Return to Flight Task Group

Public Meeting

April 16, 2004
Webster Civic Center, TX

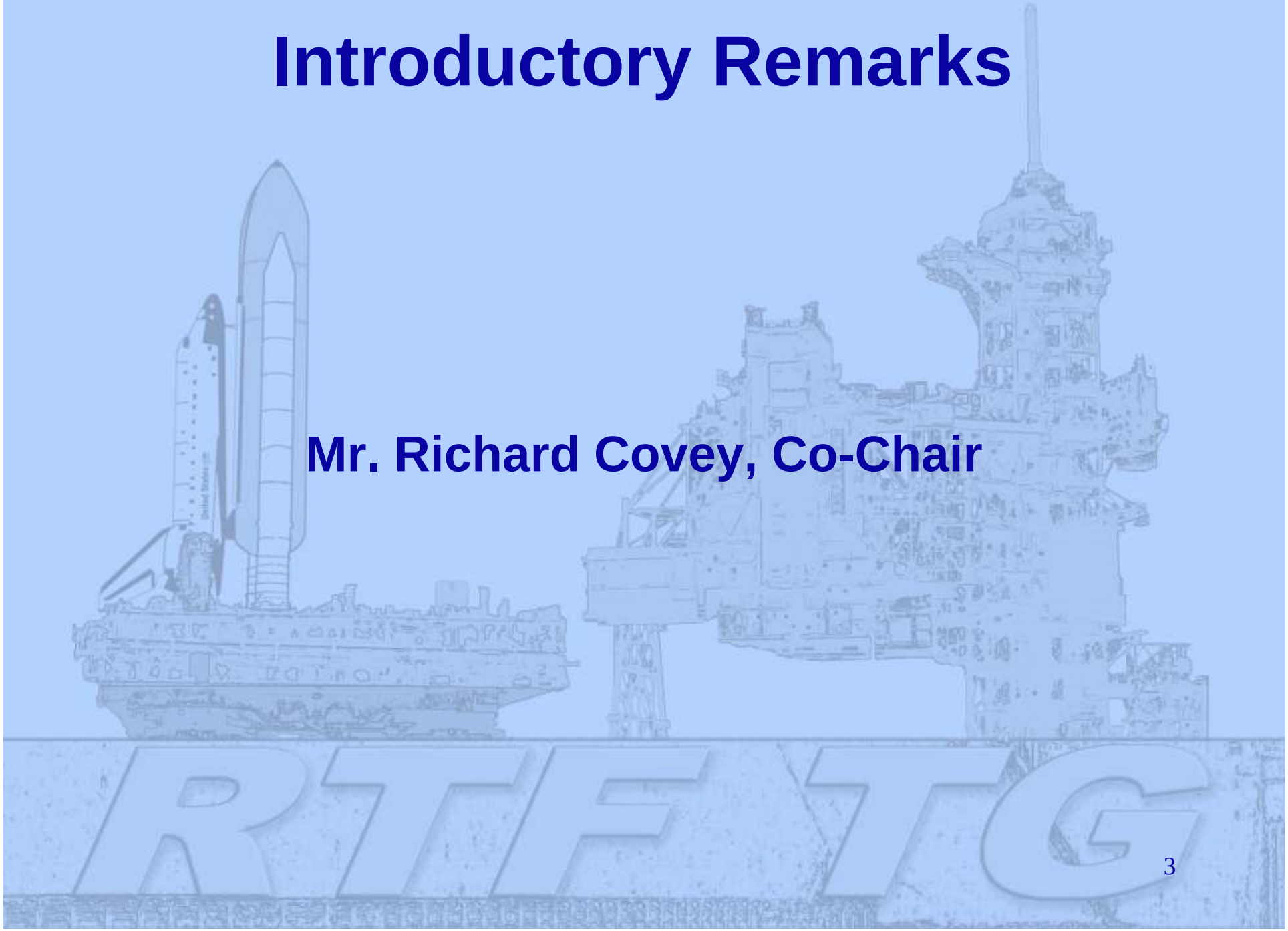
Public Meeting Agenda

April 16, 2004

Webster Civic Center, Texas

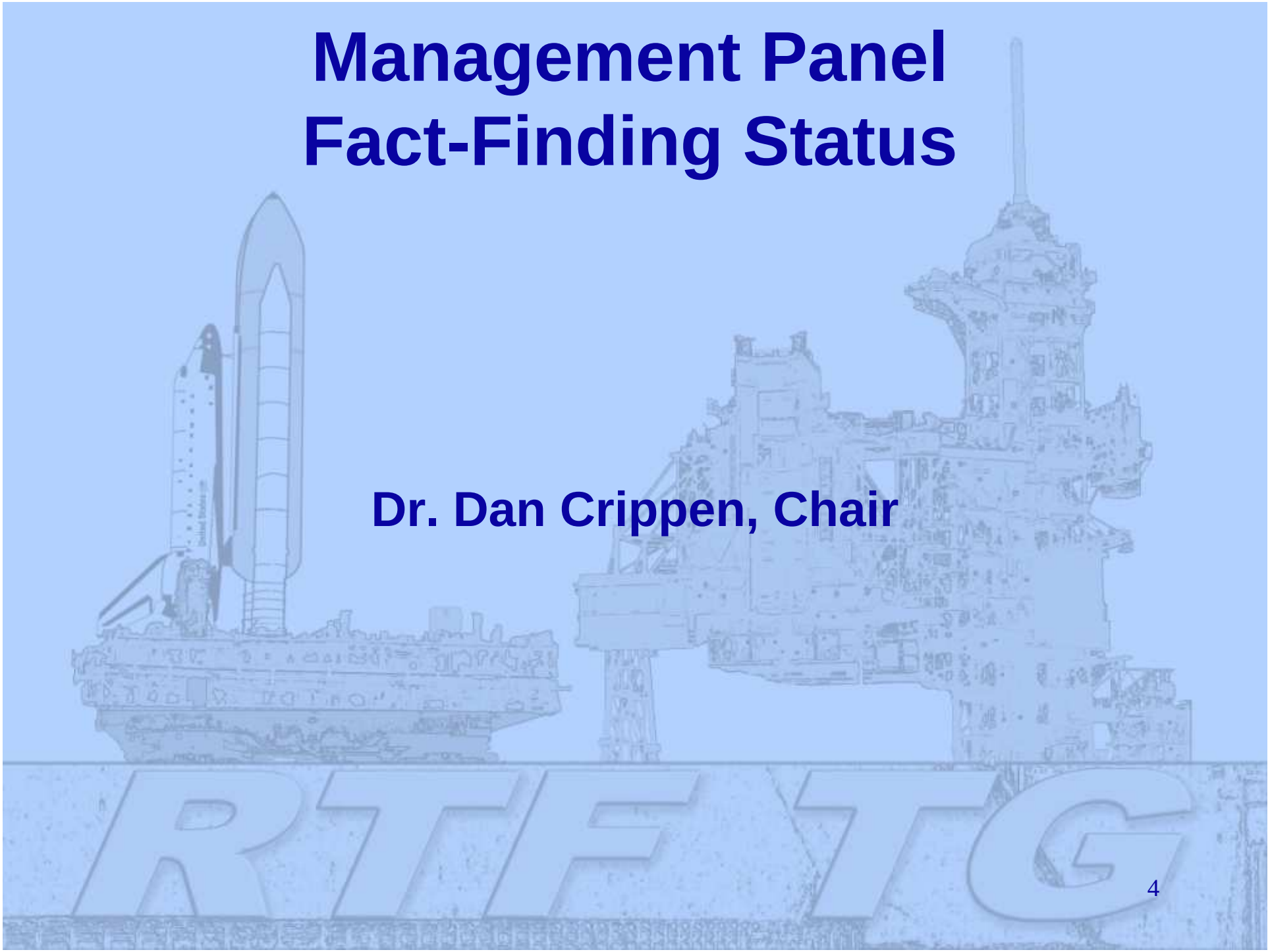
- **0800 – 0805** Introductory Remarks:
  Mr. Richard Covey – Co-Chair
- **0805 – 0855** Management Panel Fact-Finding Status
  Dr. Dan Crippen
- **0945 – 1035** Technical Panel Fact-Finding Status
  Mr. Joseph Cuzzupoli
- **0855 – 0945** Operations Panel Fact-Finding Status
  Mr. James Adamson
- **1035 – 1050** Integrated Vehicle Assessment Sub-Panel Fact-Finding Status
  Ms. Christine Fox
- **1050 – 1100** Action Item Summary and Closing Remarks
  Mr. Richard Covey – Co-Chair

Introductory Remarks



Mr. Richard Covey, Co-Chair

Management Panel
Fact-Finding Status



Dr. Dan Crippen, Chair

Management Panel
CAIB Recommendations

6.3-2 NASA/NIMA MOA

6.3-1 MMT Improvements

9.1-1 Organization

7.5-1 Independent Technical Authority

7.5-2 S&MA Organization

7.5-3 Shuttle Integration Office Reorganization

6.2-1 Scheduling and Resources

Management Panel
Acceptance Recommendation

6.3-2 - NASA/NIMA MOA
Mr. Gary Geyer

6.3-2 - NASA/NIMA MOA

CAIB Recommendation

Modify the Memorandum of Agreement with the National Imagery and Mapping Agency to make the imaging of each Shuttle flight while on orbit a standard requirement.

6.3-2 - NASA/NIMA MOA

Per agreements with other Federal Agencies, NASA is seeking all available data that may assist in the resolution of future investigations. Specific requests for data or the involvement of specific agencies will not be discussed.

