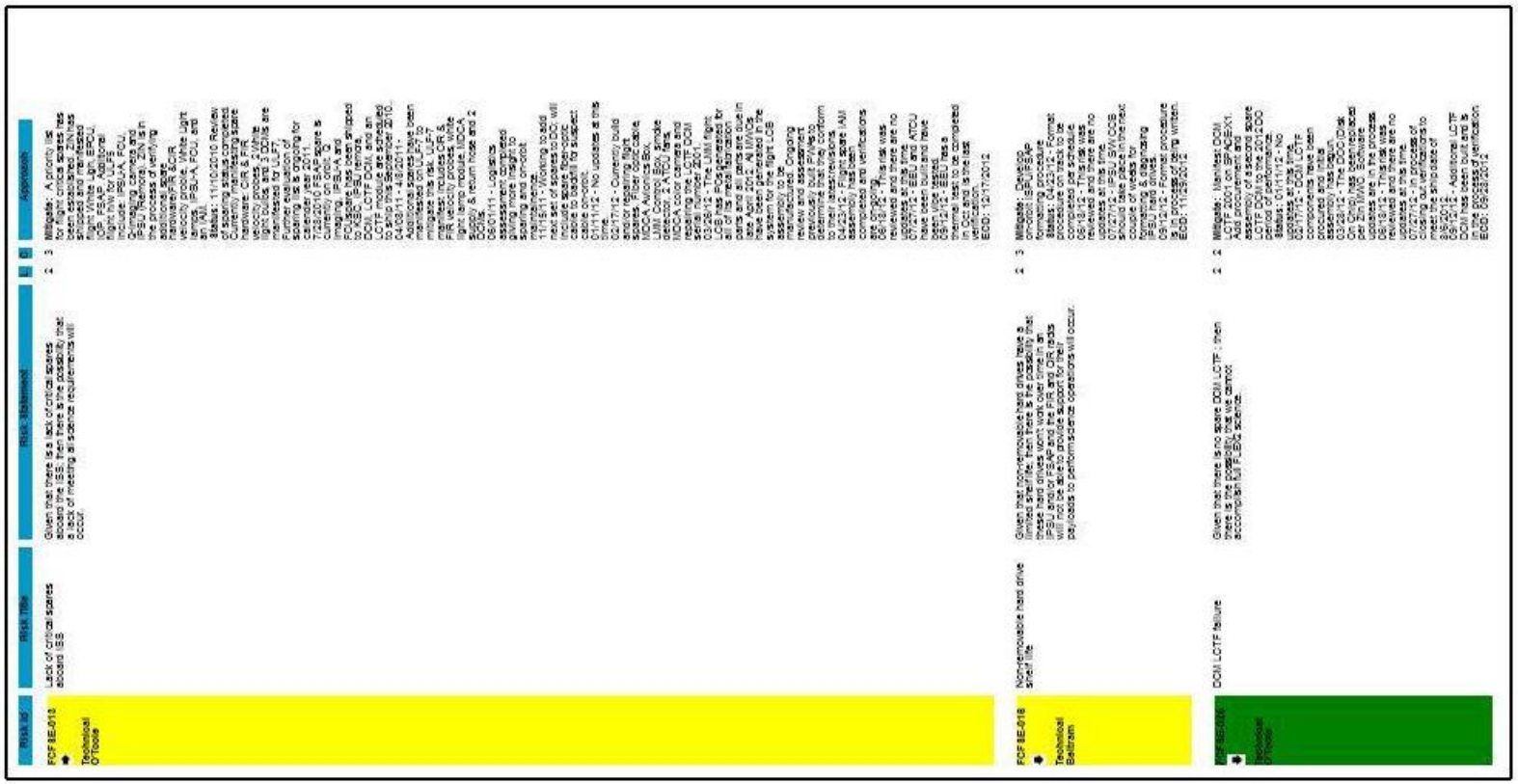
101 Fluids and Combustion Facility, MIP, TSC, LMM, MDCA



Risk Id	Risk Title	Risk Statement	L	C	Approach
FCFSE-026 ➡ Technical Beltram	LMM GIU does not fully emulate the flight unit	Given that the LMM GIU does not fully emulate the flight unit;; the possibility exists that future LMM flight experiments will not operate correctly.	3	3	**Mitigate:** Plan is to review LMM GIU non-flight design issues, and add task to update LMM GIU to the next DO period of performance. **Status:** 12/21/11 - Task has been added t the DO to upgrade to LMM GIU. 01/11/12 - No updates at this time. 02/17/12 - The LMM GIU has been assessed and the upgrades needed to emulate the flight system have been identified. Additionally, microscope motor functions are in the process of being repaired. 03/28/12 - Risk has been reviewed and there are no changes to its status at this time. 04/23/12 - Currently preparing trouble shoot procedures for LMM motor functions. 06/18/12 - This risk was reviewed and there are no updates at this time. 07/27/12 - Turret motor problem diagnosis has been completed and repair for it is in process. **ECD:** 07/02/2012
FCFSE-029 * Technical O'Toole	ICM failure	Given that the ICM may fail; then there will be a significant impact to the back lit imaging science instrument to occur.	3	3	**Mitigate:** Develop ICM spares. **Status:** **ECD:** 04/30/2013
FCFSE-014 ⬇ Technical Beltram	IOP removable hard drive shelf life	Given that the IOP removable hard drives have a limited shelf life; then there is the possibility that these hard drives won't work over time and the FIR and CIR racks will not be able to provide support for their payloads to perform science operations will occur.	2	3	**Mitigate:** Implement a procedure to re-format the hard drive on-orbit to minimize loss of magnetic field encoding data on the disk. **Status:** 04/23/12 - Currently on track for the development of the formatting procedure. 06/18/12 - This risk was reviewed and there are no updates at this time. 07/27/12 - Formatting being developed. 09/12/12 - Documented format procedure is in process of being developed. **ECD:** 08/30/2013

Risk Matrix - FCF

101 Fluids and Combustion Facility, MIP, TSC, LMM, MDCA



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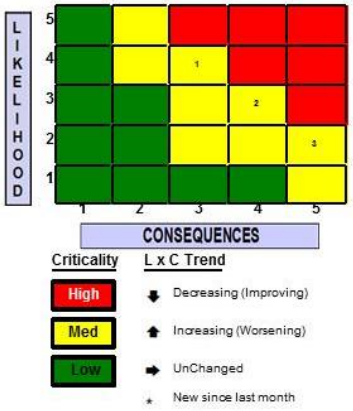
101 Fluids and Combustion Facility, MIP, TSC, LMM, MDCA



