Department of the Navy
Small Business Innovation Research (SBIR)

Guidebook to Installation & Operation Processes for Experimentation

Guidance for Installation and Operation Processes on
Navy Ships, Submarines, Aircraft, Unmanned Systems, and Shore Facilities

Version 2

January 2024

Record of Changes

Revision Number	Date Published	Summary of Changes
1	6/28/2022	New Version
2	12/29/2023	Revised MSC and battery information

Contents

1 Introduction

The Department of the Navy (DON) in concert with System Commands (SYSCOMs) supports the technological advancement of Naval forces. Experimentation is one way to fast-track the development of capabilities and identify additional research needed to address warfighter gaps and shepherd warfighters into the future by discovering innovations and technologies. Many such solutions are developed by small businesses that, while experts in their field, may lack an in-depth background in Naval systems and the processes required to integrate with these systems. The Small Business Innovation Research (SBIR) program's mission is to apply agility, dedication, and entrepreneurial ingenuity to the Research and Development (R&D) needs of the Navy.

The Navy's communications, surveillance, and weapons systems are complex and certified to allow personnel to train as they fight and rely on dependable, repeatable outcomes. The Navy cannot allow untested technologies to be installed or operate with certified and established systems without assurances that it will not disrupt existing capabilities. There are numerous processes, subprocesses, and regulations in place to ensure that installing any system on a Naval platform and operating with other systems does not put the personnel, material, or mission at risk.

This document is intended to assist SBIR sponsors and their industry partners by highlighting these complex processes and the permissions/certification required to enable an experiment in the operational environment. The objective is to enable these SBIR technologies to have every possible advantage in impacting decisions and further developing identified improvements. Furthermore, understanding the organization, funding and other specific skillsets required for experimentation will help the community identify the right experiment platform for the technology vice installing and investing before a technical path is worked out.

1.1 Purpose and Scope

Installation and operational processes are complicated procedures that are steeped in organizational structure. It is important to understand that no single document can cover all aspects of these processes, let alone detail the approving organizations and personnel. The scope of this guidebook is to provide general, albeit targeted, knowledge on the processes to better inform decisions for the SBIR community. Each of the defense platform types— ships, submarines, aircraft shore sites, and Marine elements will be explored in the following sections.

As installations and operations are a portion of the larger experimentation process, it is prudent to be mindful of what an experiment is and identify the goals for any undertaking. An experiment is fundamentally an attempt to learn whether a technology (in this case, a SBIR technology) has the possibility of addressing a warfighting gap. The knowledge gained during an experiment is unique in that it is founded on observation and experience.[1] Experiments require rigorous engineering and risk management processes be followed. Several risk assessment processes exist, based on the experiment's risk to the ship and mitigation complexity.

This guide aims to provide a basic understanding of the installation and operational requirements for experimentation and serve as a comprehensive reference tool for SBIR community innovators in Phase II or III of maturity. As Phase II is the primary demonstration

[1] Code of Best Practice, Alberts & Hayes, 2002

period, candidates will find that much of this guide dives into installation processes for Phase II. Please note, due to the ever-changing nature of reference documents and manuals, the information in this guidebook is current at the time of publication. For the most updated procedures, consult the latest version of the materials listed in References. Several of the processes summarized here are detailed further in individual Process Guides, to be released on the DON-SEC website when available. This selection may be expanded in the future. Consult the forthcoming guide areas below for more information. Environmental policy information (Environmental Impact Statements, Categorical Exclusions, etc.) can also be found in the Experimentation 101 Guidebook.

Installation Scheduling	Topside Surveys	RMMCO Check	Application Integration	Lithium Battery Safety Program	Spectrum	COTS Waivers
UAS Airworthiness	Aircraft Operations	Aviation & Navigation Certification	Categorical Exclusions	Laser Safety	Due Regard	Certificate of Authorization

1.2 Initial Considerations

The Navy processes for certifications and installations are specific to the platform being used. However, there are numerous processes that are common across all platforms and may be rooted at the Department of Defense (DOD) or national level accreditations (i.e., Cybersecurity, Lithium Battery, Commercial-Off-The-Shelf (COTS) Waiver, etc.) The processes and procedures discussed here will not be required for every experiment, however some, such as Cybersecurity, can apply across the board.

Early planning is essential for progressing through these processes. Established timelines, the flow of information and the decision sequence are crucial to any course of action. It is beneficial to develop objectives early on before progressing to pre-event activities such as planning conferences. Consideration of these types of long-lead activities should ideally be given at the onset of funding for a SBIR. This can ensure the SBIR will be fully tested to obtain necessary data collection that will ultimately enable decision-makers to acquire technologies that fill capability gaps with a minimum waste of resources. For more in-depth information and additional requirements, see Unique Circumstances & Specialized Processes.

1.3 Process Overview

The type of platform, which platform systems are used, and type of installation that a SBIR technology utilizes will determine which processes are required to install the SBIR technology on the platform and conduct the experiment. Some processes are more focused on the technical or engineering aspects of the installation on or within the platform. These engineering processes are usually overseen by the SYSCOMs. Other processes are focused on the operational environment outside and around the platform that the SBIR technology will be experimenting in. The operational processes are usually owned by operational or similar commands. A quick rule of thumb is that processes addressing items “on or in the platform” are owned by the SYSCOMs and processes “outside or around” the platform are owned by operational commands.

1.3.1 Process Owners

SYSCOMs have the technical authority to define and enforce technical standards and processes to ensure systems are engineered for safe, effective, and consistent operation. There are five SYSCOMs: Naval Sea Systems Command (NAVSEA), Naval Air Systems Command (NAVAIR); Naval Information Warfare Command (NAVWAR), Naval Facilities Engineering Systems Command (NAVFAC), and Marine Corps Systems Command (MARCORPSYSCOM or MCSC). For most installations, a SBIR will follow processes from one or two SYSCOMs.

