BY ORDER OF THE COMMANDER
AIR FORCE RESEARCH LABORATORY
(AFRL)

AIR FORCE RESEARCH LABORATORY
INSTRUCTION 61-106

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Scientific/Research and Development

PLANNING AND MANAGEMENT OF AFRL SPACE EXPERIMENTS

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This instruction implements the Department of Air Force Policy Directive (DAFPD) 61-1, *Management of the Science and Technology Enterprise*, Department of the Air Force Instruction (DAFI) 99-103 Air Force Materiel Command (AFMC) Supplement, *Capabilities Based Experiment and Evaluation* and AFI 91-202 AFMC and AFRL Supplements, *The US Air Force Mishap Prevention Program*, Air Force Manual 91-222, *Space Safety Investigations and Reports*, and Air Force Policy Directive 13-6, *Space Policy*. This instruction also compliments AFI 10-1202, Space Test Program (STP) Management, where STP is the primary provider of mission design, spacecraft acquisition, integration, launch, and on-orbit operations for the DoD's Space research and development (R&D) community. It establishes policy for how the Air Force Research Laboratory (AFRL) plans and manages space flight experiment activities in support of its research mission. This instruction applies to AFRL planning, management of space experiment activities. Ensure all records generated as a result of processes prescribed in this publication adhere to AFI 33-322, *Records Management and Information Governance Program*, and are disposed in accordance with the Air Force Records Disposition Schedule, which is located in the Air Force Records Information Management System. Refer recommended changes and questions about this publication to the office of primary responsibility (OPR) using the DAF Form 847, Recommendation for Change of Publication; route DAF Forms 847 from the field through the appropriate functional chain of command. This publication may be supplemented at any level, but all direct supplements must be routed to the OPR of this publication for coordination prior to certification and approval. The authority to waive requirements in this publication resides with the AFRL/CC (or AFRL Vice Commander (AFRL/CV) if delegated). Submit requests for waivers

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1. Purpose and Scope.

1.1. **Purpose and Definitions.** The purpose of this instruction is to establish roles and responsibilities, standardize policy, and define basic guidance and mission assurance (MA) and safety processes for the planning and management of space flight experiments and demonstrations. In general, space experiments only include those conducted in lunar or planetary trajectories or in orbit for at least one period. The intent of this instruction and associated reference documents is to ensure AFRL effectively manages unique technical and safety risks associated with space experimentation. While this instruction defines basic policy, processes, and procedures common to all AFRL space research experiment activities, each Mission Organization (Msn Org) or Wing may adopt existing AFRL/RV best practices and policies, available from this instruction's OPR, for space experiment programs or define and document their own internal implementation instructions to manage each type of space experiment activity. This instruction is meant to complement existing AFRL instructions, such as AFRLI 61-103, *AFRL Research Test Review, Approval, and Oversight*, AFRLI 61-103 Vol 3, *AFRL Space Test and Operations*, and AFRLI 61-108, *Management and Control of Technology Development for AFRL,* in order to provide additional specific guidance needed for space experiment MA. It is not meant to replicate or replace the guidance provided by those instructions, and where discrepancies may exist between this and those prior documents, the aforementioned documents will take precedence.

1.2. **Scope.** This instruction applies to all AFRL organizations and units within AFRL reporting to the AFRL/CC. This Instruction applies to any space experiment that wholly or partly meets any of the criteria listed below. Activities covered include any that:

1.2.1. Utilize resources owned, possessed, leased, expended, or operated by AFRL (personnel, spacecraft, equipment, facilities, funding, etc.) except as exempted in **Paragraph 1.2.6**.

1.2.2. Take place in space, characterized as orbital, and lunar trajectory space flights, including beyond geosynchronous orbit, and are operated by AFRL.

1.2.3. Are accomplished with AFRL as the Lead Test Organization (LTO)

1.2.4. AFRL has Satellite Control Authority (SCA).

1.2.5. AFRL is charged with mishap investigation responsibility or provides the mishap convening authority.

1.2.6. Do not meet one of the following exceptions. Contact OPR to confirm if any of these exceptions apply.

1.2.6.1. The activity is a service or deliverable provided to AFRL under a grant.

1.2.6.2. AFRL resources are provided on a loan basis or as a consequence of being asked to develop or deliver a product for transfer to a customer to support their end use or objectives. This exception applies only when AFRL support does not include SCA.

1.2.6.3. Space experiments that do not involve flight, such as ground-based demonstrations or experiments.

1.2.6.4. Launch vehicle experiments and launch vehicle development programs.

1.2.6.5. Experiments that do not use AFRL-owned hardware or software. See section 2.0 – 2.4 for details.

1.3. **Intent.** AFRL activities require unique rule sets driven by its Science and Technology (S&T) mission. This instruction is based on the core tenets of Department, Service, and Major Command (MAJCOM)-level policies and practices for space experimentation, safety, space flight worthiness, MA, cyber resiliency, etc.

1.3.1. **Method and Assurance** . The intent of this instruction, in conjunction with AFRLI 61-103 and associated volumes, is to ensure a suitable level of application of technical rigor to AFRL research involving space experimentation along with providing assurance of safe and efficient execution with good stewardship of resources. Regardless of the level of complexity or rigor in an AFRL space experiment, there must be appropriate documentation of the objectives and method of experimentation as well as identification and acceptance of risks by the proper authorities.

1.3.2. **Importance of Tailoring** . AFRL conducts space experiments across a wide spectrum of investment, technology maturity, risk levels, and safety challenges. Accordingly, AFRL members managing these activities shall tailor the level of planning, rigor, and oversight according to the complexity (safety, cost, design, operations, etc.) and risk of the space experiment.

1.3.3. Regardless of complexity of the space experiment, all AFRL Program Managers (PM) and Scientists and Engineers (S&E) shall follow the review, approval, and execution processes outlined in this instruction and AFRLI 61-103 and associated volumes.

2. Space Experiment Types: Definitions and Requirements. The following are definitions for the different types of space experiments based on complexity, end state, ownership, and SCA (Figure 1). Experiments meeting the criteria in section 1.2 will be assigned to one of the types shown in **Figure 1**. To determine which type an experiment falls under, follow the experiment type determination flow (**Figure 2**.). SCA is defined as the responsible authority for planning, scheduling, and performing satellite commanding. More specifically, SCA is a transferable authority with the ability to provide Telemetry, Tracking and Commanding (TT&C) of a satellite bus (i.e., on-orbit infrastructure necessary to support payload functionality) A more detailed definition of SCA is provided AFRLI 61-103 Vol 3. The final determination of Space Experiment Type is made by the Deputy Technology Executive Officer for Space Science and Technology (D-TEO).

Figure 1. AFRL Space Flight Experiment Types.