Risk Id	Risk Title	Risk Statement	L	C	Approach
MDCA-012 ➡ Technical O'Toole	FLEX-2J Droplet Size Repeatability	Given the tolerance on droplet reproducibility has not been demonstrated there is possibility that we will not meet the reproducibility requirement	4	3	**Mitigate:** Review science requirement with JAXA and determine the capability of the flight hardware to meet the science requirement. **Status:** 06/18/12 - Not started. S/W engineering resource not available as of 6/15/2012. Expected closure date is Aug 31, 2012. 09/12/12 - Awaiting for the revised MDCA S/W to complete the last mitigation task. **ECD:** 10/31/2012
MDCA-011 ➡ Technical O'Toole	FLEX-2J Deployment Validation	Given that we cannot verify multiple droplet deployments in a 1G environment there is possibility that not all science will be met	3	4	**Mitigate:** Develop a robust 1G validation program **Status:** 06/18/12 - Not started. S/W engineering resource not available as of 6/15/20102. 07/27/12 - S/W developer resource got a late start. 09/12/12 - Pusjhed out the first mitigation task by one month per monthly RMWG. **ECD:** 10/31/2012
MDCA-007 ➡ Cost O'Toole	Lack of on-orbit spare avionics box	Given that there is no flight spare MDCA avionics box on ISS and there are no plans or budget to build a flight or GIU MDCA avionics box; then there is the possibility that, if the MDCA avionics box becomes inoperable, a complete loss of the ability to obtain FLEX-2 science will occur.	2	5	**Mitigate:** A plan to build a flight spare avionics package is authorized under the current DO with delivery planned for the 4th quarter of 2011. **Status:** 08/24/11 - Still on schedule to deliver flight spare avionics box. 10/04/11 - The project is still targeting the flight spare avionics delivery in December of 2011. 11/15/11 - Delivery of the assembly is projected for February 1, 2012. Verification and manifest is expected to be included in the follow-on DO period of performance. 03/07/12 - Flightspare MDCA avionics box is in the process of being built per ZIN Tech MWO. 03/28/12 - Flightspare avionics box is tentatively scheduled for several environmental tests as follows: Vibe & EMI in May of 2012 and Thermal Cyale in June of 2012. 04/23/12 - Flightspare avionics box is in the process of being built. 06/18/12 - Assembly complete. Vibration and EMI testing Completed. Thermal Cycle testing scheduled for June 2012. **ECD:** 09/28/2012

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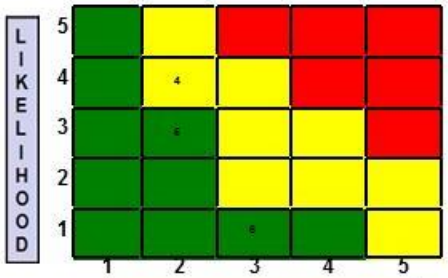
Risk Matrix - FCF

101 Fluids and Combustion Facility, MIP, TSC, LMM, MDCA

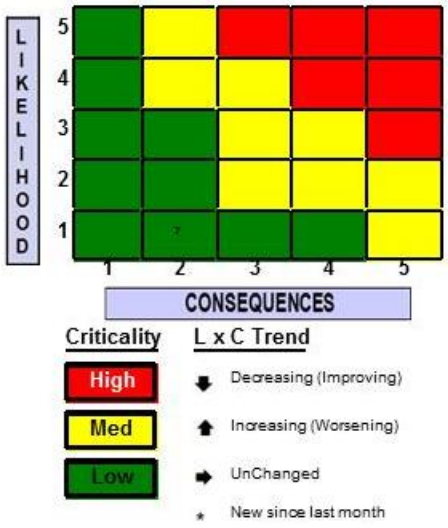


Criticality	L x C Trend
High	Decreasing (Improving)
Med	Increasing (Worsening)
Low	UnChanged
	New since last month

Risk Id	Risk Title	Risk Statement	L	C	Approach
MDCA-013 ➡ Technical O'Toole	FLEX-2J Droplet Imaging Resolution	Given that the there is limited performance data for the droplet imaging camera at 60 frames per second there is possibility that we will not meet the resolution requirement	4	2	**Mitigate:** Review science requirement with JAXA and determine CIR h/w capability. **Status:** 06/18/12 - Resolution test pending 60 fps camera configuration. Initial attempt to operated at 60 fps failed. Expected closure date is Aug 31, 2012 per O'Toole's e-mail Friday 6/15/2012. 09/12/12 - Demonstrated that there is a 60 fps capability. The resolution test still needs to be done. **ECD:** 08/31/2012
MDCA-010 ➡ Schedule O'Toole	FLEX-2J SRD not signed	Given that the FLEX2J SRD is not signed at PDR there is a risk that project cost and schedule will not be met.	3	2	**Mitigate:** Document requirements as understood via previous TIMs and coordinate with JAXA to obtain concurrence **Status:** 06/18/12 - Reviewed updated draft document with JAXA rep. Signature parties identified per O'Toole's e-mail Friday 6/15/2012.. 07/27/12 - FLEX-2J is still in work by the PI. Latest JAXA comments have been incorporated into the SRD. 09/12/12 - GRC Science, JAXA Science, as well as GRC Project management & Zin Engineering have all signed off on SRD. Awaiting for NASA HQ to sign off and approve. **ECD:** 09/28/2012
MDCA-014 ➡ Technical O'Toole	ICE-GA combustion by-products	Given that the hexanol combustion by-products are not established there is the possibility that the ICE-GA hexanol fuel may not be allowed on ISS.	1	3	**Mitigate:** The project intends to perform by-product testing on hexanol to show it is compatible with ISS vents requirements and meets toxicity limits. **Status:** 09/12/12 - Test has been initiated. **ECD:** 10/31/2012

Risk Matrix - FCF

101 Fluids and Combustion Facility, MIP, TSC, LMM, MDCA



Risk Id	Risk Title	Risk Statement	L	C	Approach
MDCA-015 ➡ Schedule OToole	Unapproved ICE-GA Science Requirements Document	Given that the ICE-GA SRD is not signed at PDR there is a risk that project cost and schedule will not be met.	1	2	**Mitigate:** Get the SRD signed by both Italians and Project. **Status:** **ECD:** 09/28/2012

Risk Matrix - FCF

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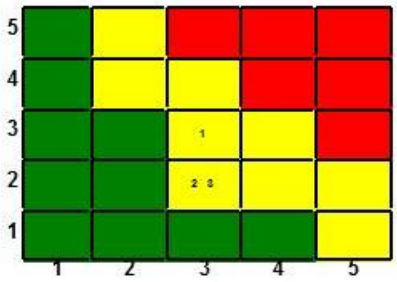


Criticality

- High
- Med
- Low

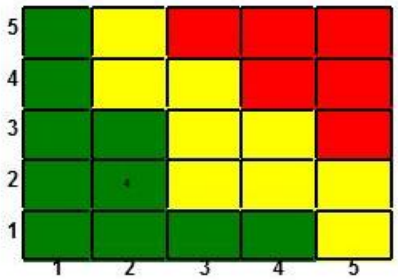
L x C Trend

- Decreasing (Improving)
- Increasing (Worsening)
- UnChanged
- New since last month

Risk Id	Risk Title	Risk Statement	L	C	Approach
TSC-004 Cost	Lack of support depth	Given that there is no more than 1 subject matter expert in the areas of TSC System administration, FCF Ground software, and FCF data post-processing, there is a risk that FCF will not be supported adequately to ensure mission success.	3	3	Status: ECD: 12/28/2012
TSC-002 Technical	DICES III voice loop system obsolete	Given that DICES III system hardware is at end-of-life, there is a risk that voice loop services will not be available to support mission operations.	2	3	Status: ECD: 12/28/2012
TSC-003 Technical	Video System Difficult to Support	Given that the Grass Valley video matrix and AMX video switch system uses an unmaintainable and undocumented configuration, there is a risk that all video channels may not be available to support mission operations.	2	3	Status: ECD: 12/28/2012