Operational commands have the authority to define and enforce standards and processes to ensure systems on platforms are interoperable with other units, do not interfere with or degrade other units, and only operate within approved parameters or areas. There are numerous operational commands that own or implement processes; Fleet Commanders such as Commander Third Fleet (C3F) and Fleet Area Control and Surveillance Facility (FACSFAC) are examples. The requirement to complete an operational process will vary widely depending on the location and how a SBIR technology will conduct an experiment.

1.3.2 Installation Types

The type of installation used by most SBIR technologies will be a Temporary Alteration (TEMPALT). TEMPALTs do not follow the standard installation processes in their entirety, as the SBIR technology will be removed at the end of the experiment and the platform returned to its original configuration.

Please note that unmanned systems operating on or integrating with systems on one of the previously mentioned platforms may trigger the processes for the platform that the unmanned system is operating on or with. Installation of SBIR technology on Marine Corps platforms is subject to MCSC requirements. Other processes overseen by MCSC or others may also apply. Refer to the below table for an overview of each platform and the overall process associated with each. Please note that this table reflects a small example of installation processes, and some systems may be classified.

Platform	Installation Type	SYSCOMs	Processes	Considerations
Ships	TEMPALT	NAVSEA, NAVWAR, NAVAIR	Navy Modernization Process (NMP)	MSC (TRANSALT)
Submarines	TEMPALT	NAVSEA, NAVWAR	NMP	
Aircraft	TEMPALT	NAVAIR	Interim Flight Clearance (IFC)	
Shore Facilities	TEMPALT	NAVFAC, NAVWAR	Ashore Application Integration Processes (AAIP)	MSC (TRANSALT)

TABLE 1 OVERVIEW BY PLATFORM

2 Ships

Navy ships can have numerous requirements, but keep in mind not all requirements and deliverables will be needed in every situation and are dependent on complexity. Gaining an

awareness of what may be involved can help to understand the process better and why it appears to be a long timeline. Additionally, this research may generate a greater understanding for the formulation of questions about how the process relates to a particular experiment.

The Secretary of the Navy (SECNAV) recognized the need for a more succinct and effective process for experimentation and demonstration of new technologies that would help fill capability gaps. SECNAV directed that the well-codified processes in the Navy Modernization Program Management and Operations Manual (NMP-MOM) be distilled into a more concise and effective process for Fleet Experiments (FLEX) and Technology Demonstrations (TECH DEMO) on Fleet ships. This led to the 2019 development of a subsection to the NMP entitled "Appendix H – Fleet Experimentation and Technology Demonstration." This newer manual answers the need outlined by the SECNAV to reduce difficulties for experimentation on ships and mitigate installation requirements that pose challenges to rapid innovation, experimentation, and closure of capability gaps. See Figure 2 for an overall look at the process structure.

The process for U.S. Navy vessels and Aegis Ashore sites (shore installations that mimic AEGIS ships systems) explores procedures and requirements for the temporary alterations to be performed for experiments or technical demonstrations. The result of this process depends on the type of certification required, as every vessel will be reviewed on a case-by-case basis, but essentially will ideally result in permission to install aboard. For surface ships, there are 12 groups. Each of these groups will have a set of process and product requirements.[2]

In the case of experimentation activities that are not complex, such as bringing a stand-alone laptop onto the ship, the Regional Maintenance and Modernization Coordination Office (RMMCO) process is bypassed. However, if the experiment is complex enough or industrial in nature and requires one or more Ship Installation Drawings (SIDs), then the RMMCO process may be required.[3]

Execution planning often starts in March or April each year (although some events may have different timelines), at which time sponsors facilitate planning for the events. Plans will be approved by the pertinent command. TECH DEMOs requiring a Ship Change Document (SCD) or a Technical Data Package (TDP) will be tracked through NDE Entitled Process (NDE EP).[4] During pre-planning, the sponsor will work to choose ships and dates. The sponsor will then plan the installation along with the preparer, initiator and/or submitter. During execution, the group will develop more detailed plans and Plans of Action and Milestones (POAMs) as well as obtain authorization, perform the execution, and report results. If no SCD was required for the TECH DEMO, then details and results of execution will be submitted in a TECH DEMO Risk Assessment Request Message.

The more complex Phase II SCD should be submitted early to facilitate the needed approvals. Also, if the installation impacts the Integrated Combat System (ICS), the submitter must go through the ICS Configuration Change Board (CCB) before submittal in NDE. When

[2] Appendix H, NMP Management and Operations Manual-Fleet Experiment & Technology Demonstration, 2019, pp. H-27 – H-53

[3] Appendix H, NMP Management and Operations Manual-Fleet Experiment & Technology Demonstration, 2019, Sections 1-2

[4] Appendix H, NMP Management and Operations Manual, 2019, 1.1-1.5

submitting an accompanying Cost Benefit Analysis (CBA), the submitter should submit one CBA for installation and another for removal.[5] CBAs are required for all groups where SC connects to warfare/combat systems and should at least include Element Certifications, Integrated Combat System (ICS) CCB assessment, and Navigation Certification (NAVCERT), Aviation Certification (AVCERT), or Flight Deck Certification impact assessments, and Weapons Systems Explosives Safety Review Board (WSESRB).