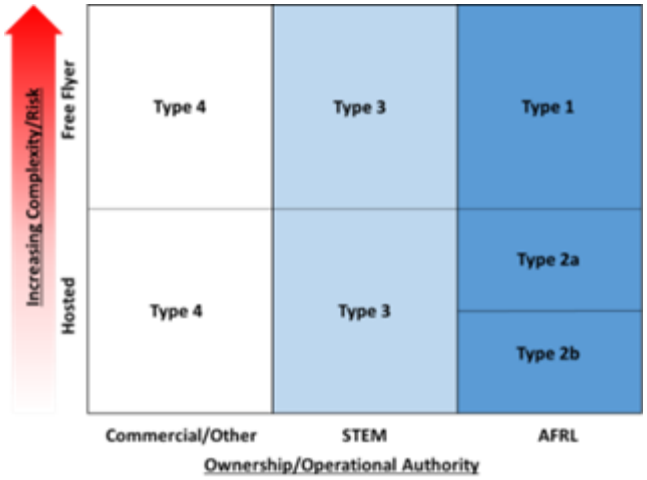
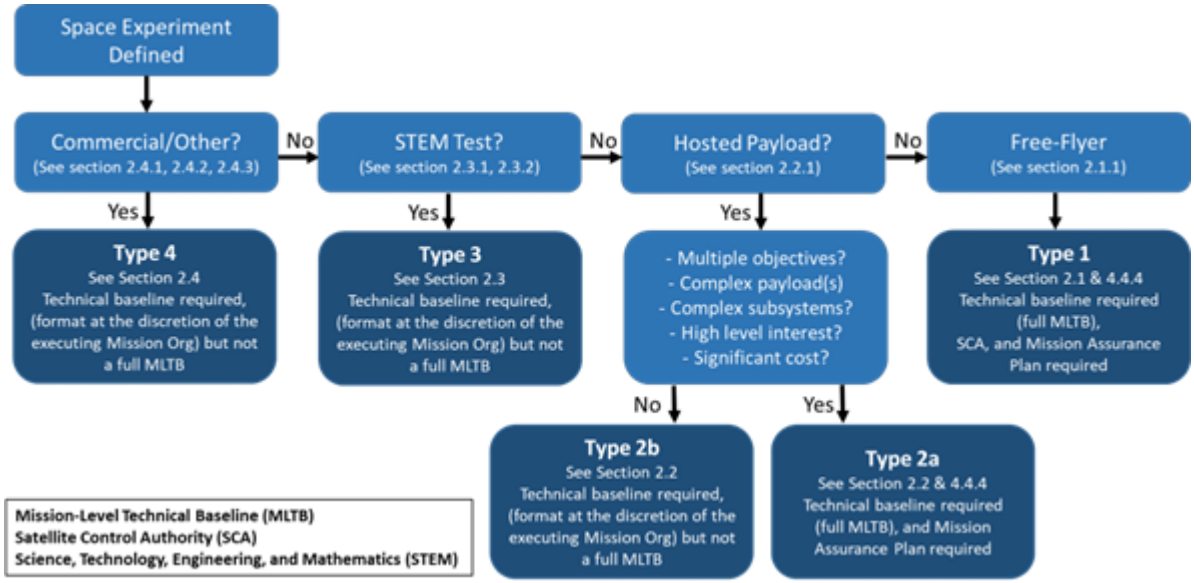


Figure 2. AFRL Space Flight Experiment Type Determination.



2.1. **Type 1: AFRL-owned Free-Flying Spacecraft.**

2.1.1. **Type 1 space experiments are free-flying spacecraft owned by AFRL.** A spacecraft consists of a satellite bus and one or more payloads. A free-flying spacecraft independently generates and maintains power, thermal, Command, Control & Communications (C3), Guidance, Navigation & Control (GN&C) including Attitude Determination and Control (ADC), Command and Data Handling (C&DH), and propulsion (if needed) for the spacecraft. The spacecraft is not dependent on another spacecraft for system functionality. The satellite bus subsystems (power, thermal, C3, GN&C, propulsion, etc.) can themselves be experiments with no payload.

2.1.2. All Type 1 programs must complete a Mission Level Technical Baseline (MLTB). The Type 1 space experiment MLTB must be approved by the AFRL Lead Space Experimentalist before the System Requirements Review (SRR). After the MLTB is approved, a programmatic baseline, as defined and directed in AFRLI 61-108, must be developed. Mission Orgs may use *AFRL RV Configuration Management (CM) and Configuration Control Board (CCB) Process*, for programmatic baselining, i.e., creating the Mission Level Program Baseline (MLPB), or use their own programmatic methods and policies for this purpose as supplements to AFRLI 61-108. (The basic elements of the MLTB and MLPB are described in sections 4.4.4. and 4.4.5. and in *AFRL RV Configuration Management (CM) and Configuration Control Board (CCB) Process).* AFRL conducts space activities across a wide spectrum of investment, technology maturity, risk levels, and safety challenges. Accordingly, AFRL members managing these activities shall tailor the level of planning, rigor, and oversight according to the complexity (safety, cost, design, operations, etc.) and risk of the space activity. The principles of tailoring are exercised by those composing program and technical baselines, developing test procedures, and exercising process review and oversight. Approval authorities apply their judgment as to the suitability of the tailoring applied when they approve, disapprove, or direct changes to a proposed space activity. This will be documented in a Letter of Agreement (LOA) or Memorandum of Agreement (MOA) with the most qualified organization.

2.1.3. Responsibility for mission assurance oversight for Type 1 experiments will be as assigned by the AFRL/CC.

2.2. **Type 2 (a & b): Hosted Payload.**

2.2.1. A hosted payload experiment is dependent on another spacecraft for any bus functions (e.g., power, thermal, structure, C3, GN&C, and propulsion (if needed)). A hosted payload is typically on-board another satellite. All experiments flown on the International Space Station (ISS) and X-37 are considered hosted payloads (unless separated prior to completion of the experiment). Type 2 hosted payloads (both a & b) are specifically payloads owned by AFRL.

2.2.2. A Type 2a hosted payload is defined as a substantial experiment with multiple experiment objectives, complex payloads or subsystems, high-level interest or of significant cost.

2.2.3. All other hosted payload experiments not meeting the Type 2a definition are considered Type 2b experiments.

2.2.4. All Type 2a space experiments must complete a hosted-payload-focused MLTB. The Type 2a space experiment MLTB must be approved by the AFRL Lead Space Experimentalist before the SRR. After the MLTB is approved, a programmatic baseline as defined and directed in AFRLI 61-108 must be developed. Mission Orgs may use *AFRL/RV Configuration Management (CM) and Configuration Control Board (CCB) Process*, for programmatic baselining, i.e., creating the MLPB, or use their own programmatic methods and policies for this purpose as supplements to AFRLI 61-108.

2.2.5. Type 2b space experiments will define and document in an appropriate fashion, such as a test plan, their experiment objectives. The MLTB process may be followed, although the formal approval structure is not required.

2.3. **Type 3: Science, Technology, Engineering & Mathematics (STEM) Educational Experiment.**

2.3.1. A STEM space experiment is an experiment whose primary purpose is education. It may be conducted via educational grant or contracted effort to perform Fundamental Research for public purpose, per Under Secretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L), *Fundamental Research Memorandum*, 24 May 2010).

2.3.2. STEM is defined as an interdisciplinary approach to learning where rigorous academic concepts are coupled with real-world lessons as students apply science, technology, engineering, and mathematics in contexts that make connections between school, community, work, and the global enterprise enabling the development of STEM literacy and with it the ability to compete in the new economy.