Risk Matrix - FCF

101 Fluids and Combustion Facility, MIP, TSC, LMM, MDCA



Criticality	L x C Trend
High	Decreasing (Improving)
Med	Increasing (Worsening)
Low	UnChanged
	New since last month

Risk Id	Risk Title	Risk Statement	L	C	Approach
TSC-001 Technical	Stale TSC documentation and not up to date	Given that documentation has not been updated as physical changes are made at the TSC, there is a risk that troubleshooting and maintenance will not be properly performed.	2	2	Status: ECD: 12/28/2012

102 Acceleration Measurement Program (AMP)

Engineering Lead Jennifer Keller & Ray Pavlik

NASA Program Manager: Tom St. Onge
NASA Project Lead: Kevin McPherson / Bob Hawersaat

SAMS Objective:
- Provide acceleration measurement systems that meet the requirements of the researchers on board the International Space Station.
- SAMS measures the acceleration environment in the 0.01 to 400 Hz range for payloads.

MAMS Objective:
- Provide acceleration measurement system that measures the Quasi steady and vibratory acceleration data in the 0.00001 to 100 Hz frequency range on board the International Space Station (ISS) vehicle

PIMS Objective:
- Provide acceleration measurement data to Principal investigators who conduct scientific research on board the International Space Station.
- The SAMS acceleration measurement system provides the raw data that PIMS uses to provide analysis to the Principal Investigators. SAMS measures the acceleration environment in the 0.01 to 400 Hz range for payloads.

Milestone Schedule

102 AMP (SAMS, MAMS, PIMS)

WBS	Milestone	Start	Baseline	Projected	Actual	Schedule Variance
1.8.9	SE Cable – at least 144 inches in length	7/12		12/12		
1.8.10	Spare TSH-ES and TSH-ES 08 for MSG	7/12		12/12		

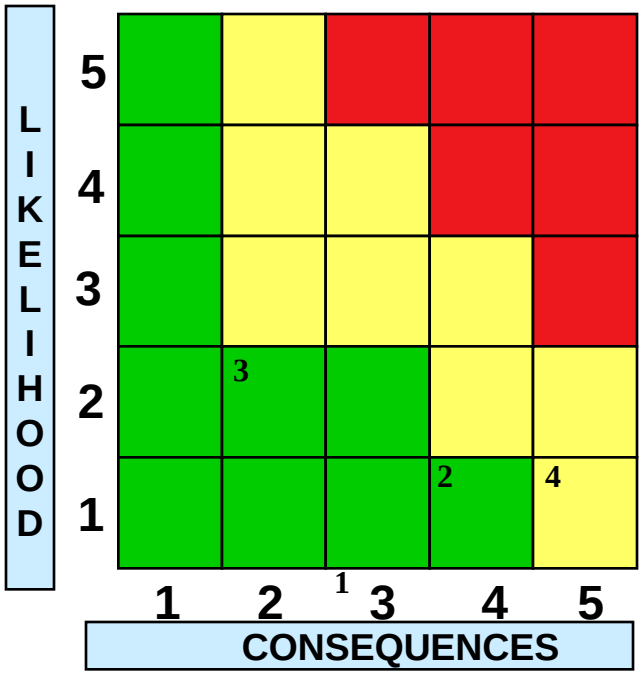
Issues and Concerns

102 AMP (SAMS, MAMS, PIMS)

Issue	Potential Impact	Action Plan	Resolution Date
Network issues onboard delaying EE-F05 boot process	EE-F05 not booting	Work with DMC to help determine network issues.	Moved sensor back to EE-F05 and the network troubles have not appeared as of late. Continue to work with Express if/when it does occur.
Crew office cannot properly torque the SAMS MSG baseplate into the MSG WV	Not a good surface mount for the SAMS TSH-ES	1. ECO the SAMS AIDD to call out the torque values for the baseplate 2. Request in writing the issue and why it cannot be performed.	9/15/09 – telecon held with MSG. It was decided that the fasteners on the SAMS baseplate for the TSH-ES will not be torqued. Integrated Safety Hazards are being updated on the MSG side, and SAMS is clarifying a SAMS safety hazard. TSH installed in MSG and working with SODI. Crew procedures said to be hand tight.
Long term budget for sustaining/sparing		1. Kevin working with Bob on POP charts for FY 2012	
Don Parrott	Staffing & funding		

Top Risks

102 AMP (SAMS, MAMS, PIMS)



Criticality	LxC Trend	Approach
High	Decreasing	**M**-Mitigate
Med	Increasing	**W**-Watch
Low	Unchanged	**A**-Accept
	New	**R**-Research

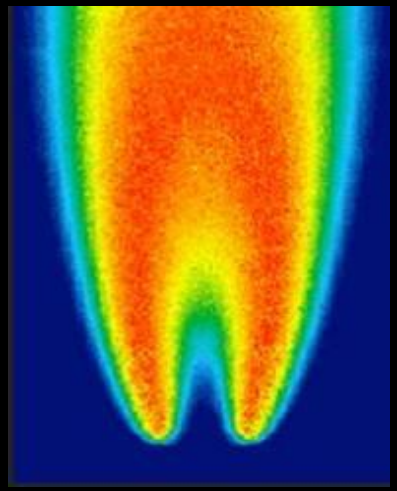
Approaches: Mitigate, Watch, Accept, Research

Risk ID	Risk Title	Risk Statement	L	C	Approach
DO102-1	TSH-ES wire size	Wire sizing could limit usage of the TSH-ES. The use of 12 gauge wire would increase the size of the TSH. Many power suppliers have 20 amp breakers.	1	2	**Watch**: Will address risk with inline breakers if a customer requires it. Not a problem for FIR or CIR. **Status**: Does not affect FCF or MSG. Will address when there is a user. **Close date**: Future User
DO102-2	Commanding Issue	NCR 237 identified: The laptop may lockup when commanding to the TSH-ES that is running at 400 Hz.	2	3	**Watch**: The system will need to be rebooted only. Alternative means to adduress this issue in future software builds will be considered. 400 Hz mode not a normal operating mode. **Status**: Waiting for funds to consider s/w fix **Close date**: On going
DO102-3	SAMS Sparing	SAMS PCS hardware not supported by the ISS program.	3	2	**Mitigate**: Ghosting function for hard drives in place. Laptop shells, spare hard drives and floppy drives have been set aside on ISS for SAMS use. **Status**: Need to configure one more set of spare hard drives **Close date**: 04/09
DO102-4	SAMS Fan Regulator	SAMS RTS Drawer #2 fan regulator frequency varies	2	4	**Watch**: Fan speed has shown the variable frequency for several months and has not shown any distinct changes in behavior over that period of time. **Status**: Need to configure one more set of spare hard drives **Close date**: 04/09

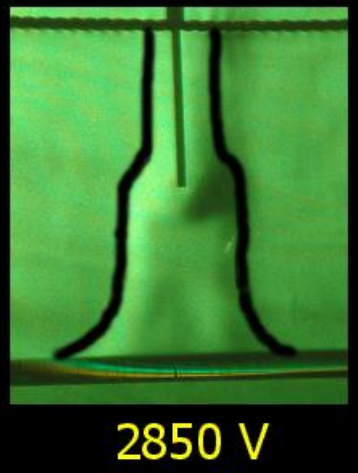
110 Advanced Combustion via Microgravity Experiments (ACME)

s-Flame
(drop test)

Flame Design
(drop test)



CLD Flame
(aircraft test)



E-FIELD Flames
(1g schlieren)

Manager: Brian Borowski

NASA Program Manager: Tom St. Onge
NASA Project Lead: Mark Hickman
NASA Project Scientist: Dennis Stocker

SpaceDOC 110 encompasses the initial development phase of ACME including requirements and verification development and planning, flow system breadboard interface with existing FOMA breadboard and color camera trade studies to ultimately provide a new diagnostic capability for CIR. Work on Engineering Model design is included following completion of Preliminary Design Review in January of 2011.