For Non-Permanent alterations that facilitate experimentation, the **changes will include prototypes, proof-ins and any current TEMPALTS**. It will start in Phase I and must be approved at the first decision point. After this stage, the change will either be stopped or will proceed to SCD Phase II for concept design. The Ship Change Data Package (including POAM) will then be prepared, and the proposal sent through the review process to the second decision point for approval to install.[6] The technical assessments will depend mainly on the SCD for decision-making and must follow the requirements outlined below to continue past Block 10. Technical Assessments are performed in the preliminary engineering, design development, and detailed specifications stages. Phase I (Technical Assessments) should take no longer than five days. Once prepared and all cost information is complete, the SCD will be entered into NDE by an authorized submitter. All data must be complete for SCD Phase I fields before the SCD can be forwarded to the submitter.

Once the Submitter receives approval of Phase I and notice to complete Phase II or IIa, the Submitter will complete engineering and provide a draft SCD Phase II to the Change Manager (CM) in the related SPM Office. Upon approval of Phase II, execution can begin.[7] ***Note***: Phases described above are not related to the SBIR phases for experimental maturity. A typical timeline for a complex experiment to navigate all the necessary gates and reviews is shown below.

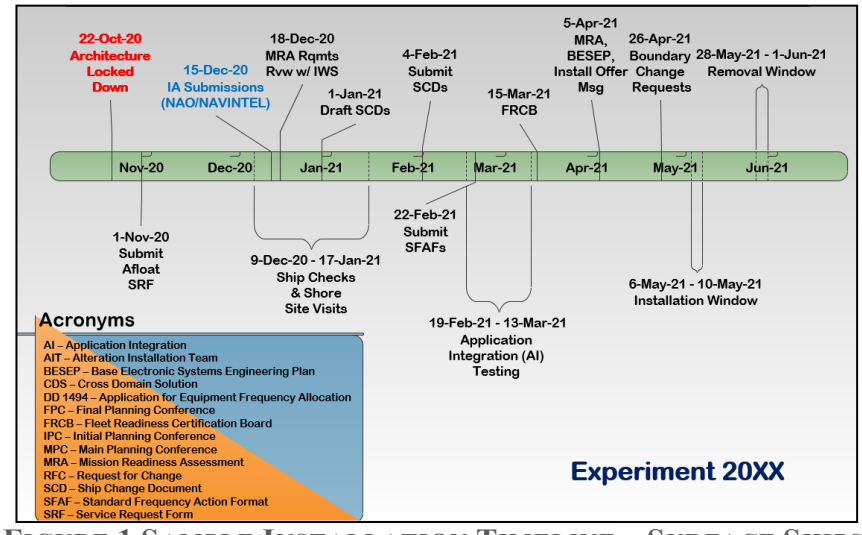

FIGURE 1 SAMPLE INSTALLATION TIMELINE – SURFACE SHIPS
*DATES ARE FOR REFERENCE ONLY – REPEATABLE TIMELINE

[5] Appendix H, NMP Management and Operations Manual, 2019, 1.4-1.5
[6] Joint Fleet Maintenance Manual Volume VI, Department of the Navy, 2019, p. 36-9
[7] Joint Fleet Maintenance Manual Volume VI, 2019, pp. 36-4, 36-5, 36-9 – 36-11

2.1 Military Sealift Command Ships

Installations on Military Sealift Command (MSC) ships and shore locations are referred to as Transportation Alterations (TRANSALTS) and used to initiate, design, install and document changes to ship's configuration.[8] The Port Engineer validates requirements and works with the requestor on the TRANSALT Request, beginning the process for a proposed TRANSALT. The Port Engineer is the life cycle manager of the ship and is responsible for ensuring that the ship is maintained in a satisfactory condition.[9] The Port Engineer is also familiar with the ship's Safety Management System (SMS) with a focus on maintenance and all required shipboard certificates.[10] Unmanned aircraft or other devices brought onto a MSC ship may need a SMS document drawn up (if one does not already exist) to ensure safety of transport and operation.

MSC shall ensure that safety and environmental policy is implemented and maintained at all levels of the organization, both ship and shore based. The SMS Procedures Manual provides the procedures that enable these policies to be effectively implemented.[11]

Requirements for MSC ships include:

- Interim Flight Clearance (IFC) for Aircraft, if needed
- Lithium-ion battery compliance if vehicle has one
- Agreement that MSC ships may not attempt to recover any unmanned/autonomous vehicle being remotely controlled
- Sponsor-identified all requirements of the unmanned/autonomous vehicle before loading onto the ship, such as equipment storage (space, power, deck stress, stability, environment)
- Environmental policies
- Training for Ship's Force to support operations
- Preventative or corrective maintenance support may be required by Ship's Force
- Sponsor-written Mission Plan with seek agreement from the MSC Master (30 days advance notice)
- Sponsor-completed Operational Risk Management (ORM) Analysis that is approved by the MSC Master
- Detailed Safety Management System Procedures for each type of unmanned/autonomous vehicle for the ship class

It should be noted that operating unmanned vehicles is outside MSC operations, therefore, additional safety measures are necessary for all government owned/operated, contractor operated/long-term chartered owned, and contractor operated vessels. The sponsor of

[8] Military Sealift Command, 10.3-002-SQ, p. 1
[9] Military Sealift Command Port Engineering Manual, pp 7-8.
[10] Military Sealift Command, 10.3-001-ALL, p.2.
[11] Military Sealift Command Safety Management System, p. 6

the unmanned/autonomous vehicle is responsible for safety on launch, operation, and recovery and must coordinate with the ship on safely storing and securing the device when not in use.

2.1.1 Civil Service Mariners

Certain MSC special mission ships can be used for experimentation or demonstrations. Most of these are government owned. They are often operated by commercial mariners working for contracted companies. Area commands are also supported by Ashore Staff for coordination, engineering, contracting and IT support of government-owned ships. The MSC commander has Type Commander (TYCOM) responsibilities such as lifecycle management, ship readiness, maintenance/repair, and logistics support. Unlike Navy ships ("gray hulls"), MSC commercial vessels fall under the American Bureau of Shipping (ABS) which establishes technical standards for design, construction, and survey of marine-related facilities.