2.3.3. STEM space experiments must be owned by the educational institution to be considered a Type 3 experiment.

2.3.3.1. STEM "Ownership" means the educational institution shall design, develop, build, experiment, and operate the spacecraft. Ownership is also defined by who will have operational control authority over the spacecraft (or payload) once it launches as well as who has the authority to decide when to execute the spacecraft's end of life or deorbit procedures (free flying spacecraft only). Note that AFRL can provide sponsorship of Type 3 experiments to the Space Experiments Review Board (SERB) for flight, assistance with Space Flight Worthiness criteria (SFWC), environmental stress experimenting and feedback at major design reviews without having any ownership of the experiment. Funding that supports Fundamental Research of a public purpose, or that supports a program whose primary purpose is education also does not constitute ownership.

2.3.4. Support for Type 3 space experiments may be provided upon written agreement. Historically, such requests have included various testing (subsystem/component, functional, vibration, thermal vacuum), and Do No Harm (DNH) analysis. Details clarifying ownership, mishap responsibility, limitations, and other liabilities for such support, must be appropriately documented, e.g., in a contract or MOA with the launch provider.

2.3.5. Type 3 space experiment technical objectives will be defined and documented by the test team in a Memo for Record (MFR), or MOA/Memorandum of Understanding (MOU).

2.4. **Type 4: Commercial/Other Space Experiment.**

2.4.1. A commercial/other space experiment is a space experiment owned by another institution or organization where AFRL has an interest in the experiment data or technology maturation but does not have any direct ownership. The experiment can be a hosted payload or free-flying satellite.

2.4.2. Commercial/other space experiments must be owned by the other institution to be considered a Type 4 experiment.

2.4.3. Commercial "Ownership" means the other institution or organization shall design, develop, build, experiment, and operate the satellite. Ownership is also defined by who will have operational control authority over the satellite (or payload) once it launches as well as who has the authority to decide when to execute the satellite's end of life or deorbit procedures (free-flying satellites only). Note that AFRL can provide sponsorship of Type 4 experiments to the SERB for flight, assistance with SFWC, environmental stress experimenting and feedback at major design reviews without having any ownership of the experiment or mishap liability. Collaboration on design of the satellite up to a Critical Design Review (CDR), and or AFRL funding does not necessarily constitute ownership. Ownership of the space vehicle must be clearly defined in the contract or other agreement.

2.4.4. Support for Type 4 space experiments may be provided upon written agreement. Historically, such requests have included various testing (subsystem/component, functional, vibration, thermal vacuum), and Do No Harm (DNH) analysis. Details clarifying ownership, mishap responsibility, limitations, and other liabilities for such support, must be appropriately documented in the written agreement or contract.

2.4.5. Type 4 space experiment objectives will be defined and documented appropriately by the test team, e.g., MFR, MOA etc.

3. Roles and Responsibilities. Roles and responsibilities with respect to the implementation of this instruction for key individuals are listed here. These are not all-inclusive regarding the positions listed but are meant to provide a minimum guidance set based on the overall position authorities and responsibilities as they pertain to execution of space experiments. These may be further expanded upon within the limits of the positions' official authorities and responsibilities.

3.1. **AFRL/CC.**

3.1.1. Appoints the AFRL Deputy Technology Executive Officer for Space Science and Technology (D-TEO) as the Laboratory's primary focal point to the Department of the Air Force (DAF) for AFRL's integrated space S&T activities.

3.1.2. Appoints the AFRL Lead Space Experimentalist as the Laboratory's primary focal point for space experimentation.

3.1.3. Delegates MA and SCA responsibilities for each space experiment to the appropriate Msn Org Director as required.

3.1.4. Refers applicable experiments for higher-level approval as required.

3.2. **Deputy Technology Executive Officer for Space Science and Technology (D-TEO).**

3.2.1. Authorizes all space experiments to ensure they appropriately contribute to strategy across the AFRL enterprise to address DAF mission needs with input from the AFRL Lead Space Experimentalist (supported by the AFRL SERB.)

3.2.2. Chairs the AFRL SERB and formally designates experiments as Type 1, 2, 3 or 4.

3.2.3. The D-TEO recommends to the AFRL/CC via the AFRL SERB, appropriate delegation of SCA and MA responsibilities to Msn Org Directors for each space experiment.

3.3. **AFRL Lead Space Experimentalist.**

3.3.1. Leads the AFRL SERB process and is AFRL's voting member on the DAF and DoD SERBs.

3.3.2. Reviews all S&T space experiments to ensure the need for space flight and that sufficient experiment quality exists. Provides recommendations to the D-TEO on all AFRL space experiments.

3.3.3. Responsible for the implementation of an AFRL Space Experiment Tracker process.

3.3.4. Recommends categorization (e.g., Type 1, 2, 3 and 4) and authorization of all AFRL space flight experiments to the D-TEO (through the AFRL SERB).

3.3.5. Chairs (or co-chairs with Mission Org Chief Engineer (CE)) all space experiments' MLTBs (when applicable). See section 4.4.4. for further MLTB detail.

3.4. **AFRL Msn Org Director.**

3.4.1. Ensures compliance with the space experiment processes as defined in this instruction.

3.4.2. Ensures all PMs and S&Es conducting space experiment activities follow the procedures published in this instruction.

3.4.3. Provides resources to support space experiment processes: technical review, safety review, MA, space flight worthiness, airworthiness, adequate space operations training (IAW AFRL 61-103 Vol. 3), or other approved Msn Org training, as applicable.

3.5. **Mission Director (MD).**

3.5.1. Directs oversight and direction of all aspects of on-orbit operations for the mission(s). (See AFRLI 61-103 Vol. 3 for further details)

3.5.2. Coordinates with the Principal Investigator (PI) to establish objective priorities across missions and to develop long-term schedules and planning objectives, especially as they pertain to separate and combined on-orbit operations, respectively.

3.5.3. Communicates operational activities (e.g., via Situation Reports) to Program Office Team, AFRL/Msn Org Director, AFRL/CC, D-TEO, and other stakeholders.

3.5.4. For more description/details see AFRLI 61-103 Vol. 3.

3.6. **Lead Flight Director.**

3.6.1. Leads the Flight Operations Team and, if on console, holds tactical SCA as delegated from the MD.

3.6.2. Primarily responsible for tactical command and control and safety of the on-orbit asset.

3.6.3. Responsible for ensuring that the team is staffed, trained, and able to conduct operations.

3.6.4. Trains, mentors, and schedules Flight Directors; ensures that other positions are properly scheduled.

3.6.5. Helps develop team structure, roles and responsibilities; ensures team discipline.

3.6.6. Responsible for ensuring reporting of objective success or failure back to the mission planning team.

3.6.7. For more description/details see AFRLI 61-103 Vol 3.

3.7. **AFRL Detachment 3/Safety (Det 3/SE).**

3.7.1. Per AFI 91-202 AFRL Supplement, the AFRL Det 3/SE office will have at least one system safety manager authorization dedicated to Space Safety. This system safety manager will serve as the AFRL Space Safety Manager (SSM) and serve as AFRL's focal point and primary advisor to the AFRL/CC on all space safety issues. AFRL/SE will maintain oversight of the space safety program.