Issues and Concerns

110 Advanced Combustion via Microgravity Experiments

Issues	Potential Impact	Action Plan	Resolution Date
Coming out of the Phase 0/1 Safety Review there are some potential programmatic impacts involving materials, basic design elements and test matrices	Could result in changes to the design and/or test matrices	Project Scientist has been informed of areas of concern and will address and baseline the test matrix . Materials concerns are being re-assessed	4/12 Project Scientist has addressed the potential impacts. Decisions are now at a programmatic level
Following functional testing of the E-Field Subsystem and EMI testing of the same subsystem some requirement compliance issues have arisen with regard to rise times and energy levels	Unable to meet science requirements	Project Scientist has been informed of test results and is assessing the impacts to the test matrices with the PIs	12/12

Monthly ACME Highlights

- Visited Princeton Combustion Lab to learn how they make spherical burners. The technique was demonstrated and they were very helpful in sharing design concepts and hardware
- Continued build of EM Avionics Package
- Continued build of Flight Avionics Package
- Completing flight drawings for Color Camera Package. Review redlines are being incorporated before going to a final engineering and structural/materials review
- Build of the EM Cube assembly underway
- Working with Integration Group to ensure a PIL simulator is available to ACME in December for EM Avionics Package testing

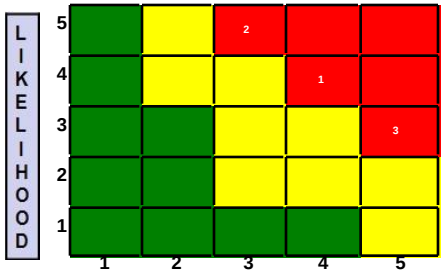
Milestone Schedule

110 Advanced Combustion via Microgravity Experiments

WBS	Milestone FY12	Credit	Start	Baselined	Projected	Actual	Scheduled Variance
1.1	Interim Design Review	100% package complete	May 2012	June 2012		June 2012	

ACME

Task Level Risk Assessment



Criticality

- High
- Med
- Low

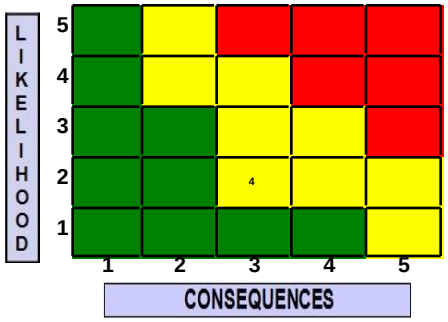
L x C Trend

- Decreasing (Improving)
- Increasing (Worsening)
- UnChanged
- * New since last month

Risk Id	Risk Title	Risk Statement	L	C	Approach
ACME-021 ➡ Technical Mroczka	Inability to disassemble Mass Flow Controllers for Conformal Coat / Ruggedizing	Given that the Mass Flow Controllers cannot be fully taken apart to perform conformal coating and staking on the electronic boards; then there may be an incompatibility with elements of the chamber atmosphere including fuels, oxygen and diluent mixtures causing CIA electronics to fail.	4	4	**Mitigate:** This risk will be re-assessed after reviewing the results of the analysis scheduled to take place by September 2012. **Status:** 08/21/12 - Contacted MFC vendor, obtained bill of materials and assessment is on-going. 09/18/12 - Zin M&P is assessing and is on track for resolving by the end of September. **ECD:** 09/28/2012
ACME-014 ⬇ Technical Rogers	IPSU to IOP image transfer rates take too long	Given that the current data transfer rates from the IPSU to the IOP is severely limited, transfer of ACME data may take an unacceptable amount of time and may reduce obtainable science for the allotted operational time on board ISS.	5	3	**Watch:** Need to keep an eye on this and follow up with the CIR team to keep updated on transfer improvements. **Status:** 12/13/11 - The FCF team has improved transfer rates by utilizing both IOP hard drives. The FCF team needs to provide quantitative data transfer rates. 03/27/12 - Risk reviewed by the ACME team and no staus updates at this time. 05/08/12 - ACME RMWG has reviewed this risk and there are no updates at this time. 06/12/12 - Risk was reviewed at the monthly ACME RMWG and there are no updates at this time. 07/27/12 - Negotiations to fund an IPSU upgrade with increased data transfer rates has been intiated. 09/12/12 - Currently the IPSU to IOP transfer rate is approx 1.3 Mbps. The IPSU redesign concept calls for a direct downlink from the IPSU directly to ground with ISS downlink capability at 20Mbps. FCF project is submitting a funding request to support development of the concept. 09/18/12 - ACME needs a minimum of 10 Mbps. **ECD:** 12/31/2012
ACME-010 ➡ Technical Mroczka	CIA electronics and fuel mixture compatibility	Given that the CIA electronics is exposed to chamber atmosphere; then there may be incompatibility with elements of the chamber atmosphere including fuels, oxygen and diluent mixtures causing CIA electronics to fail.	3	5	**Mitigate:** This risk will be re-assessed after reviewing the results of the analysis scheduled to take place by September 2012. **Status:** 08/21/12 - Assessment is on-going.

ACME

Task Level Risk Assessment



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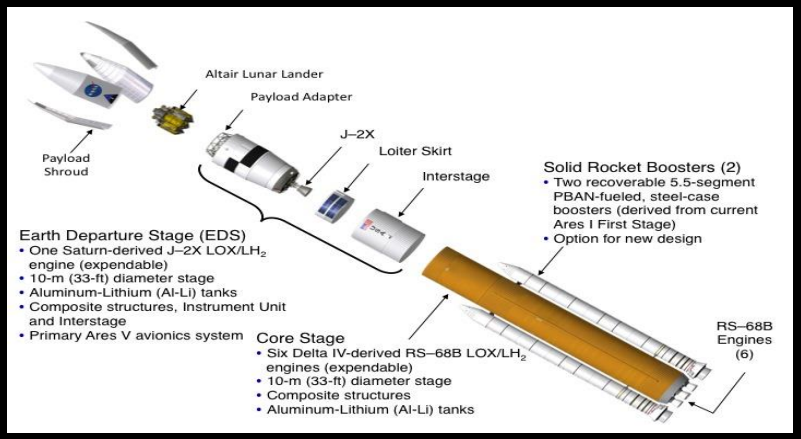
- UnChanged
- New since last month