More than half of the MSC workforce are civil service mariners (CIVMARs). CIVMARs are federal employees, however, the rest of the workforce can be civil service personnel ashore and active-duty or reserve military members. On government-owned ships, the crew are CIVMARs directly employed by MSC. Contracted vessel crews are called "contract mariners" and work for the contracted ship's company. These are likely represented by maritime labor unions. When conducting an experiment that may involve these crews or any ashore logistics support, it is important to take into consideration that not only are there processes for decision-making through the command, but there may also be union processes that could extend the timeline.

As MSC does not receive appropriations from Congress or the Navy, it is the purchases of the customers that fund it. MSC customers will transfer funding into a working capital fund. Therefore, when using a MSC ship for experimentation or demonstration, the sponsor would need to examine this method of funding up front.[12]

[12] Military Sealift Command 2020-2021 Handbook

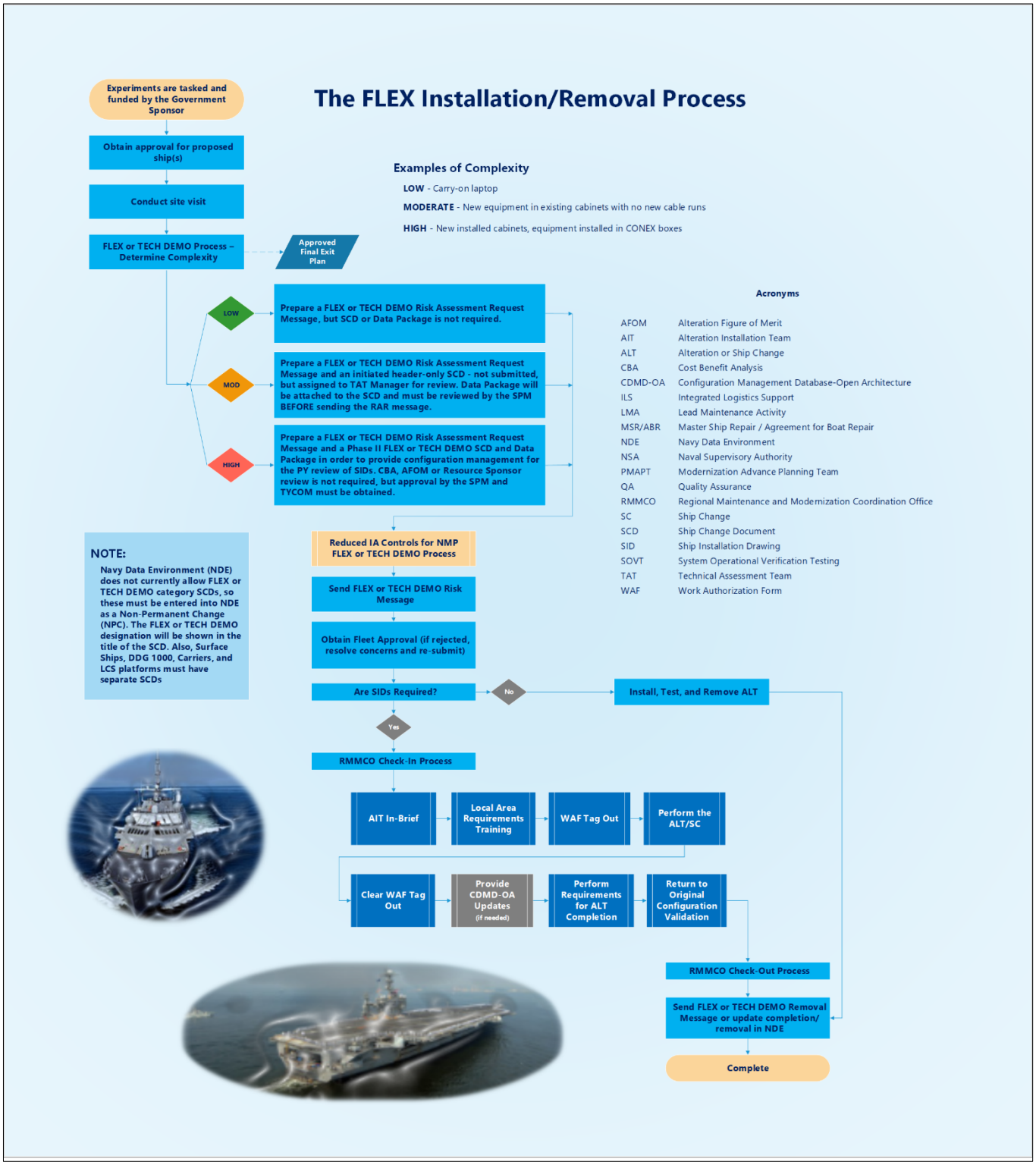

FIGURE 2 SURFACE SHIP INSTALLATION

3 Submarines

Submarines fall under a different process and much of it is not typically available for unclassified viewing. Success results in TEMPALT approval, however, keep in mind there are many certifications that may also apply. The Submarine TEMPALT process is governed by the below:

- Appendix H of the NMP-MOM, SL720-AA-MAN-030
- Appendix K of the NMP-MOM, SL720-AA-MAN-030, Alterations to Ships Accomplished by Alteration Installation Teams, TS9090-310G
- COMUSFLTFORCOMINST 4790.3
- Joint Fleet Maintenance Manual (JFMM), Vol 3, 1.3, Scope and JFMM, Vol 6, 4.3.2 Submarines Electromagnetic Compatibility Certifications
- JFMM, Vol 7, 12.4, Submarine Preservation Requirements for Contracting
- Technical Requirements Manual (TRM) for Temporary Submarine Alterations, 28 March 2018