3.7.2. Administrates space experiment safety tracking functions within the AFRL Space Experiment Tracker overseen by the Lead Space Experimentalist.

3.8. **Msn Org Chief Engineer (CE).**

3.8.1. Serves as the Msn Org Senior Engineering and Program Management focal point for mentoring, guiding, and overseeing implementation of space experiment MA processes.

3.8.2. Guides space experiment programs in the development of and approves tailored space experiment MA processes, including tailored space flight worthiness and systems engineering processes.

3.8.3. Reviews and coordinates on all technical, programmatic, and performance baselines. Participates, and/or chairs (or delegates participation, and/or chair) in all space experiments' technical reviews**.**

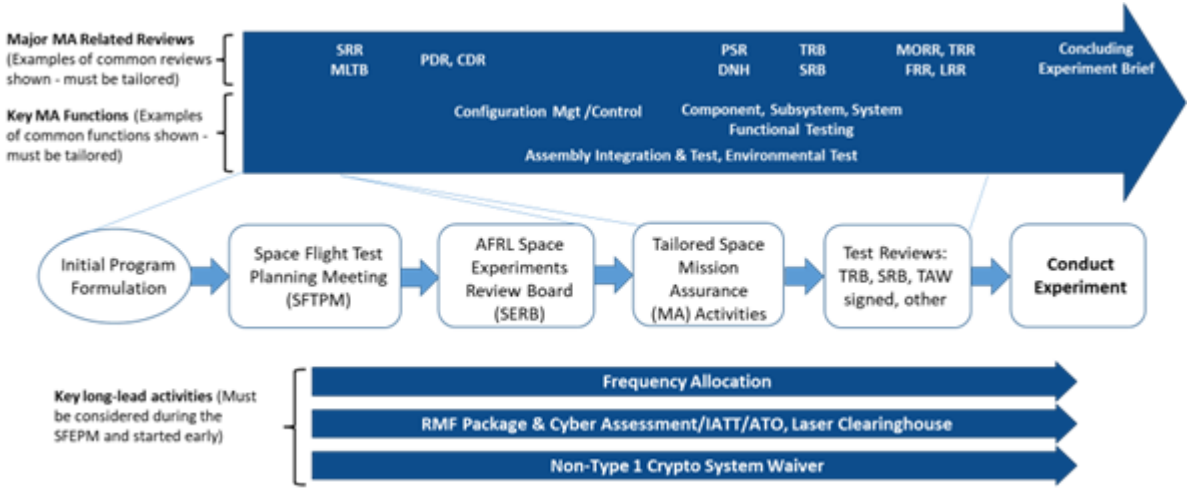
3.8.4. Assesses space vehicle compliance with AFRL Mission Org-developed SFWC.

3.9. **AFRL Center Test Authority (CTA).** Provides assistance and support to the Msn Org, Mission Director, Flight Director, Test Lead, PM, and program test team for Test and Evaluation (T&E) policy, procedures, or other matters requiring Headquarters input or representation as it pertains to planning and managing space experiments. See AFRLI 61-103 Vol 3.

4. Space Experiment Planning and Management. The space experiment planning and management process covers the major MA and SFWC activities tailored for each experiment. It complements the test processes discussed in AFRLI 61-103Vol 3, as well as the management processes discussed in AFRLI 61-108. **Figure 3** shows the overall process, which can be described in six parts: Initial Program Formulation, Space Flight Experiment Planning, SERB, tailored Space MA, Experiment/test, and safety reviews, and finally experimentation. Major MA functions

include configuration management activities, functional and physical testing of hardware and software, and assembly, integration, and test efforts. Interspersed in the various functions are reviews which address specific criteria throughout the process. These include the more common practices such as SRR, Preliminary Design Review (PDR), CDR, as well as the Technical Review Board (TRB) and Safety Review Board (SRB) discussed in more detail in AFRLI 61-103. Also included are MLTB, Mission Operations Readiness Review MORR, Flight Readiness Review (FRR) and Launch Readiness Review (LRR) and potentially others depending on the experiment (see the Reviews section at the end of this instruction for more details concerning some of these reviews). Long-lead activities are critical to decide on and initiate early, preferably no later than right after the Space Flight Test Planning Meeting (SFTPM) as they can take several months or more to complete.

Figure 3. Nominal Space Experiment Planning and Management Process.



4.1. **Initial Program Formulation.** Once a program begins and the need for a space experiment becomes apparent, the program goes through the process of formally standing up and defining their experiment. Programs can begin based on different initiators, such as direction from the Msn Org and leadership, a Warfighter Technology (WARTECH) approved program, Small Business Innovative Research (SBIR) award, Congressional Adds, etc. Initial program formulation establishes the envisioned best technical approach based on the top-level mission needs and requirements decomposition as well as the initial plans for experiment. A Concept Design Review (CoDR) and roadmap or proposed schedule may accompany Initial Program Formulation. The output from the Initial Program Formulation provides the information necessary to initiate the SFTPM. This activity occurs during the Ideation Phase described in AFRLI 61-108.

4.2. **Space Flight Test Planning Meeting (SFTPM).** The SFTPM, described in AFRLI 61-103, Vol 3, is held as a part of or soon after the Initial Program Formulation Phase that a program conducts when envisioning the future space experiment activity. This meeting allows the PM and program team to introduce the space flight activity concept to key AFRL organizations that may need to be involved in or oversee the experiment process (to include AFRL/Mission Org/DO/EN/RC, and Det-3/SE). At the SFTPM, the PM and program team work together to identify and tailor the AFRL space flight requirements to define the initial space flight experiment envisioned and gain input from the participants. Topics such as long

lead activities that need to be considered and started early should be discussed and acted upon if necessary. These include starting the Risk Management Framework (RMF) process leading to an eventual authority to operate (ATO), cryptographic requirements, airworthiness requirements, or laser safety and deconfliction processes with Laser Clearinghouse (in the case of a lasercomm experiment), reference AFI 91-401, *Directed Energy System Safety*. If significant changes in scope occur after this meeting the program may host a delta SFTPM to address these changes as appropriate. Scheduling a SFTPM as early as practical allows the PM to leverage AFRL subject matter expertise to properly plan for the key tailored MA, technical reviews, safety reviews, and supporting activities, to include all Spectrum Management actions. Output of the SFTPM are the basic space experiment design considerations and anticipated technical approval processes needed which provide the basic information required for the AFRL SERB. This activity occurs during the Pre-Planning Phase described in AFRLI 61-108.

4.3. **AFRL Space Experiments Review Board (AFRL SERB).**

4.3.1. The purpose of the AFRL SERB is four-fold: 1.) advocate to the DAF and DoD STP for flights to space, 2.) assess and assign an initial risk posture of the proposed experiment, 3.) ensure alignment of space flight experiments with the S&T space portfolio, and 4.) ensure high quality of the proposed experiments (e.g., reason for space flight, good experiment hypothesis, etc.). Experiments not requiring STP support for flight to space will not participate in the DAF or DoD level SERBs.

4.3.2. New experiments shall conduct a Space Flight Test Planning Meeting (SFTPM), as described in Par. 4.2, prior to briefing the AFRL SERB.