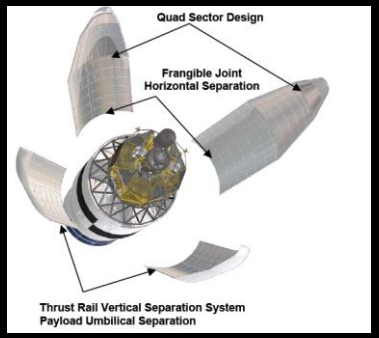
Risk Id	Risk Title	Risk Statement	L	C	Approach
ACME-008 ➡ **Technical Gobeli**	E-field emission exceedences	Given that there might be e-field exceedence emissions; then there is the possibility that the EMI requirement will not be met and ACME hardware would be adversely effected causing diminished science to occur.	2	3	**Mitigate:** The ACME team will be intensively working with the EMI lab to determine what if any EMI exceedences occur to meet its EMI requirement and minimize any impact on the hardware. **Status:** 1/11/11 Planned testing has been delayed due to funding. 11/23/10 No changes or updates at this time. 9/14/2010 No changes or updates at this time. 05/03/11 - 5/3/2011 - This risk will be on hold until the Engineering Model is completed. 05/31/11 - 5/31/11 - Nothing new to report. 02/14/12 - Still appear to be on target for test date. 06/12/12 - EMI testing has begun and should be completed by the end of June 2012. 08/21/12 - EMI report # GRC-EMI-RPT-331 has been written. 09/18/12 - ACME Project Scientist is in discussions with the ACME team about potential requirement change or requirement deviation. **ECD:** 05/31/2013

119 Ares V Payload Shroud Element (PSE) Project

ZIN Manager: **Michael Johanson**
ZIN Engineering Lead: Bill Dial

NASA Project Manager: Gerry Sadler





SpaceDOC 119 encompasses evaluation of potential manufacturing approaches focusing on the Heavy Lift Payload Shroud but not be limited to (e.g. can include other element composite dry structures). Approaches may include: existing composite manufacturing sites, MAF, and new sites. ZIN and our subcontractor Zero Point will identify needed composite manufacturing assets and capabilities to support current Heavy Lift Vehicle concept and associated requirements based on manufacturing assessments done by the NASA ESMD ACT project. The scope of the analysis shall include logistics and supply chain requirements.

Issues and Concerns

119 Ares V Payload Shroud Element (PSE) Project

Issue	Potential Impact	Action Plan	Resolution Date
None			

Monthly PSE Highlights

- Continued to provide support in updating the BOE for the Baseline SLS Fairing (Phase 0, Phase 1, & Phase 2)
- Continued to work Shroud Structural Analysis and Design task.
- A no cost extension was implemented extending the POP to 12/31/2012.

Milestone Schedule
119 Ares V Payload Shroud Element (PSE) Project

Milestone (Cal 10)	Baseline (Cal 10)	Projected	Actual	Schedule Variance
Payload Shroud Technology Development Plan	November 30, 2010	Nov 30, 2010	Nov 30, 2010	None
Preliminary Element Integration Assessment Report	January 15, 2011	Jan 15, 2011	Jan15, 2011	None
Manufacturing Implementation Plan	February 15, 2011	Feb 15, 2011	Feb 15, 2011	None
Final Element Integration Assessment Report	March 25, 2011	April 25, 2011	April 25, 2011	1 month no cost extension approved by Gerry Sadler
Provide a Basis of Estimate Bottoms Up Assessment of the Current SLS Shroud for metallic and composite 8.4 meter baselines.	June 6, 2011	June 6, 2011	June 6, 2011	None
Assessment of CPS Impacts on Payload Shroud	September 30, 2011	Sept 30, 2011	Oct. 13, 2011	Delivery slipped based on stop work due to lack of funding, slip was approved by Gerry Sadler
Fairing Basis of Estimate Updates 1. PPBE13 Update 2. Initial PPBE14 Update 3. Final PPBE14 Update	1. Oct. 30, 2011 2. May 30, 2012 3. Sep 30, 2012	1. Oct. 30, 2011 2. May 30, 2012 3. Sep 30, 2012		The PPBE schedule is determined by NASA and the dates of the deliverables are subject to change.
Analysis and Design Reports 1. SRR 2. SDR	1. Oct. 1, 2011 2. Feb 1, 2012	1. Feb 1, 2012 2. Feb 1, 2012		SLS SRR & SDR are NASA determined dates. They are currently planned to be combined and held Feb. 15, 2012.
Payload Fairing Evaluation: Test Plans and Procedures	15 day prior to testing			Work is de-scoped
Delta IV Stage Integration Assessment	Jan 31, 2012	Jan. 31, 2012		Work is de-scoped

Risk Matrix - PSE

119 Ares V Payload Shroud Element (PSE) Project

Study Delivery Order – No risks

126 Human Health Countermeasures Project (HHC)

Project Manager: Chris Sheehan

SpaceDOC 126 continues the work performed under SpaceDOC 113 to manufacture and flight verify the CSM/Glenn Harness as a crew preference item. Additionally, this delivery order carries drawing and documentation build information and materials research to allow for removal of the SDTO containment bag