The process is administered by the Supervisor of Shipbuilding (SUPSHIP). SUPSHIP assigns the TEMPALT number and contact should be maintained throughout the process. They require payment for review of the TEMPALT, so it is important to have funding in place first. Submarine TEMPALTs are scheduled in the Navy Tool for Interoperability and Risk Assessment/Submarine Modernization and Alteration Requirements Tool (NTIRA-SMART) platform, which is the authoritative tool for the Submarine Force C5IMP. SMART is available on NIPRNet for SSNs and SSGNs and on SIPRNet for SSBNs. NTIRA-SMART is where the TYCOM schedules and authorizes Hull, Mechanical and Electrical non-nuclear alterations that will be done by an AIT. Submarine TEMPALTs require SYSCOM and TYCOM approvals. Submarine TYCOM alterations are managed in the TYCOM Alteration Management System (TAMS) and Ohio Class Submarine Alts are managed in Maintenance Figure of Merit - Submarine Acquisition and Support (MFOM-SAS).

The assigned alteration coordinator will ensure that a MOA is in place for any TEMPALT before installation begins and that it provides the duration of installation and scheduled removal, as well as delivery of all required Integrated Logistics Support (ILS) documentation to the ship per the approved ILS Certification Form. They will also ensure that all TEMPALTs are removed by the scheduled removal date and that the ship is returned to its original configuration. The coordinator will verify the accuracy of the TAMS Report, the Non-Nuclear Title “K” SHIPALT Report and, if applicable, the NUCALT Technical Documentation CD Report.

Technical problems discovered during the planning phase or during an installation are handled through a Liaison Action Request (LAR) submitted to the pertinent Planning Yard. If a non-technical or administration problem is discovered, then an Alteration Feedback Message or email should be submitted to the TYCOM Program Manager.[13] In the case of fleet experiments

[13] An example can be found in JFMM (VI), Appendix G

that must be done on submarines, it would be best to stay in contact with the sponsor-assigned coordinator to ensure all processes are followed.[14]

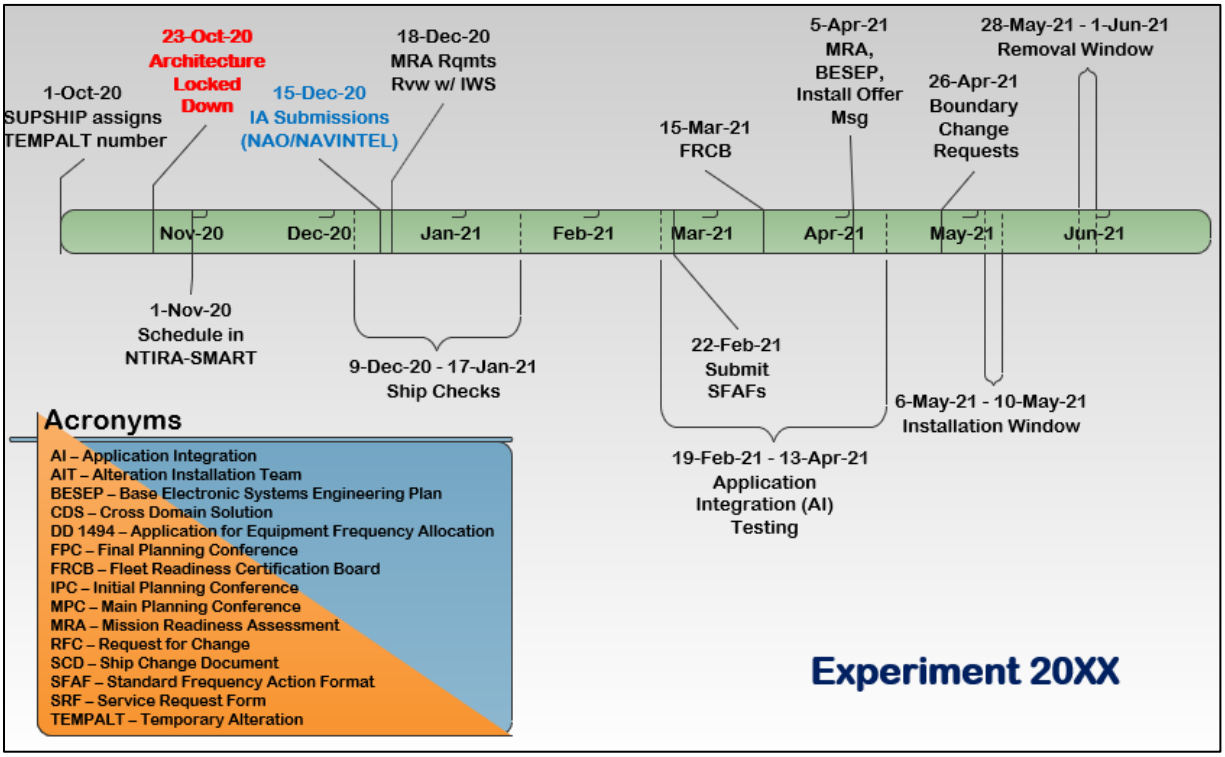

FIGURE 3 SUBMARINE INSTALLATION MILESTONES[15]
*DATES ARE FOR REFERENCE ONLY – REPEATABLE TIMELINE

More detailed information (not available for general distribution) can be found in the Technical Requirements Manual for Temporary Submarine Alterations.[16] This manual provides some of the same information listed above, but more fully addresses the requirements needed to deal with any risks to the submarine by the TEMPALT. It includes requirements for the following components: sponsor's letter, technical data package, electromagnetic influences (EMI), hydrodynamics, implodable/explodable volume, Lithium Battery Safety Program review, Laser Safety Review Board (LSRB), Shock Hazard Assessment (SHA), Hazard Assessment Report (HAR), Safety Assessment Report (SAR), WSESRB, Anti Tamper (AT), Cybersecurity (CS), Markings, Material Properties, Power Supplies/Convenience Receptacles, Welding, movement of lockers, and the relationship of any associated packages such as TEMPMODs or Carry-on Equipment. It also contains requirements for engineering design, SUBSAFE, atmosphere control and stress, weight, and hydrodynamic calculations.