4.3.3. Experiments shall be briefed to the AFRL SERB annually, even if manifested for flight. The initial SERB briefing shall be accomplished prior to SRR. Refer to section 5.0. for further detail on the AFRL SERB briefing requirements.

4.3.4. The AFRL SERB is chaired by the D-TEO. At a minimum, the Lead Space Experimentalist and a representative from AFRL Det-3/SE should be present. Appropriately cleared AFRL Msn Org Directors and their representatives are invited to attend.

4.3.5. The output of the AFRL SERB, at a minimum, will be a memo listing space experiments and a recommended type designation of each experiment (Type 1, Type 2 (a/b), Type 3 and Type 4).

4.3.6. All programs that come before the AFRL SERB must have a plan for conducting technical oversight, space flight worthiness, MA, security and SCA. That plan may or may not include services provided by AFRL/RV.

4.3.7. SERB briefings will be similar in format to the DAF and DoD SERB briefings but will have additional slides (see content requirements in section 5.0.).

4.3.8. In addition to the annual SERB, out of cycle AFRL SERBs will be convened to address emerging needs.

4.3.9. The SFTPM and the outcome of the AFRL SERB provide the basis to tailor and define the necessary MA activities. These two activities are required for all AFRL space

experiments. SERB briefing content is described in Section 5.0. This activity occurs during the Budgeting Phase described in AFRLI 61-108.

4.4. **Tailored Mission Assurance (MA) Activities.**

4.4.1. Mission Assurance is both a process and a culture that must be adhered to by all individuals involved with space experiments. As a process, MA is a continuous, technical, and management activity employed over the entire lifecycle of a space experiment development and execution to achieve confidence in mission success. MA includes a disciplined application of systems engineering, space flight worthiness, risk management, quality assurance, and program management principles. MA is performed by a partnership of both contractor and government, beginning at concept design and continuing through launch operations and post-flight analysis.

4.4.2. Activities to help ensure MA are defined and tailored by the applicable Msn Org CE, or delegate early in the program timeline. They are tailored from proven SFWC criteria which have been developed over time. Applicable considerations which drive the tailoring include the categorization of the experiment out of the AFRL SERB (Type 1, 2a, 2b, 3, or 4), and other applicable characteristics of the experiment, such as complexity, risk, and allocated resources. These activities are then included in the programmatic baseline defined by the individual program managers. To facilitate this effort a streamlined checklist of SFWC focused on small and experimental type spacecraft has been developed by AFRL Space Vehicles Directorate as a best practice guide for use, *AFRL/RV Standard for Space Flight Worthiness Criteria (SFWC).* When used, the MLTB/MLPB process provides added rigor to the MA process.

4.4.3. Experiments categorized by the AFRL SERB as a Category 1 or 2a space experiment shall conduct an MLTB to establish the technical baseline and define and place under configuration control the scientific and technical objectives for the experiment. Note that the AFRL Lead Space Experimentalist must approve any changes. Once defined, the program can define and implement tailored Systems Engineering (SE) processes and technical reviews (SRR, PDR, CDR, etc.) along with tailored SFWC under the direction of the cognizant Msn Org CE. Note – the *AFRL/RV Standard for Space Flight Worthiness Criteria (SFWC)* is a best practice document available for others to use). Processes may include tailored configuration management/control, other experiments and reviews, such as functional experimenting, component experimenting, and activities associated with DNH determination. The Msn Org CE, or delegate, will work with the PM and program team to appropriately tailor these criteria, document them, and present them during the MLPB (for Type 1 and 2a experiments) or other program baseline effort (for all other experiment types), at which point the program baseline is set.

4.4.4. **Technical Baseline and the Mission Level Technical Baseline (MLTB).**

4.4.4.1. Following the SFTPM, as part of the MA activities, the program team shall establish and document their technical baseline. The technical baseline at a minimum should consist of the space experiment's mission objectives (with threshold and objective quantification if applicable). Once the MLTB is defined, the program should establish, maintain, and control their requirements, including suitable decomposition to the level required to provide adequate program direction. This is typically aligned with the program's functional allocation of performance to the system and may also be

reflected in the experiment objectives later established. The complexity and detail of these requirements and decomposition vary but are typically in direct correlation to the complexity and need of the program. Program requirements should be documented and maintained by the program team.

4.4.4.2. Mission Success Criteria (MSC) shall be established as well. MSC are established by the program team against the technical objectives in the MLTB and provide a means to measure the success of those objectives. At the end of the experiment the team will provide a concluding experiment brief referencing the MSC (e.g. what was successful, what wasn't successful, what is learned, and why) to the AFRL Lead Space Experimentalist.

4.4.4.3. Tailoring of systems engineering and SFWC can begin at this point. The experiment's objectives and success criteria, along with the complexities, safety concerns, and nature of the experiment itself will help define the amount of rigor appropriate for the experiment.

4.4.4.4. Once set and agreed-to, the program and experiment technical baseline should be approved by the CE within the Msn Org and held under configuration control. Updates to the baseline may be made but under appropriate review and approval as this may change the nature of the entire experiment and may drive changes to the programmatic baseline.

4.4.4.5. The MLTB review is chaired by the AFRL Lead Space Experimentalist for Type 1 and 2a experiments.

4.4.5. **Program Baseline and the Mission Level Program Baseline (MLPB).**

4.4.5.1. The programmatic baseline should be established after an experiment's technical baseline is set and the program requirements are understood and appropriately decomposed (post-SRR). The programmatic baseline should consist of 1.) a cost baseline, 2.) schedule baseline, and 3.) performance baseline based on the technical baseline. It is important to also understand how the estimated cost aligns with the program budget, given AFRL usually does not control the launch date and rides to space as a secondary/rideshare with other vehicles. The programmatic baseline should be closely monitored by the PM and program team at a minimum and reported on during program reviews to assess progress against the baseline and identify/manage risks and issues early. Requirements decomposition may be an iterative process in order to appropriately balance available performance against cost and schedule constraints.

4.4.5.2. The cost baseline should include the estimated value required to complete the program as defined by schedule and performance. The cost baseline should also identify the detailed program budget for each FY of the program. At a minimum, the budget should consist of the following items: support and R&D contracts, experimenting & evaluation, frequency management support, independent assessment teams, travel, training, University Advanced Research Contract (UARC)/Federally Funded Research & Development Contract (FFRDC) support, flight operations, ground software and data analysis. The budget will clearly annotate differences between years of funding and sources of funding such as AFRL core dollars, SBIR funding and external funding (e.g., National Aeronautics and Space Administration (NASA),

Missile Defense Agency (MDA), etc.). All funding shown should include both after withholds (i.e., executable) funding and pre-withhold funding and clearly identify the assumptions of the withhold rate for each funding category. Cost baselines are typically aligned closely with the physical allocation of the system specification, design, hardware, and software.

4.4.5.3. The schedule baseline should include major program milestones of the program lifecycle from program initiation to end of the program. Additionally, for all space experiments, the Initial Launch Capability (ILC) date (or a flight ready date) must be clearly articulated on the schedule. A summary of funding per FY should be included and overlaid on the bottom of the schedule to directly show the correlation between the cost baseline, budget, and the schedule baseline per FY. If elements of the schedule are dependent upon external programs, organizations and milestones, these dependencies should be clearly listed as such on the schedule. The PM will propose the major schedule milestones for closer review, along with the maximum length of time each milestone can deviate from the baseline, forward or backward (+/-) and critical path to be closely monitored. Approval of this milestone schedule and the milestones' deviation time windows will be established as the initial schedule baseline and be critiqued for each subsequent baseline review. Schedule baselines are also closely associated with the experiment program's chosen physical allocation, driving manufacturing, labor, approvals, experiments, materials, etc.