6.3-2 - NASA/NIMA MOA

NASA Implementation

- Concluded MOA
- Implementing Interagency Operating Agreement
- Obtaining clearances for appropriate positions, 50%
- Rehearsing tasking, distribution, and utilization of information

6.3-2 - NASA/NIMA MOA

Panel Assessment Activities

- Agreements are in place
- Compliance is being verified by analysis, demonstration, and end-to-end simulation
- NASA Closeout package submitted
- Recommendation: Accept

6.3-1 - MMT Improvements

Mrs. Susan Livingstone

6.3-1 - MMT Improvements

CAIB Recommendation

Implement an expanded training program in which the Mission Management Team faces potential crew and vehicle safety contingencies beyond launch and ascent. These contingencies should involve potential loss of Shuttle or crew, contain numerous uncertainties and unknowns, and require the Mission Management Team to assemble and interact with support organizations across NASA/Contractor lines and in various locations.

6.3-1 - MMT Improvements

NASA Implementation

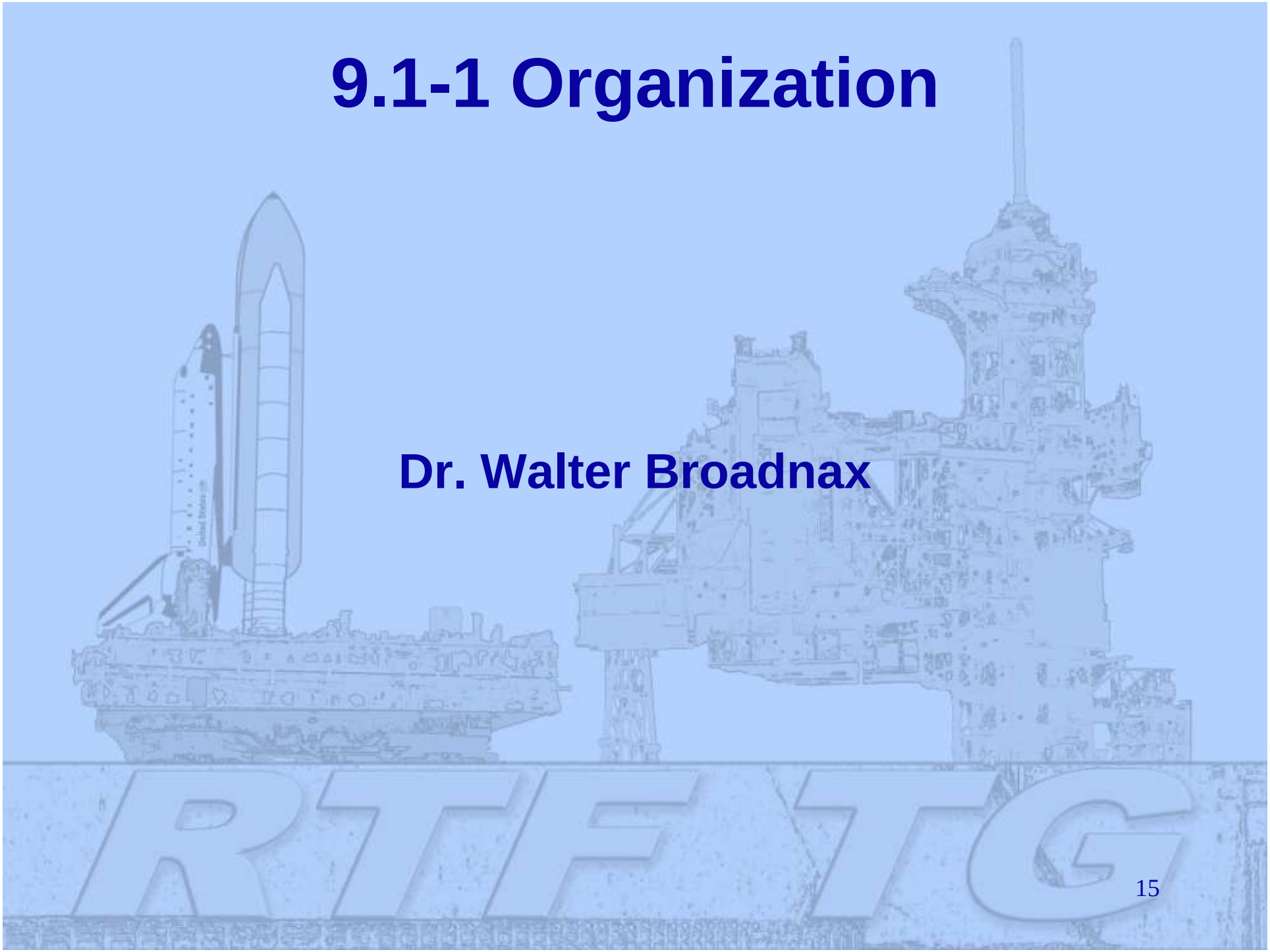
- Revised MMT membership, roles, responsibilities, and procedures – mandatory participation
- Significant expansion of formal training for MMT members
- MMT simulations will be conducted at least twice a year
- First four pre-RTF MMT simulations conducted
- Training plan with certification requirements published
- Training underway

6.3-1 - MMT Improvements

Panel Assessment Activities

- Observed MMT training and simulations
- Roles, responsibilities, and procedures still being settled
- Simulations becoming increasing realistic
- With continued maturing, simulations should become effective in identifying critical issues
- Overall—progress being made

9.1-1 Organization



Dr. Walter Broadnax

9.1-1 Organization

Recommendation

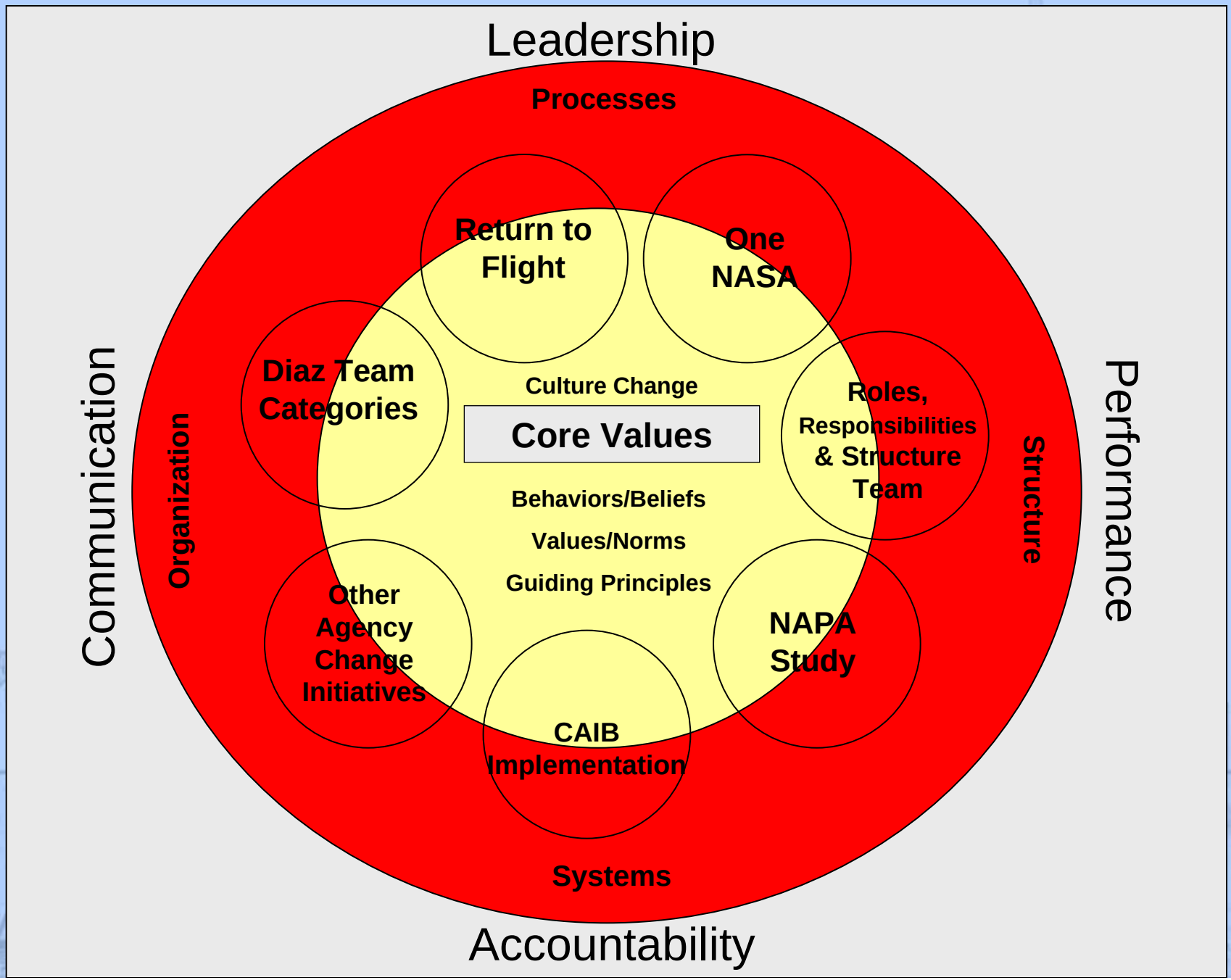
Prepare a detailed plan for defining, establishing, transitioning, and implementing an Independent Technical Engineering Authority, independent safety program, and a reorganized Space Shuttle Integration Office as described in R7.5-1, R7.5-2, and R7.5-3. In addition, NASA should submit annual reports to Congress, as part of the budget review process, on its implementation activities.