[14] Joint Fleet Maintenance Manual Volume VI, 2019, pp 3-1 – 3-9
[15] Based on a June execution date
[16] NAVSEA S9070-AA-MME-010/SSN/SSBN, ACN-5

4 Aircraft

When entering the installation process, there are several terms that apply frequently to any type of airborne vehicle. Airworthiness helps determine the ability of an air system to "attain, sustain and terminate flight." Manned aircraft must be airworthy, but Unmanned Aircraft Systems (UAS) may have a lower level of airworthiness, see Unmanned Aerial section. For military Public Aircraft Operations (PAOs), airworthiness is granted through a flight clearance. For more information on contracting for flight operations, consult the forthcoming QRG.

The SMS and risk assessments relate to the prescribed flight envelope, methodologies and processes that will fulfill safety requirements. If a risk is found that would impact the safety or airworthiness, it can be corrected through a design modification or limitation to the flight envelope. It could also be mitigated through the procedures by including warnings, cautions or other notes informing the user of the hazard. For above-normal safety risks, a System Safety Risk Assessment (SSRA) may be necessary as documentation that a hazard has been accepted at the appropriate level.[17]

When it comes to Naval Air Systems Command (NAVAIRSYSCOM) Airworthiness, there are different organizations with technical authority over specific aspects of the process. For example, a flight clearance may authorize an aircraft to fly with a particular configuration. If an aircraft needs a modification for testing, then the Assistant Commander for Logistics and Industrial Operations (AIR-6.0) would need to authorize that change to configuration. In the case of a modified configuration, there may be air vehicle limitations determined by Test and Evaluation (AIR-5.0) and/or Air Vehicle Engineering (AIR-4.0P) and approved by Airworthiness Technical Area Experts (TAEs).[18]

COMNAVAIRSYSCOM AIRWorks Directorate is a NAVAIR point of entry for efforts that involves rapid prototyping. It will triage projects to determine those that have a more urgent need as well as the risk the project may pose to the NAWC Command. As NAVAIR is determined to be the entity for approval of the IFC, the Airworthiness Office (AIR-4.0P) will be the approving authority and will determine the level at which the flight clearance will be released.[19] To initiate a request through AIR-4.0P, the request should indicate whether the IFC falls under level 1, 2 or 3; and whether it comes through Naval Air Training and Operating Procedures Standardization (NATOPS), the Permanent Flight Clearance (PFC), or Naval Aviation Technical Information Product (NATIP). Information required in the request is as follows: configuration/change description; current or proposed new wording for NATOP or NATIP; aircraft store loading, aircraft operating envelope; reference material or data; status of TYCOM/Test Wing concurrence (for IFC); and status of Class Desk concurrence.[20] The main process consists of the following:

1. Flight clearance planning meeting is held to determine the scope of the IFC.
2. Data is provided to Subject Matter Experts (SMEs) through the planning meeting.

[17] NAVAIR Air Worthiness and Cybersafe Manual, M-13034.1, p. 1-6
[18] NAVAIR Air Worthiness and Cybersafe Manual, M-13034.1, pp. 1-3 thru 1-4
[19] SWP4P00-017.4, Facilitating Flight Clearances
[20] NAVAIR Air Worthiness and Cybersafe Manual, M-13034.1, pp. 1-2

3. AIR-4.0P comes to a decision.
4. The TYCOM, ACC, or Program Office will concur with the request if it is for an IFC (or in some cases, a TYCOM concurrence may have been pre-coordinated with the NAVAIR ARC for test clearance requests submitted by the AIR-4.0P Test Flight Clearance.)[21]

For Naval PAO, an Aircraft Reporting Custodian (ARC) will coordinate certifications and approvals (RF spectrum, laser, etc.) If an ARC is not suitable to the type of activity, then the ARC will appoint a Government Flight Representative (GFR).[22]