4.4.5.4. The performance baseline should permit a complete understanding of program's scope and a description of major deliverables. A clear end-state should be defined, and some description of technical performance should be included. Key Performance Parameters (KPPs) or Technical Performance Measures (TPMs) could be used, as appropriate. TPMs serve as useful evaluation points throughout the development of a program and inform the necessary data that needs to be collected during experiments to update TPMs in order to indicate progress towards meeting performance requirements. TPMs also help inform the program team where to concentrate their efforts to meet their expected or desired performance goals. KPPs are typically must-meet parameters for a program. The performance baseline is an extension of the performance allocation given to the system decomposition.

4.4.5.5. Programs designated by the D-TEO as Type 1 (free-flyer experiments) or Type 2a (high visibility hosted payload experiments), shall convene a formal MLPB board chaired by the Msn Org Director and delegated authority and follow the *AFRL/RV Configuration Management (CM) and Configuration Control Board (CCB) Process* for program baseline details, unless the Msn Org has developed similar detailed and rigorous guidance. In cases where the scope of the space experiment project activities match the scope of the associated R&D Program, the MLPB and MLTB together satisfy the requirement for the program baseline described in 61-108. However, if the associated R&D Program contains significant activities that are not included in the scope of the space experiment project, then the R&D Program requires a separate R&D Program Baseline. This separate R&D Program Baseline may incorporate all or part of the MLPB and MLTB by reference.

4.5. **Experiment Reviews.** Key space experiment reviews shall be conducted in accordance with AFRLI 61-103 and associated volumes, and include the TRB and SRB described in AFI

91-202 AFRL Supplement, during which the experiment plan, Test Hazard Analysis (THA), and other key elements are reviewed and a residual experiment risk is established and documented on the Test Approval Worksheet (TAW). They may also include any number of additional reviews of individual, functional, or system experiment, evaluation, quality, or preparation effort as based on the tailored MA processes implemented. **Attachment 1**, Reviews, contains a summary description of these reviews. These reviews occur during the Execution Phase described in AFRLI 61-108. These reviews are in addition to the Program Management Reviews described in AFRLI 61-108.

4.6. **Operations and Conducting the Experiment.** On-orbit operations shall be conducted in accordance with AFRLI 61-103 Vol 3. These operations should leverage best practices from AFRL/RV, Space Systems Comment (SSC), NASA, and other space experimentation experts. On-orbit operations have different requirements depending on asset ownership and whether it is a Type 1 or 2 experiment. The on-orbit experiment is usually broken up into a Launch & Early Orbit Operations (LEOPs) phase, a nominal operations phase focusing on the experimental objectives and a final phase either of end of life or transition to another organization for residual operations. Activities prior to the final phase occur during the Execution Phase described in AFRLI 61-108. End of life or transition activities occur during the Retirement Phase described in AFRLI 61-108.

4.6.1. **Launch & Early Orbit Operations (LEOPs).** The LEOPs phase of a space experiment program is most applicable to a free flying spacecraft. However, generally all assets flown require varying amounts of initialization, checkout, experimenting and/or calibration to verify functionality after launch in preparation for nominal operations, i.e., the experimental campaign.

4.6.2. **Experiment.** The experimental operations on-orbit represent the entire reason for flying the payload or spacecraft in the space environment. This experiment collects the necessary data to exercise the PI's hypothesis with stated goals, objectives and thresholds as detailed in the program's MLTB or experiment technical objectives. It is important to note that failure to achieve a specific experiment objective is not necessarily a safety mishap, see AFRLI 61-103 and associated volumes, for more details.

4.6.3. **Transition/Residual Use/End of Life (EOL).** After AFRL completes the experiment objectives, there are two options, 1.) transition the program to another interested organization for residual use or 2.) complete the program's EOL plan. Option 1 may involve flying the asset from the same ground site and operations team or may involve moving the operations to another ground control site and operations team. Satellite SCA, as applicable, may or may not be transferred as well depending on the specific circumstances and agreements.

4.6.4. **Launch Authority.** AFRL free-flying satellites and hosted payloads are usually manifested as secondary payloads on another mission's Launch Vehicle (LV). As such, AFRL typically does not have the authority to slip or control the launch date. In rare cases where an AFRL satellite is the prime payload on a LV, then AFRL does control when the mission launches, in coordination with the respective launch range. Moreover, DNH criteria for the mission is established by the LV and LV integrator and must be met. If the DNH criteria are not met, the program must obtain a waiver on those non-compliance items from the LV integrator in order to be integrated into the satellite host or LV.

4.6.5. **Satellite Control Authority (SCA).** SCA provides authority and responsibility for all on-orbit operations for type-1 space experiments and is exercised by the MD. SCA for other experiment types will be held by the organization which owns/operates the space vehicle. SCA is the authority to plan, schedule, and perform satellite commanding, or more specifically, a transferable authority and the ability to provide Telemetry, Tracking and Commanding (TT&C) of a satellite bus and to provide control and management of a spacecraft's payload unless payload control authority is assigned to another organization, see AFRLI 61-103 Vol 3 for more details.

4.6.6. **Certification and Training.** The MD who holds SCA has both the authority and responsibility to establish, train and certify the mission operations team, see AFRL 61-103 Vol 3 for more details.

4.7. **Space Experiment Tracking.** All authorized space experiments shall be entered into the AFRL Space Experiment Tracker (maintained by AFRL Det 3/SE), which uniquely identifies each experiment and records completion dates for key experimentation, space flight worthiness, systems engineering, and safety milestones that need to be accomplished. The purpose of the tracker is to ensure important activities for each experiment are not overlooked resulting in detriment to MA, safety, or loss of space flight opportunity. Key items not required and consequently tailored out of a given experiment's process can be entered as "n/a". In addition, the CE should work with the program team to assign and follow other key MA and other steps not necessarily listed in the tracker. Type 1 and 2 experiments will be entered in the tracker. Type 3 and 4 will be entered in the tracker based on determination by the D-TEO and AFRL Lead Space Experimentalist, which will generally happen at the AFRL SERB and/or a determination from AFRL Det 3/SE.

4.8. **Safety.**

4.8.1. **Space Safety Overview.** This section covers additional guidance for AFRL in order to implement a comprehensive Space Safety Program, as required per AFI 91-202. The AFRL Space Safety Program establishes a methodology for mishap prevention through risk management, and mishap reporting in order to enable mission success as safely as reasonably practical within the program's level of effort.

4.8.1.1. IAW AFI 91-202, all organizations shall comply with Space Safety requirements to include, research and development systems, experimental systems, systems undergoing experimenting, operational systems, and systems at EOL. This applies to the entire space segment of the Space mission (e.g., systems architecting and design, manufacturing, launching, and operations through disposal) under DAF control.