9.1-1 Organization

NASA Implementation

- Leadership recognizes cultural change important and needed
- BST hired to start 3-year assessment and cultural change process
- BST plan delivered and shared with workforce

NASA Culture Change



9.1-1 Organization

Panel Assessment Activities

- Briefed on BST initiative
- Documents and products reviewed as developed and available
- Level of activity encouraging

7.5-1 Independent Technical Engineering Authority

Dr. Dan Crippen

7.5-1 Independent Technical Engineering Authority

Recommendation

Establish an independent Technical Engineering Authority that is responsible for technical requirements and all waivers to them, and will build a disciplined, systematic approach to identifying, analyzing, and controlling hazards throughout the life cycle of the Shuttle System. The independent technical authority does the following as a minimum:

- **Develop and maintain technical standards for all Space Shuttle Program projects and elements**
- **Be the sole waiver-granting authority for all technical standards**
- **Conduct trend and risk analysis at the sub-system, system, and enterprise levels**
- **Own the failure mode, effects analysis and hazard reporting systems**
- **Conduct integrated hazard analysis**
- **Decide what is and is not an anomalous event**
- **Independently verify launch readiness**
- **Approve the provisions of the recertification program called for in Recommendation R9.1-1**

The Technical Engineering Authority should be funded directly from NASA Headquarters, and should have no connection to or responsibility for schedule or program cost.

7.5-1 Independent Technical Engineering Authority

NASA Implementation

- Draft ITA Plan in work
- Draft OSF Implementation Plan under review
- OSF Centers basic implementation underway

7.5-1 Independent Technical Engineering Authority

Panel Assessment Activities

- Participated in roundtable at NASA HQ February 23, 2004, with OSMA and NASA Chief Engineer
- Received presentation on ITA from OSMA February 24, 2004
- Received update on NNBE and NASA technical audit plans February 24, 2004
- Received update from OSMA and Chief Engineer this week
- Panel Observations
  - Encouraged with approach to date
  - Implementation issues to be resolved by NASA
  - Basic objectives necessary for success
    - Independent (from program)
    - Authority (to issue waivers)
    - Clarity (of scope and accountability)

7.5-2 S&MA Organization

Mr. Tom Tate

7.5-2 S&MA Organization

Recommendation

NASA Headquarters Office of Safety and Mission Assurance should have direct line authority over the entire Space Shuttle Program safety organization and should be independently resourced.

7.5-2 S&MA Organization

NASA Implementation

- S&MA Plan in approval cycle by NASA leadership
- OSMA approval of key S&MA personnel assignments underway
- Concurrent performance evaluation of key S&MA personnel
- AA and OSMA will be voting member of Institutional Council
- Pursuing improved process and compliance audit capability

7.5-2 S&MA Organization

Panel Assessment Activities

- Received presentation on S&MA plan from OSMA February 2004
- Received presentation on JSC S&MA plan April 2004
- Ongoing assessment by appropriate Task Group members

7.5-3 Shuttle Integration Office Reorganization

Mr. Gary Geyer

7.5-3 Shuttle Integration Office Reorganization

Recommendation

Reorganize the Space Shuttle Integration Office to make it capable of integrating all elements of the Space Shuttle Program, including the Orbiter.

7.5-3 Shuttle Integration Office Reorganization

NASA Implementation

- Reorganization
- Retained Aerospace Corporation
- Debris transport analysis
- Revitalized Integration Control Board

7.5-3 Shuttle Integration Office Reorganization

Panel Assessment Activities

- Attended second SEIO Summit at KSC January 28-30, 2004
- Ongoing assessment of reorganization plans and associated documentation

6.2-1 – Scheduling & Resources

Dr. Dan Crippen

6.2-1 – Scheduling & Resources

Recommendation

Adopt and maintain a Shuttle flight schedule that is consistent with available resources. Although schedule deadlines are an important management tool, those deadlines must be regularly evaluated to ensure that any additional risk incurred to meet the schedule is recognized, understood, and acceptable.

6.2-1 – Scheduling & Resources

NASA Implementation

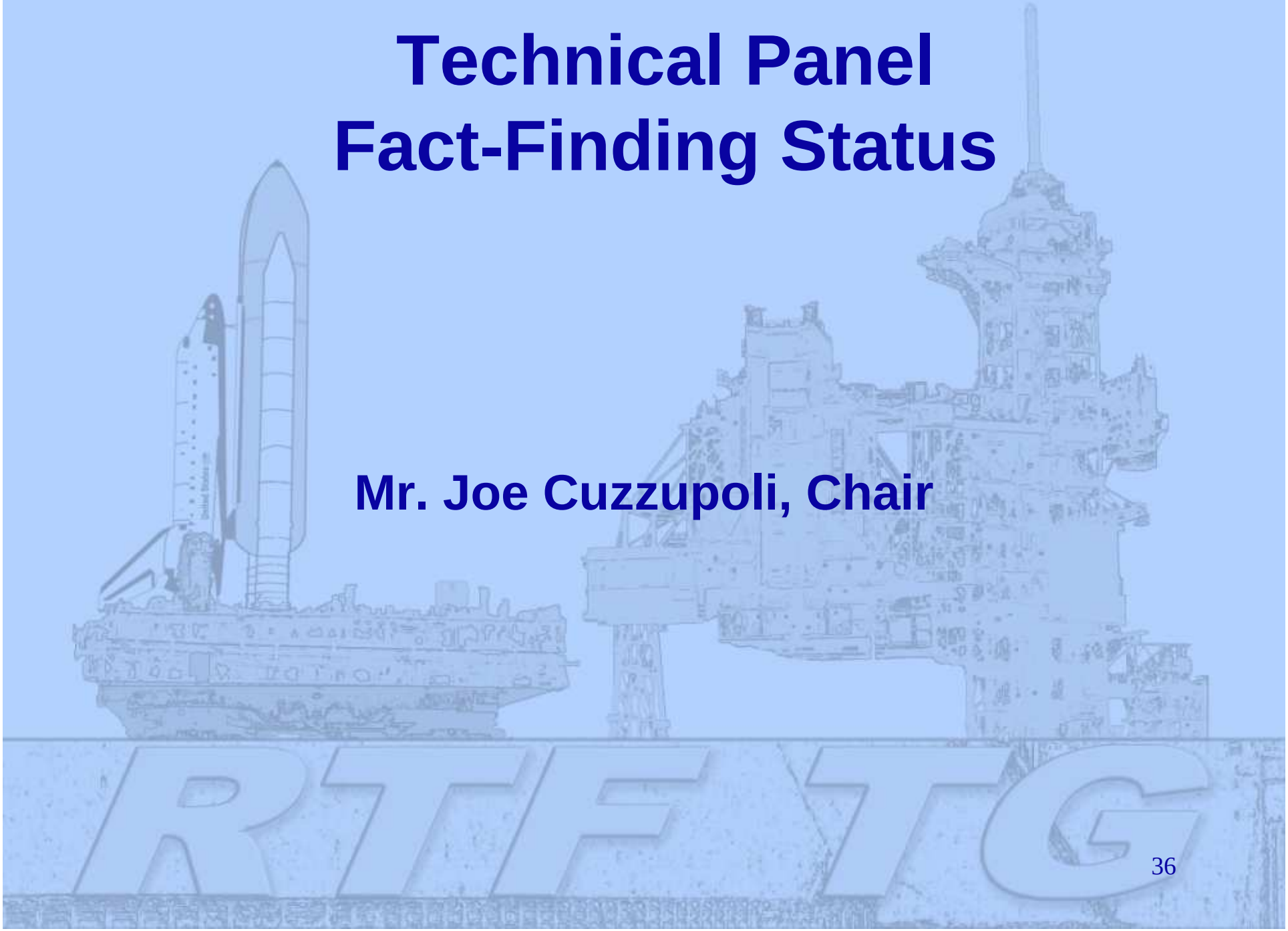
- Reinforce priorities of flight safety and mission accomplishment
- Add margin to permit changes without rippling through manifest
- Develop tools for assessing risk in budget/schedule/payloads
- Reassessment of requirements for new VISION
- Achieved passage of personnel flexibility authority

6.2-1 – Scheduling & Resources

Panel Assessment Activities

- Received briefing from NASA Comptroller and Office of Space Flight (OSF) during NASA HQ Visit on February 24, 2004.
- Briefed on NASA's One Management Information System by OSF on February 24, 2004
- Assessing effect on RTF and SSP of President's Vision
- Briefing on status by SSPO this week
- Panel's observations
  - NASA has consistently reported sufficient budget for RTF
  - Primary resource constraint for RTF may be personnel
  - FY06 budget process will affect continuing operations

Technical Panel
Fact-Finding Status



Mr. Joe Cuzzupoli, Chair

Technical Panel
CAIB Recommendations

3.2-1 External Tank (ET) Debris Shedding

3.3-1 Reinforced Carbon Carbon (RCC) Structural Integrity

4.2-3 Two Person Closeout

3.3-2 Orbiter Hardening

4.2-1 Solid Rocket Booster Bolt Catchers

6.4-1 Thermal Protection System (TPS) Inspection and Repair

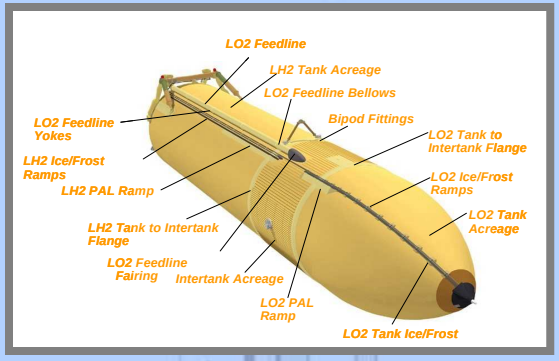
3.2-1 - External Tank (ET) Debris Shedding

CAIB Recommendation

Initiate an aggressive program to eliminate all External Tank Thermal Protection System debris-shedding at the source with particular emphasis on the region where the bipod struts attach to the External Tank.