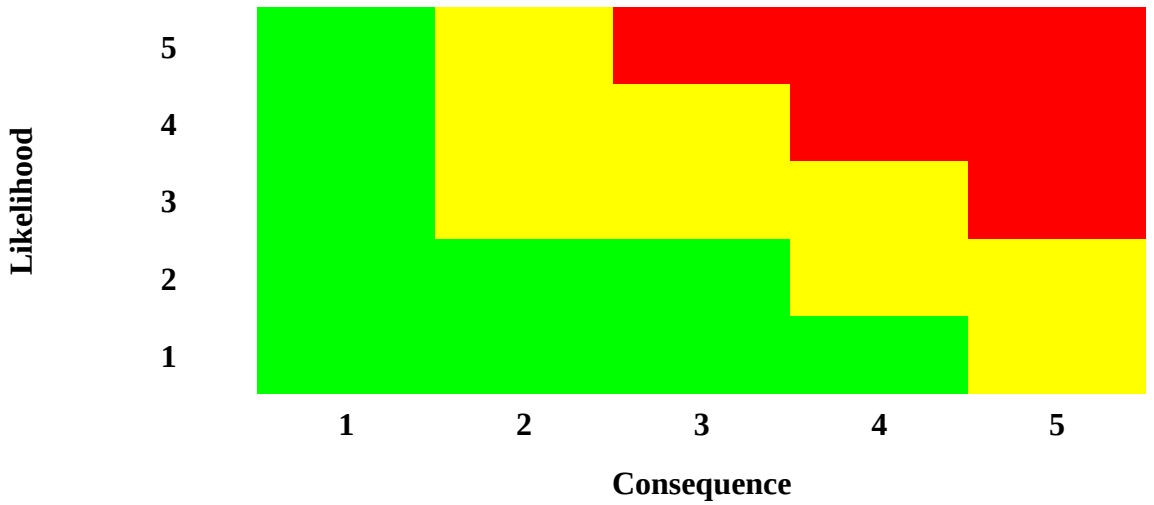
EVM Milestone Schedule

126 Human Health Countermeasures (HHC)

WBS	Title	EVM Method	Start Date	End Date	EVM Plan
1.1	**Management**				
1.1.1	Project Management	LOE	6.01.11	5.31.12	8.3%/month
1.1.2	EVM/Cost Reporting	LOE	6.01.11	5.31.12	8.3%/month
1.1.3	Configuration Management	LOE	6.01.11	5.31.12	8.3%/month
1.1.4	Property Management	LOE	6.01.11	5.31.12	8.3%/month
1.1.5	Shipping and Receiving	LOE	6.01.11	5.31.12	8.3%/month
1.1.6	Purchasing	LOE	6.01.11	5.31.12	8.3%/month
1.3	**Product Assurance**				
1.3.1	Quality Management	LOE	9.14.11	5.8.12	12.5%/month
1.7	**HHC Final Design and Fabrication**	LOE	6.01.11	5.31.12	8.3%/month
1.8	**System Assembly, Integration, Test and Launch**	LOE	9.21.11	5.22.12	12.5%/month

Risk

126 Human Health Countermeasures (HHC)



NO RISKS IDENTIFIED AT THIS TIME

Trend Legend

Upward Downward No Change New

Issues and Concerns
126 Human Health Countermeasures (HHC)

Issue	Potential Impact	Action Plan	Resolution Date
None	-	-	-

NASA GRC SpaceDOC

DO-128 Communications, Navigation, and Networking Reconfigurable Testbed (CoNNeCT-2)

ZIN Project Lead: Ray Pavlik
ZIN Software Lead: Jennifer Keller

NASA Project Manager: Diane Malarik
NASA Deputy Project Manager: Mike Zernic
NASA GRC PI: Rich Reinhart
NASA GRC Deputy PI: Sandy Johnson

- An on-orbit, adaptable, Software Defined Radios (SDR)/Space Telecommunications Radio System (STRS)-based testbed facility to conduct a suite of experiments to advance technologies, reduce risk, and enable future mission capabilities on the International Space Station (ISS).
- DO-128 Scope of Work includes:
  - Performing configuration management activities, including software.
  - Remaining development of the CoNNeCT Flight and Ground System Software.
  - Integration with the Payload Operations Integration Center (POIC) and SCaN-provided SN, NEN, and NISN.
  - Sustaining Engineering and Operations of the Flight and Ground System.
  - Experiment Integration and Operation

DO-128 Issues and Concerns

Issue	Potential Impact	Action Plan	Resolution Date
None			

DO-128 Monthly Highlights

- Subtask A CM/DM
  - Reviewed, formatted, and released multiple Document, Process Plans, Change Requests, and NCRs.
  - Supported GIU drawing updates.
  - Processed for storage as-run Mission Operations Procedures.
  - Created a plan for branch merging order for the first flight software update.
  - Supported SCaN team with various mainline requests: sent specific file versions to requestors, created branches.
- Subtask B SE&I and Experiment Integration
  - GIU GPS Status
    - Coordinated system installation by Call Henry.
    - Completed component characterizations (VNA S-parameters) where possible.
  - ELC SCS 28VDC Power Supply with the current display issue - Tested the power supply under load 112 hours, the Ammeter read correctly throughout the test.
  - Downloaded GIU Avionics Files per GIU Maintenance Procedure (GRC-CONN-PLAN-0895).
  - GIU Electronic Log
    - Trained GIU Users on the use of the GIU Log.
    - Commissioned the GIU Electronics Log.

DO-128 Monthly Highlights

- Subtask B SE&I and Experiment Integration (continued)
  - Supported Mission Ops dry runs with GIU, assisted with GD characterizations, and continued with GIU EM Harris radio characterizations.
  - Troubleshooting the GD BER Curve/ Digital AGC issue(s):
    - The troubleshooting has isolated the problem to several possibilities, and during the testing it seemed this could be an intermittent problem.
    - Additional troubleshooting procedures are being developed. Also some of the earlier versions of data from original testing will be looked at again to determine if this issue had been there but was never noticed.
  - Supported 3 Experiment Question disposition meetings to work through questions submitted to the SCaN Testbed project by prospective experimenters. 5 new questions were received and 8 questions were dispositioned/closed. Overall, a total of 45 questions have been received and 33 questions have been closed.
  - Created a draft of an experiment requirements table and distributed it for review. A modified version of the table is being used to capture requirements for SCaN Testbed commissioning activities.
  - Attended face-to-face meetings with two potential SCaN Testbed users: TDRS K check out team and SN Ground System Sustainment implementation team. Of the two, the TDRS K team has a potential need for an on-orbit experiment in Feb/Mar 2012.
  - Developed a draft mark up Experiment Plan for the TDRS K team. Since the envisioned experiment will not require new software to be developed, the portions of the plan template that dealt with software requirements were N/A'd.
  - Initiated an integration meeting between Dave Brooks, Experiment 3, and the SCaN Testbed software team. Brooks has developed software intended to run on the Avionics and a number of integration issues need to be addressed.

DO-128 Monthly Highlights

- Subtask C Flight & Ground Software
  - Completed NRB Action Item #38 - "Task Priority Conflict JIRA" .
  - Continued working through logistics issues with moving SDSs from GRC to ZIN.
  - Started work on the Avionics Scripting test plan.
  - Merged APS code to fix the counts to degrees coefficient, tested this code on the GIU and created a CR for its incorporation into the PAS build.
  - Developed a design for telemetry storage and retrieval for project personnel and experimenters.
- Subtask D Mission Operations
  - Created Configuration Data Sheets for each week of Flight Operations. These sheets are used as part of the planning process during procedure building. They are also used to provide command parameter strings during flight operations to help facilitate commanding and minimize errors. The Data Sheets contain information for each day's operations such as Waveform details, SN/NEN configuration details and names of files to be created and transferred .
  - Continued work on SFEP User's Guide. The guide contains step-by-step instructions for how to configure the GRC and WSC SFEPs for operation of all SDRs using both the Near Earth Network (NEN) and Space Network (SN). The goal is to have the draft ready for review by October 5th .
  - Provided final draft of 2012 SSP GRC STCC Experimental Communications Path Support_v1-0 for submission to GRC IT Security POC on 8/30 with all security controls addressed. FISMA authorization was approved by the CIO on September 12. Waiting on the FISMA authorization paperwork to be finalized by GRC Security POC so it can be submitted along with the NISN IONet Compliance form to NISN Security POC at GSFC.