4.8.1.2. DoD/DAF/USAF/USSF hosted payloads on non-DoD platforms shall comply with requirements for the portions within their control.

4.8.1.3. Joint/DoD/Non-DoD space safety guidelines require organizations operating in a joint environment or with non-DoD agencies to develop MOAs/MOUs specifying applicable space safety guidelines and associated responsibilities. It is the participating organizations' responsibility to determine the lead agency and proper approval authorities.

4.8.2. **Mishap Criteria.** Programs shall identify and document mishap criteria and accountability, as part of the on-orbit experiment planning process prior to conducting space experiments, i.e., identifying primary/secondary/tertiary mission objectives as defined by minimum success criteria for each to satisfy definitions in AFMAN 91-222, *Space Safety Investigations and Reports*. This criterion shall be established by the program manager in consultation with AFRL Det 3/SE and will be briefed during the SRB as well as documented in the SRB minutes. The criteria shall be integrated in the safety risk level determination. In addition, a signed Mission Experiment Objectives MFR or approved MLTB that documents the primary/secondary/tertiary mission objectives shall be provided to AFRL Det 3/SE as part of the required space safety documentation from the program.

4.8.3. **Pre-Launch and Launch Safety Responsibilities (DNH criteria).** These responsibilities depend on the launch provider for the space vehicle. If the space experiment has coordinated a ride share with STP, follow Aerospace Report No. TOR-2016-02946 Rev A, Rideshare Mission Assurance and the Do No Harm Process. Contact DOD Space Test Program and/or AFRL Det 3/SE for a copy of applicable documents. If on different rideshare, e.g., NASA or commercial, programs should follow the launch provider's process. However, regardless of launch provider, programs shall coordinate with AFRL Det 3/SE prior to sending a DNH MFR stating there will be no harm caused by the rideshare as part of required safety documentation.

4.8.3.1. If AFRL is procuring the launch service and will launch from a National Security Space Launch (NSSL) range, then SSCI 91-701, *The Space Systems Command Launch and Range Safety Program*, must be tailored to the mission and AFRL will be the lead organization for completing a Missile System Pre-Launch Safety Package (MSPSP) for the launch. Contact AFRL Det 3/SE for assistance.

4.8.3.2. Launch Collision Avoidance (LCOLA) requirements are detailed in AFI 91-202 but must follow criteria thresholds listed in Range Commanders Council (RCC) 321, Common Risk Criteria Standards for National Experiment Ranges.

4.8.3.3. If a Federal Aviation Administration (FAA) licensed commercial launch is required, then an MOA between the DAF and the FAA shall be negotiated.

4.8.3.4. If the program is classified and a Class-A on-orbit mishap was determined, then an Interim Safety Board (ISB) President must be appointed in accordance with AFI 91-202 to establish the location and process to sequester Air Force assets for conduct of the Class-A mishap investigation.

4.8.4. **Space Debris Assessment Report (SDAR)/End of Life Plan (EOLP).** All spacecraft and launch vehicles expected to achieve orbit shall mitigate and control potential space debris generation and must be assessed to be in compliance with the US National Space Policy, DoDI 3100.12, Orbital Debris Mitigation Standard Practices (ODMSP) and AFI 91-202, during all mission phases. Contact AFRL Det 3/SE for assistance. This assessment is accomplished using the SDAR/EOLP document.

4.8.4.1. The SDAR/EOLP must be formatted and contain the information per AFI 91-202, Section 13.12 and reviewed by Det 3/SE Chief of Safety. This document must also be reviewed by the AFRL/Msn Org CE and Director no later than 30 days before the SRB is convened unless waived by the SRB Chair.

4.8.4.2. AFI 91-202, Section 13.12 includes information, templates and methodology for completing SDAR/EOLPs. Assistance to generate these products is available through NASA. Instructions and software can be found on the NASA orbital debris program office site at **https://orbitaldebris.jsc.nasa.gov/index.html** . Generic SDAR/EOLP examples are located on the SharePoint Site under the Space Safety Resources folder, **https://usaf.dps.mil/teams/20547/Safe/SRB_ExperimentResource/Forms/AllItems.aspx** . Contact AFRL Det 3/SE for assistance.

4.8.5. **Training.** All AFRL personnel (military and government civilians) working on-orbit space experiments shall contact AFRL Det 3/SE for space safety requirements, associated documentation, and space safety processes.

4.8.6. **Orbital Safety.** AFI 91-202 states all organizations with SCA or that experiment or operate any space system (including satellites, hosted payloads, and experimental systems) designed to complete one or more revolutions in earth orbit [or cis-lunar trajectory], shall establish an Orbital Safety Program spanning on-orbit experimenting, operations, and end-of-life actions.

4.8.6.1. Orbital Safety Programs shall document routine, contingency, and emergency operations plus identify points of contact if there is an anomaly and/or events of significance, e.g., rendezvous proximity operations which require additional approvals, required operations training, etc. Programs should document what is considered an anomaly. Programs shall contact AFRL Det 3/SE for assistance if unable to execute the EOLP and/or potential or actual creation of unintended space debris.

5. AFRL SERB Space Experiment Briefing content. The following charts are required at the AFRL SERB for both continuing and new experiments regardless of manifest status or experiment execution. Those experiments no longer collecting data, completed experiments or experiments transitioned to other organizations are required to include "close out" briefing content (see below). The following briefing content is in addition to DAF/DoD SERB required charts and are the only AFRL SERB briefing charts required for experiments/experiments not going to the DAF or DoD SERB.

5.1. Quad Chart (Picture & OV-1, Warfighter Benefits, Experiment/Project Overview, Schedule with Funding/Milestones, Contact Information (PM, PI, Chief Engineer), Date).

5.2. Experiment Objectives and Reason for Space Flight. The experiment objectives should exactly match the MLTB, if applicable (Type 1 and Type 2a experiments). Experiments which are still pre-MLTB are exempt from this requirement unless and until designated as a Type 1 or 2a. For experiments conducting a "close out" briefing, briefly discuss the following: collection of the necessary data against the experiment goals, positive or negative result of the experiment, and the overall lifetime of the experiment (required for safety close out of the experiment). For those experiments with a formal MLTB, a MLTB close-out meeting will be conducted separately. For those experiments that did not meet expected payload/spacecraft lifetime (e.g., pre-launch agreed timeframe to collect the needed experiment data), further safety reviews may be necessary.

5.3. Execution Methodology: Overall description of execution methodology to include experiment Type (1, 2, 3 or 4) and organization performing key space-specific tasks (e.g., MA,

DNH experimenting, SCA, manifest strategy). For new experiments, this is a proposed execution methodology that will be approved by the D-TEO.