3.2-1 – External Tank (ET) Debris Shedding

ET Return to Flight Baseline



TPS Certification Plan

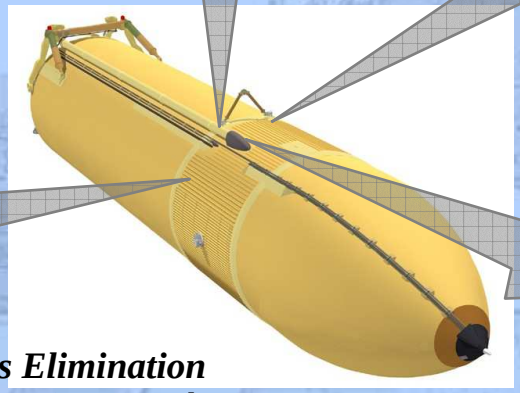
- *Baseline: Rationale for RTF based on tests, analysis, demonstrated process capability, critical defect size, allowable debris size and process control*

LO2 Feedline Bellows Ice Elimination

- *Baseline: TPS Drip Lip with gasket*

Redesigned Bipod Fitting

- *Baseline: Eliminated SOFI ramp. Heaters installed in fittings*



Intertank / LH2 Tank Flange Debris Elimination

- *Baseline: Remove / replace closeout in critical debris zone with enhanced TPS process and IML via volume fill / sealant*

ET Camera System

- *Baseline: Camera in LO2 feedline fairing*

3.2-1 – External Tank (ET) Debris Shedding

NASA Implementation

- NASA has accomplished the following:
  - ET Project has issued draft Process Verification and Validation Plan
  - Determined that NDE will be used as a confidence tool on PAL ramps
  - Re-planned LOX feed line bellows activity
  - Developed volume fill for Nitrogen displacement in intertank Y joint
  - Intertank flange critical debris zone requirement still in work; will propose +/- 90 degrees
  - ET Project has decided to rework intertank flange critical debris zone to +/- 112 degrees from Z-axis to include thrust panels
  - Reassessed the TPS verification rationale and data for all processes for applying foam and will ensure that at least two employees attend all final closeouts and critical hand-spraying procedures

3.2-1 – External Tank (ET) Debris Shedding

Extended Debris Zone

Intertank Substrate Configuration

3.2-1 - External Tank Debris Shedding

Panel Assessment

- Fact Finding Since Last Public Meeting
  - ET RFI Mini-TIM at MAF on February 3, 2004
  - ET Monthly Status Meeting on April 1, 2004
  - ET Tank Certification discussion on April 1, 2004
- Technical Panel Observations
  - NDE will be used as a confidence tool
  - TPS certification plan is based on process control
- General Panel Assessment
  - ET Project has developed draft Process Verification and Validation Plan that is under review
  - Verification and Validation Plan for flight vehicle is in development
  - Technical Panel will review the proposed plans

3.2-1 - External Tank (ET) Debris Shedding

Summary Status

- **Plan**
  - **Mature**
  - **ET Project has selected Process Control as Verification and Validation method**
- **Implementation**
  - **The program has developed an aggressive plan to eliminate critical debris**
- **Recommendation**
  - **Keep Open**

Technical Panel Acceptance Recommendations

1. R3.3-1 RCC Structural Integrity
2. R4.2-3 Two-Person Closeout

3.3-1 – Reinforced Carbon-Carbon (RCC) Structural Integrity

CAIB Recommendation

Develop and implement a comprehensive inspection plan to determine the structural integrity of all Reinforced Carbon-Carbon system components. This inspection plan should take advantage of advanced non-destructive inspection technology.

3.3-1 – Reinforced Carbon-Carbon (RCC) Structural Integrity

RTF TG Interpretation

- **Re-baseline RCC components by recycling through original manufacture process. Use advanced technology as appropriate.**
- **Pursue inspection capability improvements with newer technologies to allow NDE of RCC without removal. Assess commercially available equipment and develop standards for use against flight hardware.**

3.3-1 – Reinforced Carbon-Carbon Structural Integrity

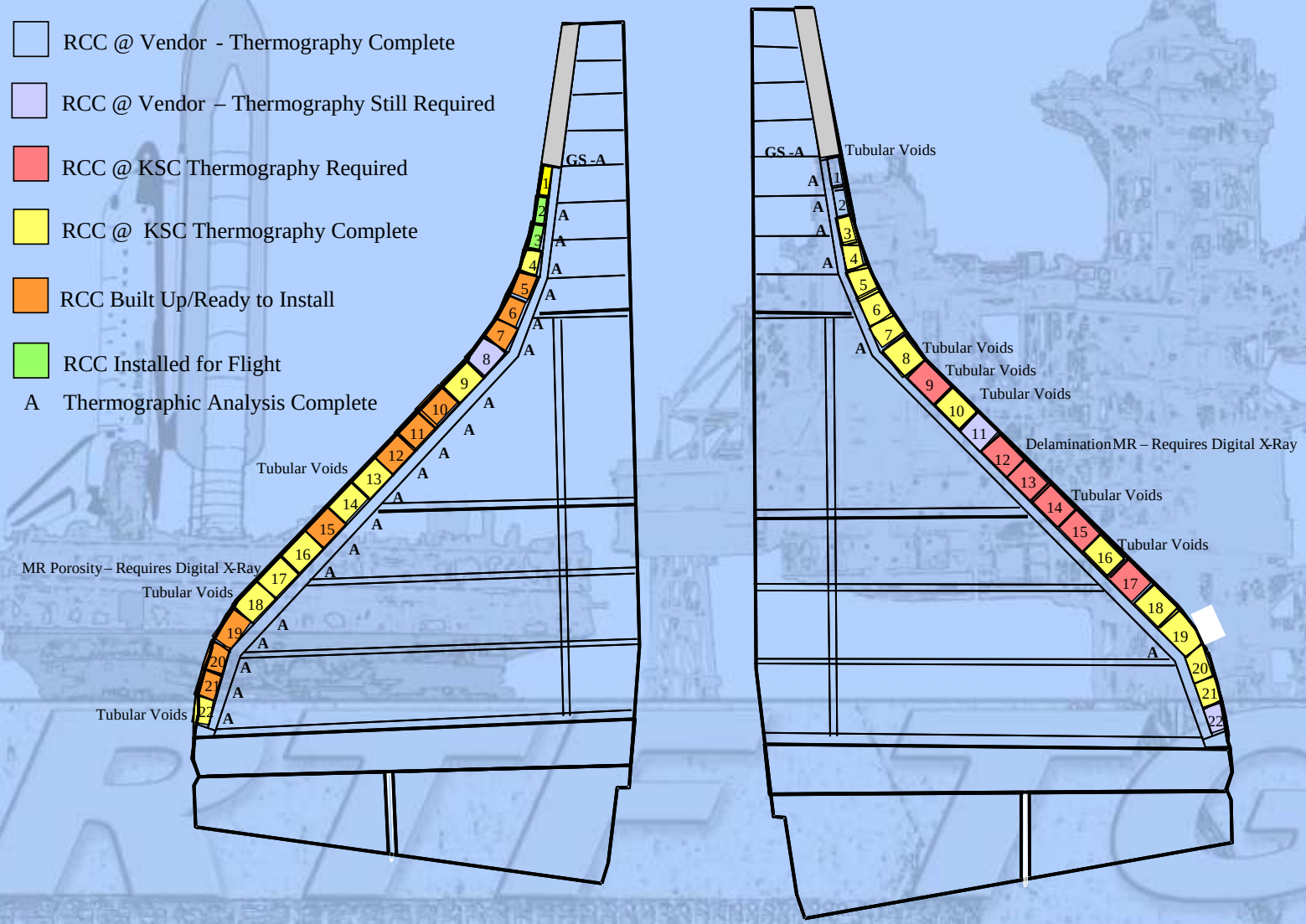
NASA Implementation

- Manufacturer re-baselined all RCC components
  - Validated conservatism of original oxidation life reduction curves
  - Verified schedules for refurb/replacement RCC panels and attach hardware.
  - Determined no unaccounted for aging by extensive material testing.
  - Determined no corrosion issues by examination of all attach hardware.
- NDE Two-Phase Approach
  - Phase 1: Quantitatively determine viability of each technique based on existing manufacturer acceptability testing capabilities and LESS localize convective oxidation NDE criteria
  - Phase 2: Develop selected techniques into “turn-key” systems
- Most Promising In-Situ Techniques
  - Thermography, Contact Ultrasonics, and Eddy Current
- Data Fusion Capability
  - Combined team is developing computer based visualization system to allow for comparison of thermography and other sensors for data evaluation