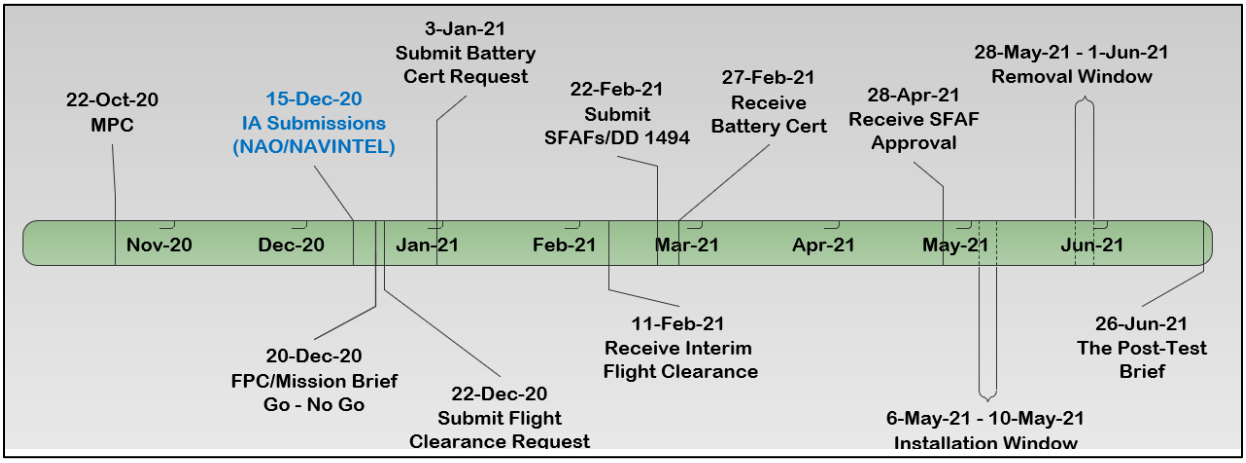

FIGURE 4 AIRCRAFT INSTALLATION MILESTONES[23]
*DATES ARE FOR REFERENCE ONLY – REPEATABLE TIMELINE

4.1 Flight Clearance Requests

For experimentation, the flight clearances issued are usually interim and ultimately determine airworthiness. IFC is obtained from NAVAIR AIR-4.0P in accordance with the Airworthiness and Cybersecurity Safety Policies for Air Vehicles and Aircraft Systems.[24] IFCs may take up to eight weeks to receive after request. IFCs are normally used in support of Research Development Test & Evaluation (RDT&E) where configurations are subject to change and may require numerous airworthiness assessments. The following are conditions requiring an IFC:

- The first test flight or subsequent developmental test flights use a non-standard configuration or envelope.
- Developmental Testing uses a draft NATOPS or NATIP NAVAIR-approved product.
- Operational Testing (OT), Follow-on OT, or fleet operations with a preliminary NATOPS or NATIP, or equivalent NAVAIR-approved product.
- Operations outside of the approved envelope by NATOPS, NATIP, or equivalent NAVAIR-approved product.

[21] NAVAIR Air Worthiness and Cybersafe Manual, M-13034.1, pp. 3-12
[22] NAVAIR Standard Work Package, SWP-4.11.6-001_GFR
[23] Based on a June execution date
[24] NAVAIRINST 13034.1F

- Operating with a configuration that is not approved by a formal NAVAIR Technical Publication or Technical Directive or in some way specified in a NATOPS, NATIP, or equivalent NAVAIR-approved product.
- Operating using the original equipment manufacturer, contractor, or system owner operating manuals, or equivalent NAVAIR-approved product without a permanent flight clearance.

IFCs are also required until NATOPS, NATIP, and/or NAVAIR permanent flight clearances have been updated. Aircraft not intended for introduction to the fleet but intended for a limited operation in a controlled test may use Tailored Technical Standards for Test Applications when the IFC provides airworthiness and risks have been identified by the TAE for a particular test environment. IFC flight envelope restrictions are issued by AIR-4.0P for temporary restrictions or other limitations. Operating Limits, if used, shall be referenced in the IFC.[25]

First, ensure receipt of the AIR-4.0P request and data along with an AIR-4.0P-approved Chop Sheet.[26] To successfully complete the Standard Work Package (SWP), the following must be received from the listed entities:

- TYCOM (or externally-directed team) – Concurrence for request (if previously requested by others).
- Assistant Program Manager System Engineer (APMSE)/Integrated Project Team, Test Airworthiness Agent (TAA), or Limited Airworthiness Agent (LAA) – A valid request accompanied by data that supports an engineering review of the flight clearance.
- AIR-4.0P Flight Clearance Releaser for Airworthiness Authority, Designated Airworthiness Authority (DAA), TAA, or LAA – A Chop Sheet lodged in the Airworthiness Web Site that is completed and signed.
- NATOPS Interim Change Coordinator or Conference Coordinator – Airworthiness Issue Resolution System (AIRS), Draft NATOPS replacement pages, list of fleet concurrences required, draft Chop Sheet, and supporting data.
- TAE – Approval of proposed IFC, NATOPS Interim Change (IC) or NATIP (NTRP) update content and/or comments/changes required for engineering approval.

The software tools that are used for the IFC process are as follows:

- Airworthiness Website (https://airworthiness.navair.navy.mil/) (AIR4.0P)
- e.POWER Flight Clearance Application (https://epower1.navair.navy.mil/epower/) (AIR4.0P)
- Microsoft Office application software suite (NMCI/Flank Speed)
- Common Operating Environment Message Processor software (NMCI/Flank Speed)

[25] NAVAIR MANUAL M-13034.1, pp. 2-5 thru 2-6
[26] Completed in accordance with SWP4P00.001

Obtaining flight clearances does vary somewhat as it relates to the type, such as IFC, NATOPS, IC, or NATIP Update. In the case of Fleet Experimentation, the IFC is the most likely type.[27] There are six steps to the flight clearance process[28]:

1. **Planning:** If the National Airworthiness Team (NAT) determines a flight clearance is needed, planning should start as soon as possible after a requirement or issue is identified and should encompass both interim and permanent flight clearances. Planning is iterative and matures as more information becomes available.
2. **Request:** AIR-4.0P submits all requests. The request should specify new, non-standard configurations, desired changes, or usage limits on existing clearances. The TYCOM and applicable Aircraft Controlling Custodians (ACCs), or the Program Office (when CAS) must concur on requests. For NATOPS, concurrence by the NATOPS advisory group review process is acceptable. The flight clearance request should be tailored to the type of flight clearance needed.
3. **Chop Sheet:** Once the request is received, the NAT will review it, check all engineering data referenced, and look for any configuration problems. The NAT then logs it into the NAVAIR flight request clearance database. A chop sheet (list of technical disciplines) will be created by AIR-4.0P specifying what technical areas of the flight clearance are to be reviewed. It outlines the scope of the required review. The NAT assigns the chop sheet to a facilitator who uses it in conjunction with the Airworthiness database of TAEs to determine the staffing of the draft flight clearance. AIR-4.0P will make a final determination of the required chops and will issue either an Interim Flight Clearance or a Permanent Flight Clearance.
4. **Product Development and Review:** AIR-4.0P assigns competencies to execute the airworthiness review. Personnel such as TAEs, fleet representatives, and program representatives will make a thorough review of the content of proposed flight clearances and provide comments or concurrence.
5. **Finalization:** The Flight Clearance Releaser (FCR) verifies that the TAEs have reviewed and concurred and checks for cross-competency coherence and user executability as well as format and completeness. If the FCR determines additional review by engineering is needed, the flight clearance will be routed through necessary channels. If any technical changes are made, it will then be sent back to APMSE for concurrence.
6. **Release:** The final clearance is then issued to recipients shown on the request and posted on the Airworthiness website.