5.4. AFRL Space Experiment Tracker Status and upcoming events (e.g., Date of signed MLTB, Pre-Ship Review (PSR)).

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Attachment 1

GLOSSARY OF REFERENCES, FORMS AND SUPPORTING INFORMATION

References

AFI 91-202_AFMC Supplement, *The US Air Force Mishap Prevention Program*, 31 March 2022

AFI 91-202_AFRL Supplement, *The US Air Force Mishap Prevention Program,* 26 September 2022

AFI 33-324, *The Air Force Information Collections and Reports Management Program*, 21 July 2019

DAFI 99-103_AFMC Supplement, *Capabilities Based Test and Evaluation,*

17 October 2022

DAFPD 61-1, *Management of the Science and Technology Enterprise*, 5 February 2021

AFRLI 61-103, *AFRL Research Test Review, Approval, and Oversight*, 5 October 2020

AFRLI 61-108, *Management and Control of Technology Development for AFRL*, 11 January 2022

Under Secretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L), *Fundamental Research Memorandum*, 24 May 2010

SSCI 91-701, *The Space Systems Command Launch and Range Safety Program*, 27 December 2022

AFMAN 91-222, *Space Safety Investigations and Reports*, 16 June 2019

AFRL/RVE Satellite Operations Governance Guide, v12, October 2021

*AFRL/RV Configuration Management (CM) and Configuration Control Board (CCB) Proc*ess, v4.1, 10 September 2021

AFRL/RV Standard for Space Flight Worthiness Criteria (SFWC), July 2021

AFRL/RV Operating Instruction (RVOI), 61-2, *Space Experimentation*, 25 March 2020

AFI 10-1202, *Space Test Program (STP) Management*, 15 November 2010

AFPD 13-6, *Space Policy*, 12 August 2013

Aerospace Report No. TOR-2016-02946 Rev A, *Rideshare Mission Assurance and the Do No Harm Process*

DoDI 3100.12, *Orbital Debris Mitigation Standard Practices (ODMSP)*

AFI 91-401, *Directed Energy System Safety*, 28 November 2018

Abbreviations and Acronyms

ADC—Attitude Determination and Control

ATO—Authority to Operate

AFPD—Air Force Policy Directive

AFMC—Air Force Material Command

AFRL—Air Force Research Laboratory

AFRLI—Air Force Research Laboratory Instruction

AFRL/CC—Air Force Research Laboratory Commander

AFRL/CV—Air Force Research Laboratory Vice Commander

C3—Command, Control, and Communications

CD&H—Command and Data Handling

CDR—Critical Design Review

CE—Chief Engineer

CoC—Certificate of Conformance

CoDR—Concept Design Review

CTA—Center Test Authority

DAF—Department of the Air Force

DNH—Do No Harm

DoD—Department of Defense

D-TEO—Deputy Technology Executive Officer for Space Science and Technology

EOL—End of Life

EOLP—End of Life Plan

FAA—Federal Aviation Administration

FFRDC—Federally Funded Research and Development Center

FTPM—Flight Test Planning Meeting

FRR—Flight Readiness Review

FSW—Flight Software

GN&C—Guidance, Navigation and Control

GRR—Ground Readiness Review

IATT—Interim Authority to Test

ISS—International Space Station

ILC—Initial Launch Capability

KPP—Key Performance Parameter

LCOLA—Launch Collision Avoidance

LEOPs—Launch and Early Orbit Operations

LOA—Letter of Agreement

LRR—Launch Readiness Review

LV—Launch Vehicle

MA—Mission Assurance

MD—Mission Director

MDA—Missile Defense Agency

MFR—Memorandum for Record

MLPB—Mission-Level Program Baseline

MLTB—Mission-Level Technical Baseline

MOA—Memorandum of Agreement

MOC—Mission Operations Center

MOU—Memorandum of Understanding

MORR—Mission Operations Readiness Review

MSC—Mission Success Criteria

MSPSP—Missile System Pre-Launch Safety Package

NASA—National Aeronautics and Space Administration

NSSL—National Security Space Launch

OPR—Office of Primary Responsibility

PDR—Preliminary Design Review

PM—Program Manager

PI—Principal Investigator

PSR—Pre-Ship Review

RDS—Records Disposition Schedule

RMF—Risk Management Framework

SBIR—Small Business Innovative Research

SDAR—Space Debris Assessment Report

SECDEF—Secretary of Defense

SERB—Space Experiments Review Board

SFTPM—Space Flight Test Planning Meeting

SRB—Safety Review Board

SRR—Systems Requirements Review

S&T—Science and Technology

SCA—Satellite Control Authority

SSM—Space Safety Manager

STEM—Science, Technology, Engineering, and Mathematics

SFWC—Space Flightworthiness Criteria

SSC—Space Systems Command

STP—Space Test Program

SV—Space Vehicle

T&E—Test and Evaluation

TAW—Test Approval Worksheet

TEA—Test Execution Authority

THA—Test Hazard Analysis

TPM—Technical Performance Measure

TRB—Technical Review Board

UARC—University Advanced Research Contract

UNP—University Nanosatellite Program

WARTECH—Warfighter Technology

Attachment 2

REVIEWS

A2.1. This is not intended to be an all-inclusive list of reviews. Other applicable reviews are described in complimentary documents such as AFRLI 61-103, AFI 91-202, and AFI 10-1202.

Table A2.1. Reviews.

Review	Scope	Products	Approval Authority / Chair	Typical Timeframe	Notes
Mission-Level Technical Baseline (MLTB)	A technical baseline consisting of the space experiment objectives with associated threshold/objective criteria if applicable as well as success/scoring criteria. The MLTB is a focused on fully defining the experimental objectives, defining success criteria, and holding those details under configuration control	Briefing containing defined objectives and success/scoring criteria.	Lead Space Experimentalist-chaired board for, at a minimum, Type 1 and Type 2a programs (unless waived).	As soon as possible after approval of the experiment by the AFRL SERB.	Defined in *AFRL/RV Configuration Management (CM) and Configuration Control Board (CCB) Process*, v4.1, 10 Sep 2020
Mission-Level Program Baseline (MLPB)	A program baseline for a space experiment based on the defined MLTB and associated requirements for the program.	Briefing covering aspects of budget, cost, schedule, and performance required to successfully execute the program.	Msn Org Chief Engineer.	As soon as possible after the establishment of the MLTB and program requirements.	Equivalent to a Program Baseline but specifically defined in *AFRL/RV Configuration Management (CM) and Configuration Control Board (CCB) Process*, v4.1, 10 Sep 2020
Flight Readiness Review (FRR)		Briefing	SSC/CC -- for STP missions where SSC owns the LV	L - 2 weeks	MSPSP, SDAR/EOLP, DNH cert and LV/mission requirements verification artifacts as required by LV integrator & Mission PM
Launch Readiness Review (LRR)		Briefing	- SLD 45/CC -- for missions flown out of CCAFS - SLD 30/CC – for missions flown out of VAFB	L-1 week to L-3 days	
Pre-Shipment Review (PSR)	Review status on SV, I&T, transportation plan, security at launch site, schedule to launch, ops update, ground sys update	- Briefing		Pre-Shipment Review (PSR)	Review status on SV, I&T, transportation plan, security at launch site, schedule to launch, ops update, ground sys update
Mission Operations Readiness Review (MORR)	- Review ops status: documentation, procedures, ops team progress on certification, remaining exercise/rehearsal trng schedule, processes/ROEs				Mission Operations Readiness Review (MORR)
Mission Readiness Review (MRR)	Summarize MORR topics & findings and address any liens, SV, launch site, mission/science	Briefing	MD or RV Dir (depends on mission)	L - 8 weeks to L - 2 weeks (always after MORR but before FRR/LRR)	