3.3-1 – Reinforced Carbon-Carbon (RCC) Structural Integrity

OV-103 RCC Inspection and Installation Status

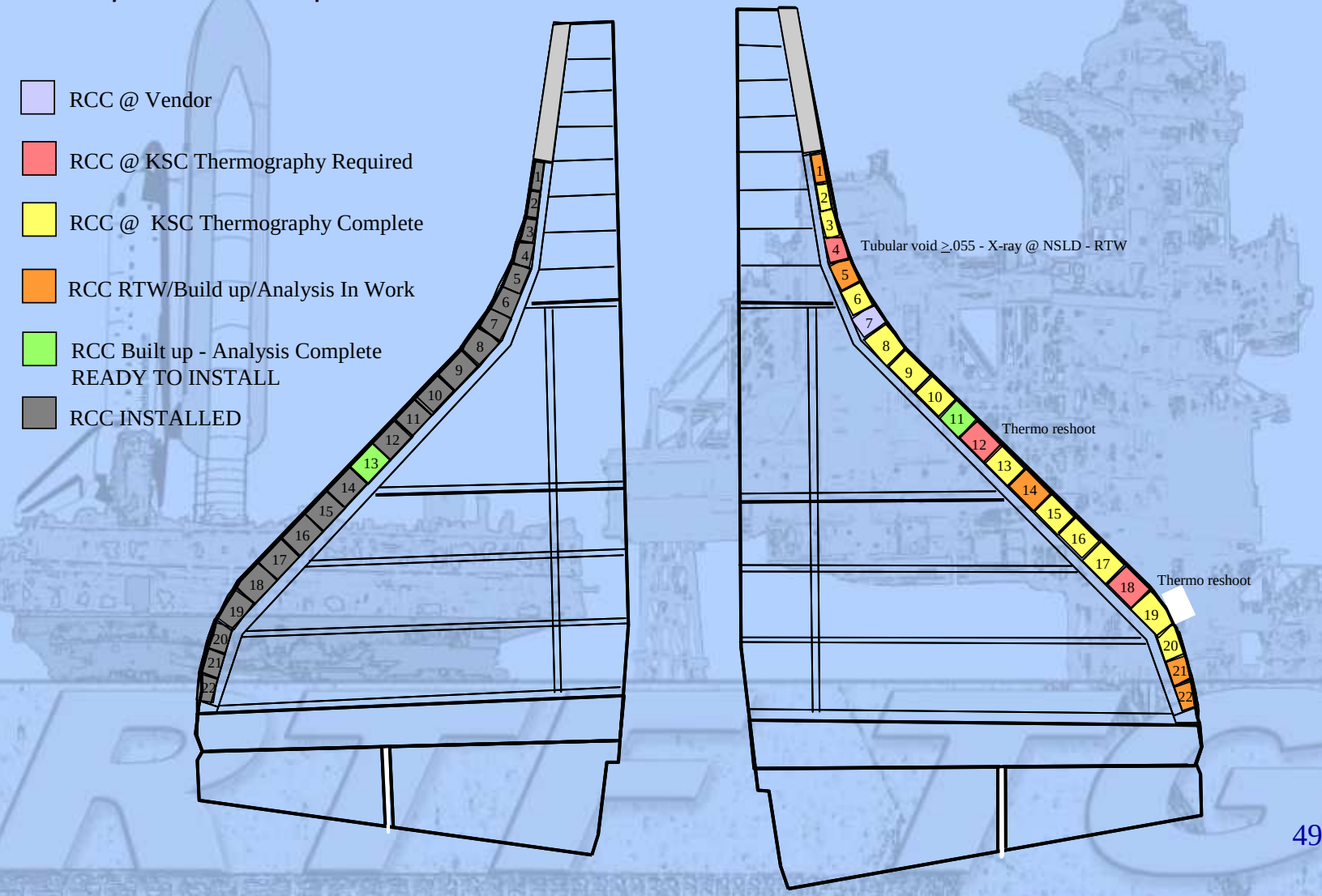
Information from USA as of mid- March 2004



3.3-1 – Reinforced Carbon-Carbon (RCC) Structural Integrity

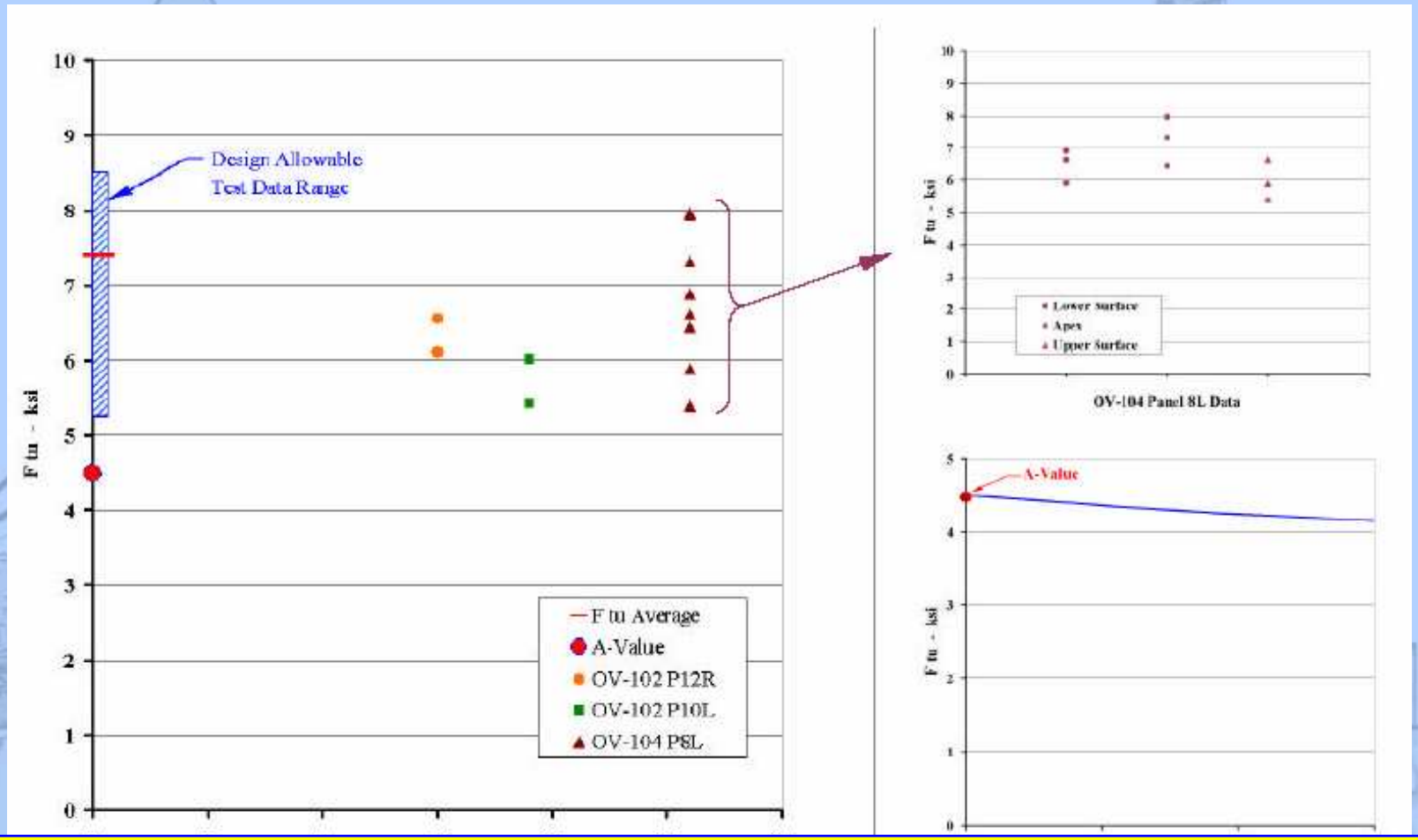
OV-104 RCC Inspection and Installation Status