DO-128 Monthly Highlights

- Subtask D Mission Operations (continued)
  - Provided SFEP & LSIMSS Administration Guide v1.0 to GRC IT Security POC. It will be used by the STCC Administrator to manage system software updates and system security functions. The guide also provides details on the SFEP hardware. This document, along with the SSP was needed for FISMA authorization. Will submit to CM for baseline/signature when final comments are received from Steve Sinacore, and Mike Aulisio .
  - Updated the SN/NEN Planning Guide to include additional planning information, the update is available in hardcopy in the STCC. A CR against the baseline document will be submitted by the end of September.
  - Developed Checkout Procedures and Scripts for on-orbit operations. Performed dry runs of procedures on the GIU.
  - Interfaced with ISS Electrical requirements owner Henry Hoang of Boeing. He had questions regarding SCAN TB closure of SSP 57003-ELC requirement 3.2.3.2.2.1.4, 120 Vdc Operational Non-Normal Voltage Transients. Pointed him to VCN-EF-0400 as well as the “Operational 120 Vdc Non-Normal Voltage Transient Analysis” GRC-CONN-ANA-0862. After a teleconference, he expressed verbal concurrence and satisfaction with the explanation.
  - Mission Planning TCR: The TCRs (TDRSS Contact Requests) were generated to support the pass planning for Weeks 0A, 01, 02, 03 for Increment 33. This involved multiple revisions to support ephemeris updates and reboost events.
  - Mission Planning TRK: The LynxCAT track files supporting the MGA tracking events were successfully completed for MGA events on GMT 257 and 263. The testing on GMT 257 illuminated a time difference between the avionics and TRK synchronized GMT. This was determined to be due to the avionics tracking GPS time which is devoid of 16 leap seconds since 1980. This required LynxCAT software updates to compensate for the bias in the track file generation.

DO-128 Monthly Highlights

- Subtask D Mission Operations (continued)
  - Characterization - APS: The APS characterizations tests were successfully completed. All APS open and closed loop configuration tests yielded a very consistent, predictable set of data. A quick data analysis was conducted and indicated that the gimbals are performing with a minimum of stiction. This is indicated by the lower velocity motions which are normally found to be clipped by the deadband controller for the comparable motions operating on the ground. At present, there are no plans to recompute the embedded SIL models using this new data since it matches very closely to the older data. Other tests, control stop test and placard walk, were successfully completed. Overall, the tests gave a strong indication that the gimbals and controller configuration are operating at peak condition and ready to support tracking motions.
  - Following the meeting to discuss the command changes applied in situ to prevent an improper APS initialization outside the SS (software stops), a detailed 2D placard model, showing HS, CS, SS and LL was created and delivered to John Morrison for integration with CTADS. This will give the operations group a much better indication of APS orientation with respect to a flattened 2D AZ-EL angle map.
  - Created a spreadsheet to convert ISS BAD telemetry data measurements into thermal modeling parameters that will be used to update the SCAN Testbed Thermal model developed by John Siamidis.
  - Based upon meetings with the Science/Comm team, a number of new SSCs need to be implemented in NCCDS to support Checkout and Commissioning for GD (8361), JPL (8372) and Harris (8373). Have mapped the launch waveforms to the GD and JPL SSCs. Based upon this mapping, modifications in the form of database change requests (DBCRs) were made to the SSCs on the NCCDS and SNAS Ops databases. Waiting for input from Network Ops Manager (NOM) and WSC Ops on what input parameters need to be changed if any in the Harris SSCs based upon the currently defined Harris waveforms.

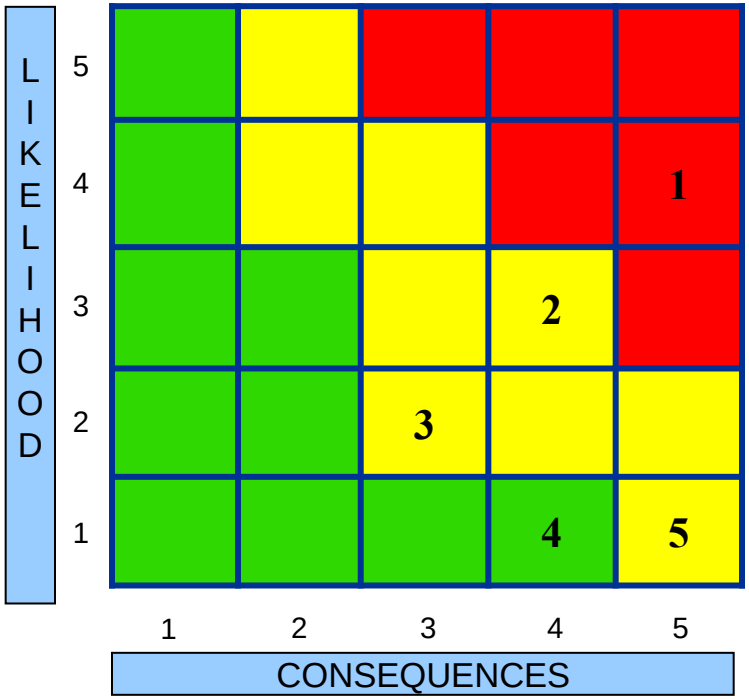
DO-128 2012 Deliverables List

Hardware/Software Deliverables

No.	Item Description	Planned Completion Date	Actual Completion Date	Note
a)	Subtask A –CM/DM: Configuration Management and Tracking System (CMTS)	December 31, 2012		Hardware
b)	Subtask C – Flt & Grnd SW: Verified Post-Ship Flight Software for subsequent upload to the Flight System	July 2012		Software – This has been rescheduled to December 2012.
c)	Subtask C – Flt & Grnd SW: Verified Ground Software required for JAXA Ground Processing	February 2012	February 2012	Software
d)	Subtask C – Flt & Grnd SW: Ground Software to support Mission Simulations	Q3 FY12	July 12, 2012	Software – Final Mission Simulation held 07/12/12.
e)	Subtask C – Flt & Grnd SW: Verified Ground Software, suitable for use during C/O & C	June 2012	August 2012	Software - SCaN Testbed operated for first time on-orbit on 08/13/2012.
f)	Subtask C – Flt & Grnd SW: Verified Ground Software, suitable for use with Post-Ship Flight Software	July 2012		Software – This has been rescheduled to December 2012.
g)	Subtask D – Mission Ops: Control Center Equipment for use during Mission Simulations and Mission	Q3 FY12		Hardware – No additional equipment required to date.
h)	Subtask D – Mission Ops: Data Distribution Services Software	May 2012		Software – Moved to December 2012 in order to capture lessons learned from C&C.

DO-128 Risk Matrix Overview

STATUS AS OF: 8/25/12



LxC Trend	Rank	Approach	Risk Title
➔	1	M	Underfunded Operations and Experiments Phase
➔	2	M	Experimenter Software Interface
➔	3	M	Loss of Experienced Software Personnel
➔	4	M,W	ELC HRDL Repair
N	5	M,W	Lack of GIU Spares

Criticality

High

Med

Low

L x C Trend

🡻 Decreasing (Improving)

🡹 Increasing (Worsening)

➔ Unchanged

N New

Approach

M – Mitigate

W – Watch

A – Accept

R – Research

C – Closed

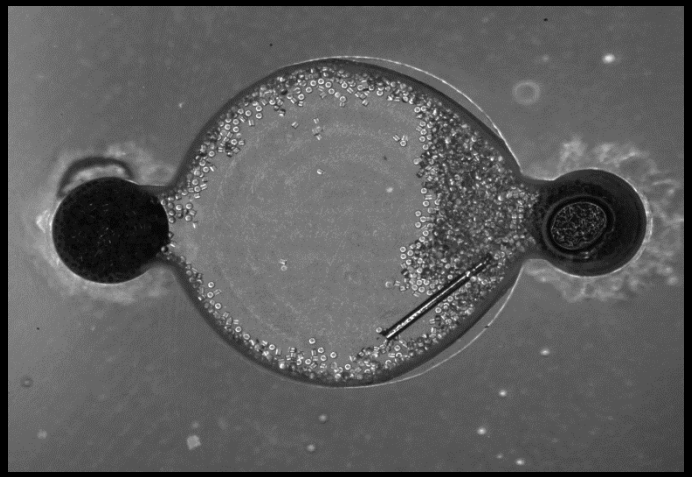
129 Advanced Colloids Experiment (ACE)