Information from USA as of mid- March 2004



3.3-1 – Reinforced Carbon-Carbon (RCC) Structural Integrity

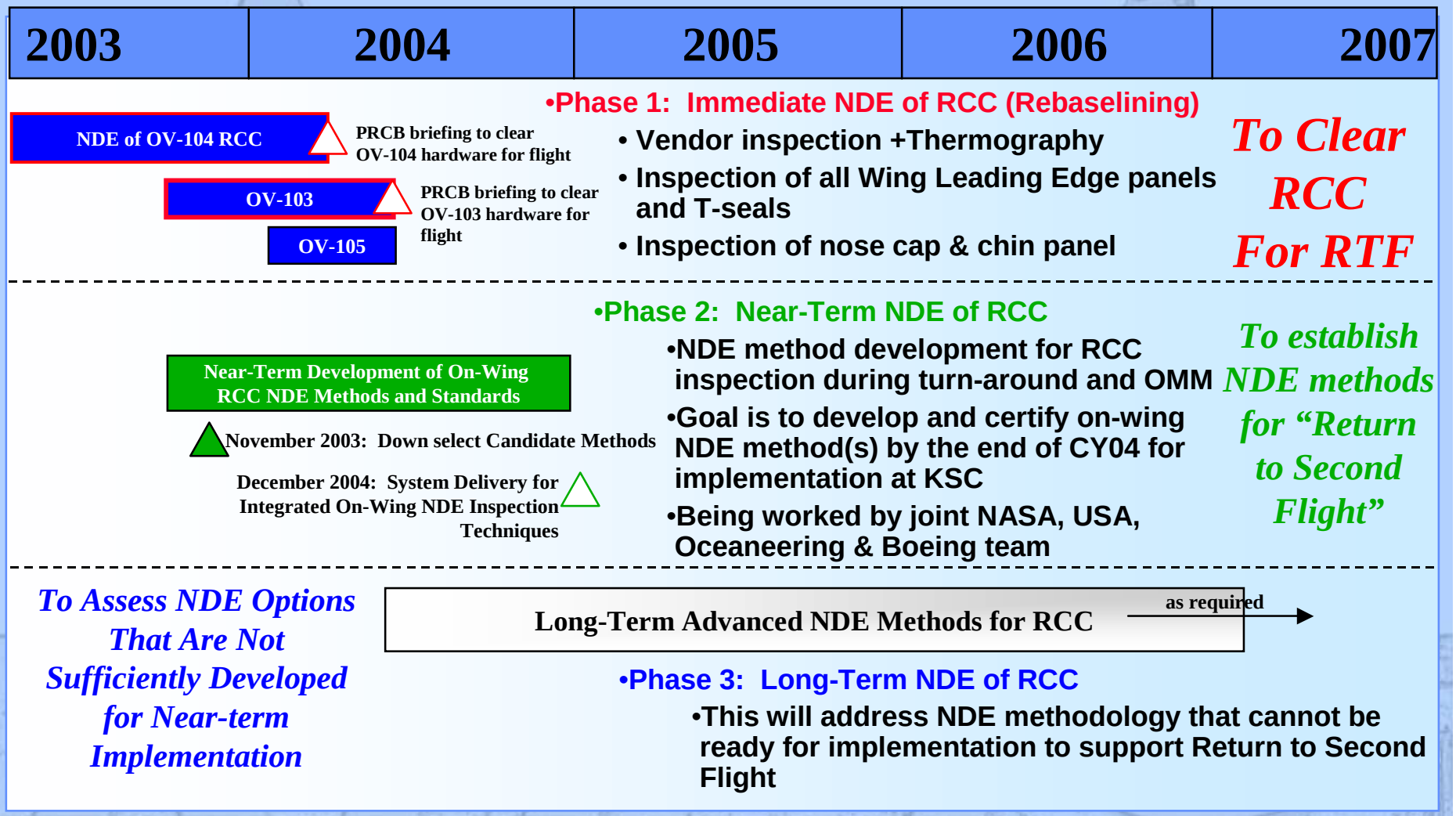
Flight Data Strength Tables



Actual Flown Hardware Data Confirms A-Allowable Values

3.3-1 – Reinforced Carbon-Carbon (RCC) Structural Integrity

Inspection Plans Include Near-Term, Mid-Term and Long-Term Activities



3.3-1 – Reinforced Carbon-Carbon Structural Integrity

Panel Assessment

- Thorough activity to clear all flight hardware
- Significant progress made in baselining new NDE
- All RCC LESS components will have manufacturer's NDE and new thermography data

3.3-1 – Reinforced Carbon-Carbon Structural Integrity

Summary Status

- **Plan: Inspection procedures in development. RCC standards in development (generic, technique specific, validation process). Flaw detection requirements are being defined. Data storage, reduction and analysis process in development.**
- **Implementation: Near and long-term technologies identified. "Turn-key" systems for in-situ techniques are under development.**
- **NASA closeout package submitted.**
- **Recommendation: Accept**

4.2-3 – Two-Person Close Out

CAIB Recommendation

Require that at least two employees attend all final closeouts and intertank area hand-spraying procedures.

The CAIB subsequently provided the following clarification: It [This recommendation] was intended to apply to the entire space transportation system for all types of close outs. The external tank intertank was specifically called out but it was not intended to be limited to the tank.

4.2-3 – Two-Person Close Out

RTF TG Interpretation

- NASA will review and update process controls.
- Two employees to attend all final closeouts and critical hand-spraying procedures.
- At Michoud, Material Processing Procedures (MPP's) to be modified in accordance with 2-person closeout requirement. Quality control and Government Mandated Inspection Points (GMIP's) are also to be included in MPP's.
- Recent SSPO direction (March 3, 2004) each project manager to review/audit all flight hardware final closeouts at the shuttle element manufacturing sites and during launch preparation at Kennedy Space Center is consistent with Implementation Plan and CAIB intent.

4.2-3 – Two-Person Close Out

NASA Implementation

- NASA has produced a draft MPP for RTF TG Review. TG has provided comments. Based on TG recommendation, MPP's will be revised and subsequently released
- SSPO letter dated March 3, 2004, requested each flight hardware project and processing manager to conduct an audit and report the results by April 30, 2004

4.2-3 – Two-Person Close Out

NASA Verification Process

- **Program-directed audit includes all major Shuttle projects and elements**
- **Audit will be comprehensive**
- **Reporting of results will establish Project and Program oversight**
  - **Each level can propose and/or enact corrective actions**
    - **Audit conducted by Quality Assurance (QA), S&MA, and Engineering**
    - **Results reviewed by each Project Manager**
    - **Results compiled and assessed by Program Integration**
    - **Results presented to SSP Manager**
      - **Presentation will show each project individually**
- **For correcting deficiencies, SSP Manager will levy actions through the normal SSP action tracking and configuration management processes**

4.2-3 – Two-Person Close Out

Schedule

March 3, 2004	Audit directive issued by SSP Manager
April 30, 2004	Audit results due
May 7, 2004	Assessment of audit results completed by Shuttle Program Integration
May 13, 2004	Findings presented to SSP Manager If any deficiencies, corrective actions issued
June 3, 2004	Responses due; actions closed

4.2-3 – Two-Person Close Out

Preliminary Audit Results

- From the CAIB report: "With the exception of two processes when foam is applied to the External Tank at the Michoud Assembly Facility, there are no known final closeouts of any Shuttle component that can be completed with fewer than two people. Most closeouts involve at least five to eight employees before the component is sealed and certified for flight."
- The Space Shuttle Program is currently conducting an audit to determine if there are any other exceptions
  - KSC Quality Planning Requirements Document (QPRD SFOC-GO0007) lists which tasks require sign off by a single technician, a second technician, or a QA representative
  - Program requirements dictate appropriate quality assurance by the projects and their contractors

4.2-3 – Two-Person Close Out

Panel Assessment

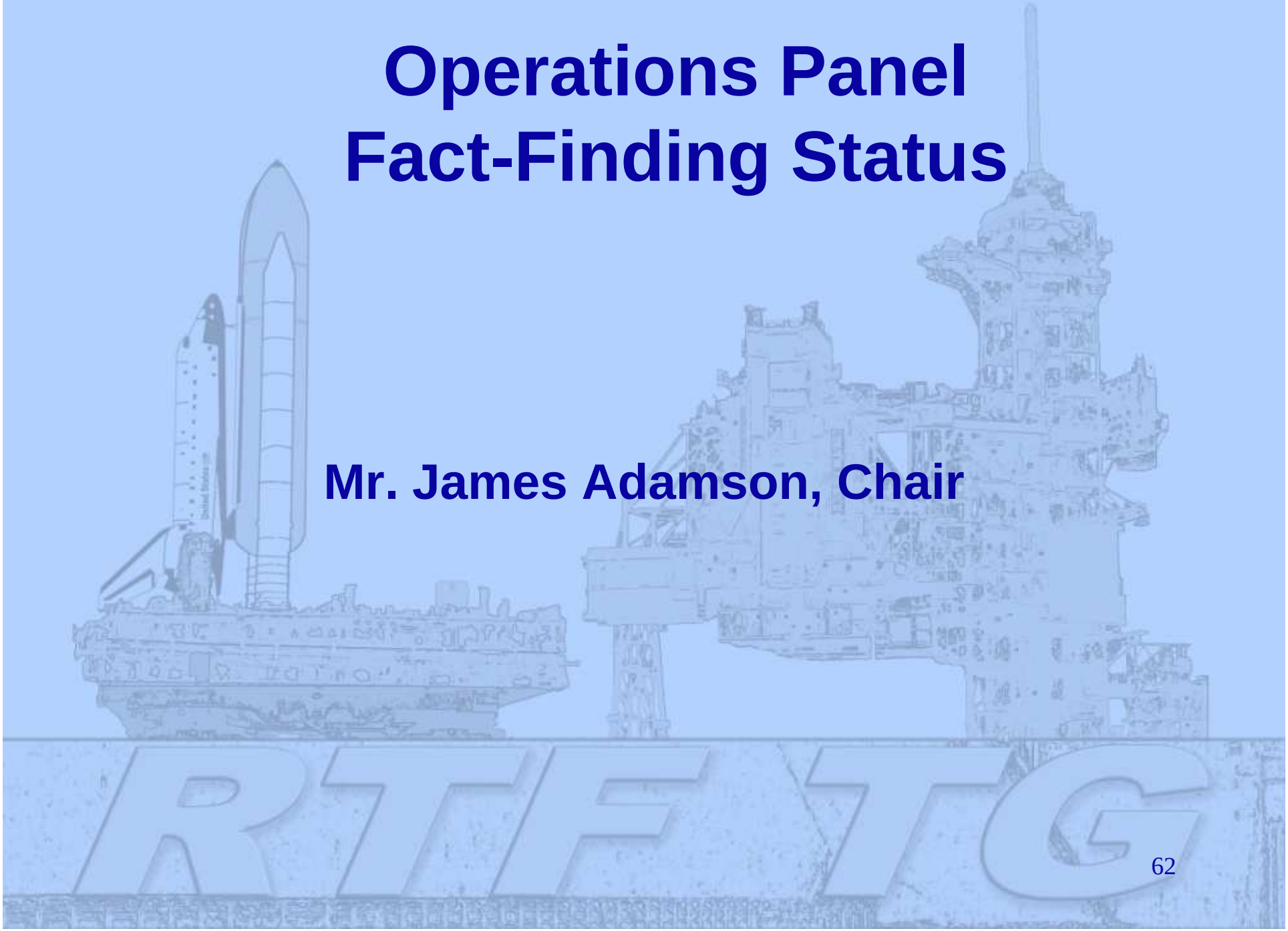
- **Significant Activities**
  - Draft MPP has been provided to Task Group. This will be used as template for subsequent baseline MPP
  - SSPO Manager initiated audit of final hardware closeouts with all Project Managers
    - Audit is underway in each project
- **Significant Observations**
  - NASA is doing everything required to implement the CAIB intent.
  - No additional verification is required by panel unless SSPO finds deficiencies with audit
  - Audit results due April 30
    - Deficiencies identified will result in an SSP action to the responsible project
    - Unexpected audit findings will be presented to RTF Tasks Group
    - Audit fidelity should identify exceptions, if any
    - Further measures will be considered if necessary after evaluation of audit results

4.2-3 – Two-Person Close Out

Summary Status

- **Plan**
  - **Audit all major shuttle projects and elements**
- **Implementation**
  - **Michoud Assembly Facility (MAF) completed and documentation updated. Audit results from other hardware elements pending.**
- **NASA closeout package submitted**
- **Recommendation: Accept**

Operations Panel
Fact-Finding Status



Mr. James Adamson, Chair

Operations Panel
CAIB Recommendations

3.4-1 Ground-Based Imagery

3.4-2 High-Resolution Imagery of External Tank (ET)

3.4-3 High-Resolution Imagery of Orbiter

4.2-5 KSC Foreign Object Debris (FOD)

10.3-1 Digitize Close Out Imagery

SSP-3 Contingency Shuttle Crew Support (CSCS)

3.4-1 – Ground-Based Imagery

CAIB Recommendation

Upgrade the imaging system to be capable of providing a minimum of three useful views of the Space Shuttle from liftoff to at least Solid Rocket Booster separation, along any expected ascent azimuth. The operational status of these assets should be included in the Launch Commit Criteria for future launches. Consider using ships or aircraft to provide additional views of the Shuttle during ascent.