May 2012

ZIN Project Lead: Hugh Arif
ZIN Systems Lead: Tibor Lorik

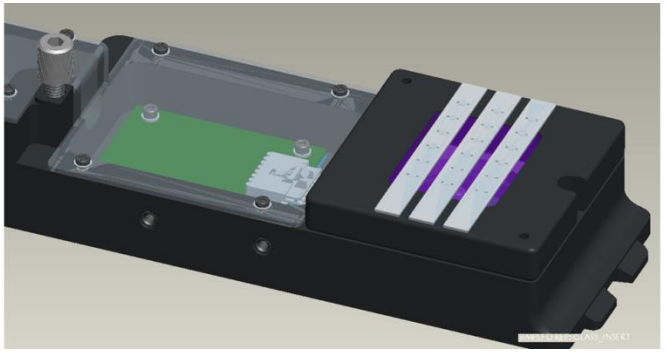
NASA Project Manager: Ronald Sicker
NASA Project Scientist: William Meyer

- ACE Program of flight experiments will use the existing Light Microscopy Module (LMM) hardware in the Fluids Integrated Rack (FIR) aboard the International Space Station (ISS)
- ACE is a series of microscopic imaging investigations in space of materials which contain small colloidal particles and will examine flow characteristics and the evolution and ordering effects within these colloidal materials.
- The goal of this research is to probe and understand particle scale relationships and extend the application of this knowledge from fundamental physics to technological applications



ACE-1 Flight Sample Cell showing sample particles from South Korean PI and stir bar

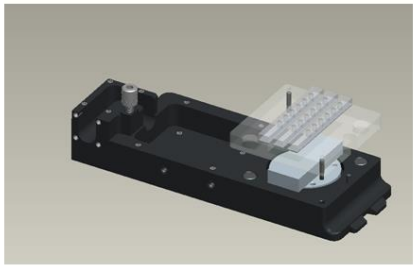
Issues and Concerns

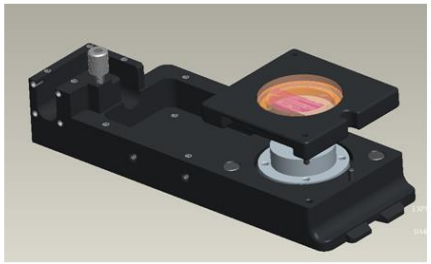
Issue	Potential Impact	Action Plan	Resolution Date
1. Manufacturability of Quartz sample cells for conformance to science requirement	ACE-M-1 and ACE-H-1 execution in time for planned flights	1. Approach is to have parallel contracts with two vendors (Translume and Spectrocell), using two different designs of sample cells. The Translume flight housing already exists (20 ordered 8/12). A new housing has been designed for Spectrocell cells, and structural analysis completed for design validation (mid-August). A PO for 2 qualification housings was placed in August 2012. NEW HOUSING DESIGN FOR SPECTROCELL WORKHORSE CELLS 	1. PO for raw material (fused silica) placed on 8/9/12, which is long lead item. PO for 4 Flight cells was placed mid-8/29/12 for delivery 11/1/12 or sooner. 2. Spectrocell FMs have been delayed to be delivered 9/17/12 (from 8/14). Vendor will supply QA paperwork, so that these cells can be classified as Flight Cells

Monthly Highlights

- **ACE-1 Launch:** Completed on-orbit testing in FIR/LMM for two ACE sample cells with the South Korean PI samples. All 10 wells in the first cell were imaged in 24 hour operations, but operations were reduced for the 2nd cell as well the wells imaged. PI representative was on hand for real-time decisions.
- **ACE-M-1, ACE-H-1 Quartz Sample Cells:** PO for quartz raw material and 4 Flight cells was placed with Translume, with cell delivery targeted for 11/1/12 or earlier. For risk mitigation, a parallel approach for quartz cell development has been adopted and a second PO placed with Spectrocell for 10 flight cells for 8/14/12 (but delayed to 9/17) delivery based on the "workhorse" design.
- **Sample Housings:** Design have been completed and POs issued for flight housings for the round (Translume) and workhorse (Spectrocell) designs.
- **Heated Sample**: A new design approach has been adopted based on leveraging the power and temperature sensing/control capability that is already available in the LMM LED Base. Two preliminary designs have been developed and purchases for breadboard testing setup have initiated. The "sample heating" requirement is required for ACE-H-1 and is now becoming a critical item for flight hardware readiness.

SAMPLE HEATING CONCEPT FOR SPECTROCELL "WORKHORSE" CELLS DESIGN





SAMPLE HEATING CONCEPT FOR TRANSLUME ROUND CELL DESIGN

Monthly Highlights

- **Oil Dispenser**: After “use testing” in the LMM GIU with a COTS multi-drop dispenser, a recommendation was made to NASA and was accepted that the legacy single drop pipettes be reflown for ACE-M-1 and ACE-H-2 flights, when oil dispensing is needed for LMM objectives. Space in the LMM AFC is limited for the multi-drop unit, which will have to be shortened. A breadboard unit will be delivered as part if the DO-129 deliverables. In addition, a longer, more permanent design will be developed in this period of performance for an automated, multi-drop dispenser.
- **Confocal**: Discussions with the P&G PIs on 8/30 are expected to produce further definitions of the confocal requirements leading to the purchase of the COTS units for breadboard testing.
- **Camera Upgrade Trade Study**: A detailed cost estimate was provided to NASA for inclusion in the Camera/IPSU Upgrade advocacy package to NASA HQ.
- **Mechanical Mixer**: Final drawings for the mechanical (drill) mixer have been completed and are under review before release for fabrication. Drawings consist of a variable speed trigger assembly as well as a MWA fixture for holding the drill in place in orbit while mixing is taking place. An ERB for the mixer (as well as other flight items for ACE-M-1) is being targeted for the week of 10/1/12.
- **Condenser**: The Condenser team has developed 5 Options for a down select towards a breadboard. One of the options included obtaining electrical and mechanical drawings to be obtained from the COTS Condenser manufacturer Leica. This is proving to be a difficult approach. These Options are to be presented to NASA and next month (9/14) for decision on a go-forward plan for COTS purchase.
- **ACE-M-1 PI visit (P&G)**: Detailed planning and lab preparations were conducted for a one-day visit 8/30 by the P&G PIs Matt Lynch and Tom Kodger (now at Harvard) to help in the definition of the Ace-M-1 flight. A similar visit by the U Penn and NYU PIs for the ACE-H-1 flight definition is being planned for mid-October 2012. Flight samples have been requested from the PIs for the ACE-H-1.

2012 Deliverables List

Deliverable	Planned	Actual	Note
None (for August)			