3.4-1 – Ground-Based Imagery

NASA Implementation

- **NASA has:**
  - **Begun to refurbish 14 existing range trackers**
  - **Continue to establish requirements and procure new optics and cameras**
  - **Assessing airborne (WB-57) cameras as imagery assets**
  - **Begun development of launch commit criteria for the ground-based camera systems**

3.4-1 – Ground-Based Imagery

Panel Assessment

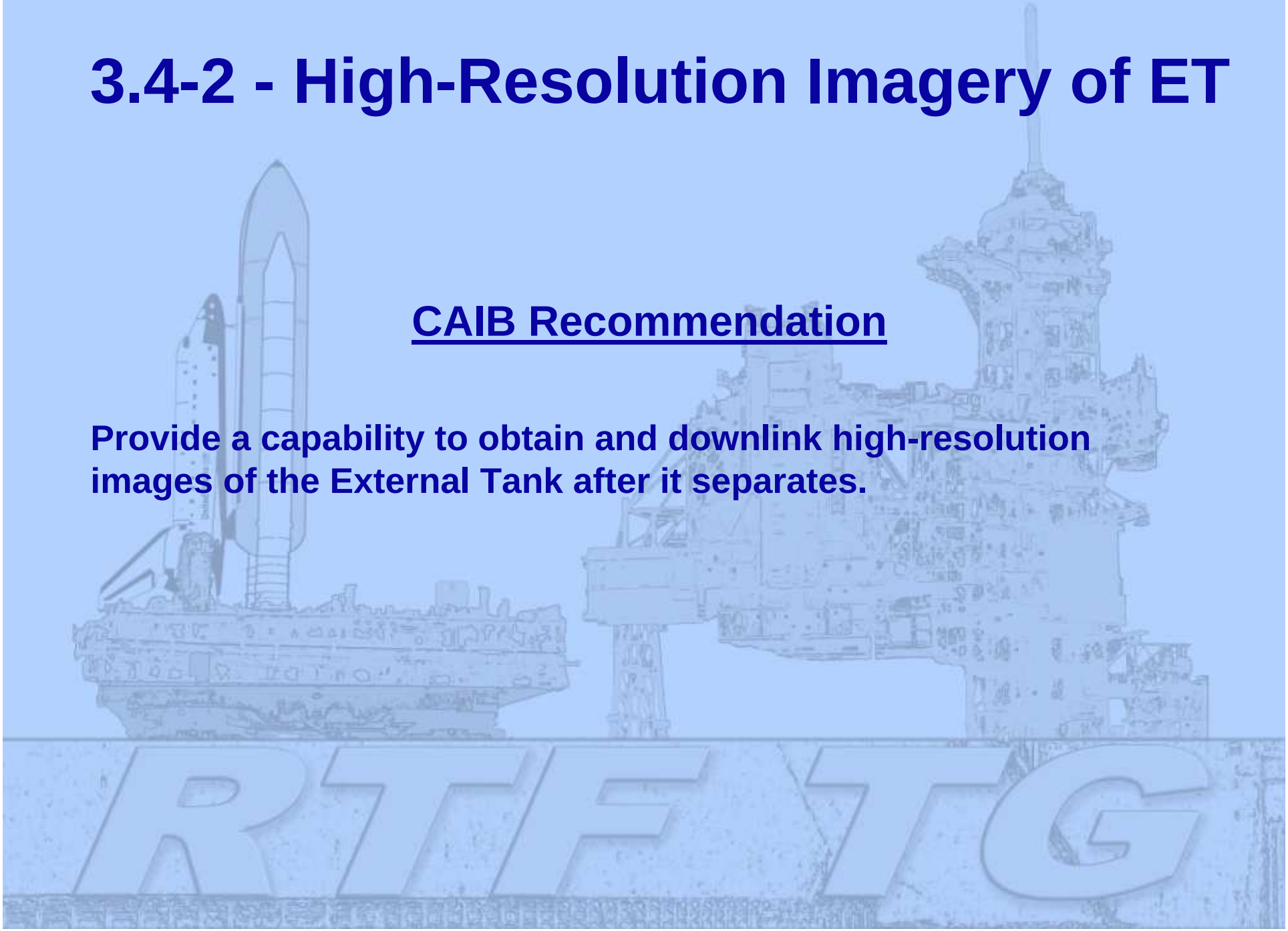
- Conducted fact-finding with CAIB on January 22, 2004, Ground Camera PRD Review February 3-5, 2004, and at Imagery TIM February 10, 2004
- The high volume of information from ground and airborne based imagery, along with other sensor data, will require development of integrated process that analyzes the data and integrates the results for mission operations decision making

3.4-1 – Ground-Based Imagery

Summary Status

- **Plan**
  - **Mature**
- **Implementation**
  - **Near completion**
- **Recommendation**
  - **Keep Open**

3.4-2 - High-Resolution Imagery of ET



CAIB Recommendation

Provide a capability to obtain and downlink high-resolution images of the External Tank after it separates.

3.4-2 - High-Res. Imagery of ET

NASA Implementation

NASA has:

- Revised procedures to optimize/facilitate crew hand-held camera imagery
- Completed umbilical well camera feasibility study
  - Committed to incorporate on STS-114
  - Conducted Critical Design Review (CDR)
  - Scheduled installation begins in May 2004
- Developed Enhanced Launch Vehicle Imagery System (ELVIS) Integration Team concept

3.4-2 - High-Res. Imagery of ET

Panel Assessment

- Conducted fact-finding with CAIB on January 22, 2004, and at Imagery TIM February 10, 2004.
- The high volume of information from ground and airborne based imagery, along with other sensor data, will require development of integrated process that analyzes the data and integrates the results for mission operations decision making

3.4-2 - High-Res. Imagery of ET

Summary Status

- Plan
  - Mature
- Implementation
  - In progress
- Recommendation
  - Keep Open

3.4-3 - High-Resolution Imagery of Orbiter

CAIB Recommendation

Provide a capability to obtain and downlink high-resolution images of the underside of the Orbiter wing leading edge and forward section of both wings' Thermal Protection System.

3.4-3 - High-Res. Imagery of Orbiter

NASA Implementation

- Changes to Implementation plan since last Public Meeting include:
  - Established Orbiter Boom Sensor System (OBSS), together with ISS, as primary inspection tool, augmented with vehicle ascent cameras
  - OBSS inspection of wing leading edge (WLE) and nose cap reinforced carbon carbon on flight day 2
  - ISS crew take digital imagery of tile acreage during approach roll pitch maneuver (RPM)
- NASA has:
  - Approved improved cameras for SRB aft skirts and ET O2 flow line fairing

3.4-3 - High-Resolution Imagery of Orbiter

Panel Assessment

- Conducted fact-finding with CAIB on January 22, 2004, and at Imagery TIM on February 10, 2004
- The high volume of information from ground and airborne based imagery, along with other sensor data, will require development of integrated process that analyzes the data and integrates the results for mission operations decision making

3.4-3 - High-Resolution Imagery of Orbiter

Summary Status

- **Plan**
  - **Mature**
- **Implementation**
  - **In progress; schedule for OBSS is very aggressive**
- **Recommendation**
  - **Keep Open**

4.2-5 - Foreign Object Debris (FOD)

CAIB Recommendation

Kennedy Space Center Quality Assurance and United Space Alliance must return to the straightforward, industry-standard definition of "Foreign Object Debris," and eliminate any alternate or statistically deceptive definitions like "processing debris."

4.2-5 - Foreign Object Debris (FOD)

NASA Implementation

- The term "Processing Debris" has been eliminated
- Best Practices were determined from benchmarking: NAFPI definitions, senior management buy-in & flow down, employee buy-in, customer buy-in, FOD focal point, FOD program monitoring, tool control, FOD program training, and measurement process
- FOD program milestone schedule has been developed. PRCB approval, updating procedures and database, and training/implementation to occur in May-June 2004
- Forward actions include: NASA management walk downs, USA-generated metrics, rollout of program to work groups (OPF's, VAB, OSB), baseline audit of FOD program, process procedure compliance assessments by QAS, FOD Focal (POC) to be defined and named
- Periodic surveillance audit planned every 2 years (variable depending on trends).

4.2-5 - Foreign Object Debris (FOD)

Panel Assessment

- Conducted fact-finding during Mini-TIM at KSC on March 11, 2004
- Next assessment will occur after new FOD emphasis program is introduced to workforce (Summer 2004)

4.2-5 - Foreign Object Debris (FOD)

Summary Status

- **Plan**
  - **Mature**
- **Implementation**
  - **In progress**
- **Recommendation**
  - **Keep Open—candidate for closure in August 2004**

10.3-1 – Digitize Close Out Imagery

CAIB Recommendation

Develop an interim program of closeout photographs for all critical sub-systems that differ from engineering drawings. Digitize the closeout photograph system so that images are immediately available for on-orbit troubleshooting.

10.3-1 – Digitize Close Out Imagery

NASA Implementation

NASA has:

- **Procured 6.1M pixel cameras for close out photography**
- **Subset of generic and RTF-specific closeout photo requirements obtained from Program Elements**
- **Identified Shuttle Imaging Management System (SIMS) enhancements required; upgrades in-work**
- **Developed training materials for users of SIMS database and schedule for training**
- **In process of collecting close out and configuration imagery requirements from users, and documenting requirements**

10.3-1 – Digitize Close Out Imagery

Panel Assessment

- Conducted fact-finding on SIMS Database on February 10, 2004, and at Mini-TIM at KSC on March 11, 2004
- After the user requirements are collected the Program should authenticate that these requirements satisfy the needs of the total Program

10.3-1 – Digitize Close Out Imagery

Summary Status

- **Plan**
  - **Mature**
- **Implementation**
  - **In progress**
- **Recommendation**
  - **Keep Open—candidate for closure in August 2004**

SSP3 – Contingency Shuttle Crew Support

Raising the Bar Corrective Action

NASA will evaluate the feasibility of providing contingency life support on board the International Space Station (ISS) to stranded Shuttle crewmembers until repair or rescue can be affected.

SSP3 – Contingency Shuttle Crew Support

RTF TG Rationale

- CSCS not required by CAIB for RTF
- Based on fact-finding, RTF TG believes NASA may need to consider alternatives to robust WLE RCC repair capability for first flight
- To meet intent of CAIB recommendations, NASA might consider ISS CSCS
- Therefore, RTF TG elected to assess SSP-3

SSP3 – Contingency Shuttle Crew Support

NASA Implementation

- Pursue as an emergency contingency capability
- Manifest additional logistics for more robust capability
- Evaluate current Shuttle and ISS support capabilities for crew rescue during a CSCS situation
- Evaluate ISS fault tolerance requirements during the CSCS duration
- Assess consumables management
- Coordinate with International Partners

SSP3 – Contingency Shuttle Crew Support

NASA Implementation

- Changes to Implementation plan since last Public Meeting:
  - Evolved from best effort basis to a contingency rescue plan (backup Shuttles for STS-114 and STS-121)
    - Launch of first two missions would be delayed, if necessary, to ensure rescue vehicle turnaround could be launched within declared capability of ISS to support 9 crew
  - Pursue manifesting additional logistics to make CSCS more robust
  - Shuttle rescue mission for stranded crew
- NASA has:
  - Begun evaluating ISS sparing to maintain 1 fault tolerance
  - Begun assessment of consumables and stowage management
  - Baselined STS-300 launch on need rescue mission

SSP3 – Contingency Shuttle Crew Support

Panel Assessment

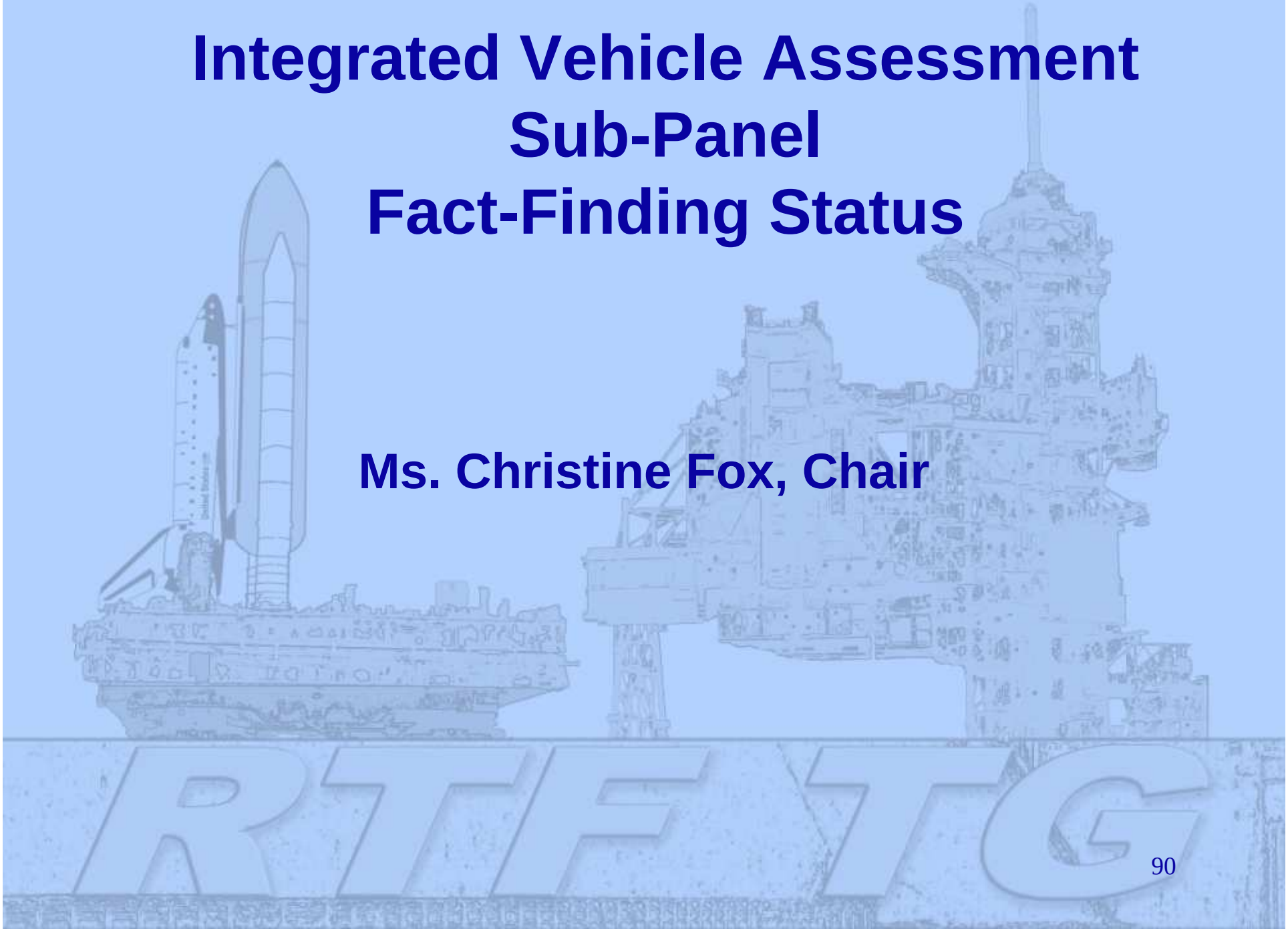
- Conducted fact-finding on CSCS at JSC
  April 13-15, 2004
  - Key consumables have been identified
  - Relevant ISS systems have been identified
- Definition of requirements to develop CSCS concepts across the Shuttle and ISS Programs appears not mature

SSP3 – Contingency Shuttle Crew Support

Summary Status

- **Plan**
  - **Preliminary**
- **Implementation**
  - **Not Yet Begun**
- **Recommendation**
  - **Keep Open**

Integrated Vehicle Assessment Sub-Panel Fact-Finding Status



Ms. Christine Fox, Chair

Purpose of Integrated Vehicle Assessment Sub-Panel

Purpose

Assess NASA's process to:

- obtain and integrate external damage data

- translate that data into integrated vehicle assessments

- based on a variety of imagery and sensor sources

- in direct support of decision-making

- for real-time operations

Purpose of Integrated Vehicle Assessment Sub-Panel

Charter

- Examine interaction of allowable debris, critical damage size, damage detection / assessment via imagery / sensors, and development of associated MMT improvements to support real-time operations
- Use CAIB recommendations to assess how the results of NASA implementation are reflecting in this emerging area
- Assess the data integration into timely information in support of informed decision-making by the Flight Control Team/MMT
- Review responsibility for system level assessment review of this critical, and heavily related, set of changes driven by the NASA Implementation Plan

Purpose of Integrated Vehicle Assessment Sub-Panel

Activities to Date

- Systems Engineering and Integration Office (SEIO) produced early draft Operations Concept in December 2003
  - Shared with sub-panel even though very preliminary
- SEIO established Systems Engineering Office for Imagery Coordination
- IVASP met with Shuttle Program and NASA representatives on February 20, 2004
  - Reviewed sub-panel charter
  - Discussed challenges of imagery/sensor integration to support decision-making
  - Agreed to provide revised Ops Concept prior to April plenary
- SEIO produced revised draft April 2004
  - Shared with sub-panel
  - Meeting to discuss Ops Concept occurred April 12, 2004

Purpose of Integrated Vehicle Assessment Sub-Panel

Observations

- **Significant progress on Operations Concept in a short period of time but Ops Concept is still evolving:**
  - **Identified data sources**
    - **Imagery, sensors, etc.**
  - **Determined critical data sources such as the Orbiter Boom Sensor System**
  - **Developed timeline for data availability**
  - **Identified all organizations involved in data processing**
  - **Identified a path to get the processed data to the MMT**

Purpose of Integrated Vehicle Assessment Sub-Panel

Next Steps

- NASA will revise preliminary Ops Concept based on feedback:
  - Revisions provided to sub-panel
  - Work through NASA to produce final version
- NASA plans to include Ops Concept in upcoming simulations
  - Sub-panel will observe

Action Item Summary and Closing Remarks

Mr. Dick Covey – Co-Chair