4.2 Test Plans

The project test plan is an important component in the acquisition lifecycle, providing an effective and safe method for conducting a test/experiment. An approved test plan is typically required for research, development, and/or test and evaluation for systems that are attached to, installed on, integrated with, or just carried on an air vehicle. All testing will occur in the AIR-5.4 IBST facilities which include shielded hangars, radar reflectivity labs, and testing chambers.

[27] Standard Work Package, Facilitating Flight Clearances (FCs), SWP4P00-017.4
[28] NAVAIR Air Worthiness and Cybersafe Process Manual, M-13034.1, pp. 4-2 thru 4-3

Other laboratories/facilities may also be indicated as needed by the Test and Experimentation Coordination Team (TECT); other surface or airborne systems that interact with air vehicles may need a test plan as required. This information will be applicable for testing/experimentation that is not a dedicated OT series.[29]

If the test plan is developed by a non-NAVAIR entity, the plan will need to undergo further risk assessment/management, tailoring, and review of content in a timely manner. Test plans are good for one year after they have been approved, unless the TECT has negotiated a different timeline. At the end of the year, the test team will need to review the test plan and submit an amendment to continue assessments.[30]

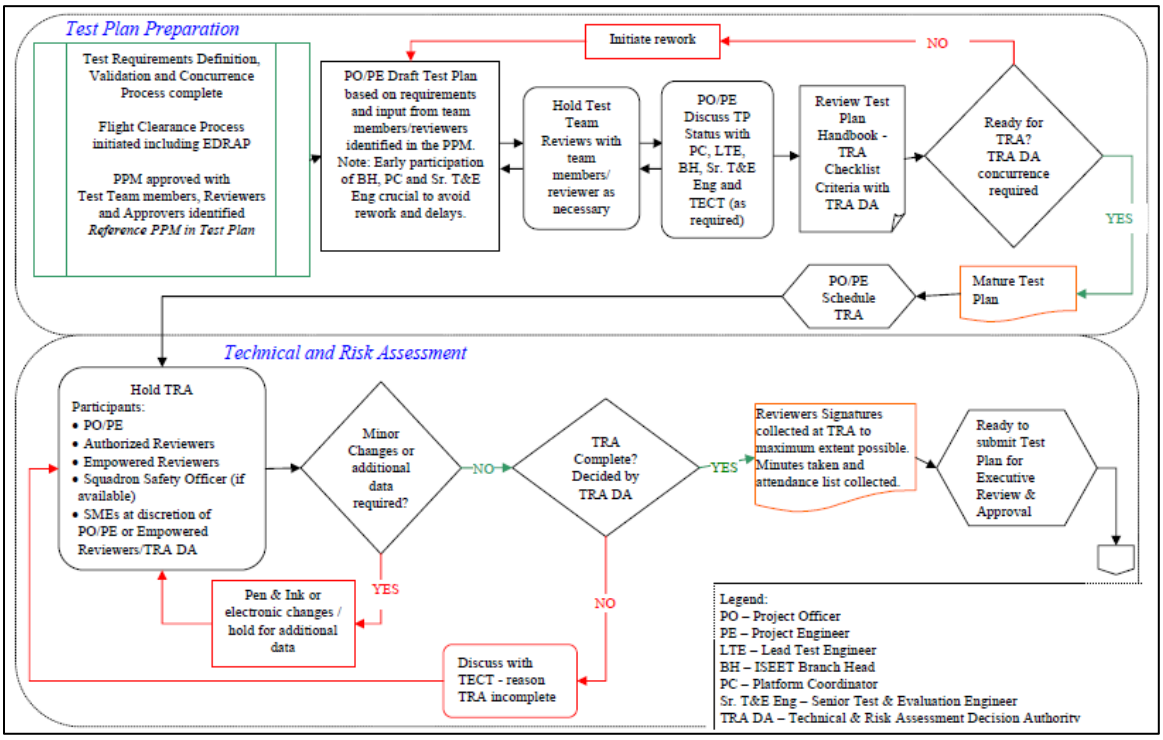

FIGURE 5 TEST PLAN PREPARATION AND REVIEW PROCESS[31]

5 Shore Facilities

If an experiment is happening at an AEGIS Ashore facility, it will follow the requirements above (Section 2) for surface ships. If the experiment is happening from the shore in other circumstances, then it is important to take into consideration the following points:

- Electromagnetic Environment: Even from the shore, it is important to ensure reliable and safe mission-capable shore operations. Impacts to any electrical or Communications-

[29] Project Test Plan Policy for Testing Air Vehicles, Air Vehicle Weapons, and Air Vehicle Installed Systems, NAVAIRINST 3960.4C, p. 4

[30] NAVAIRINST 3960.4C, p. 23

[31] NAVAIRINST 3960.4C, Figure 4

Electronics equipment, systems and subsystems, devices, ordnance, fuels, and personnel need to be examined and officially mitigated for the operational electromagnetic environment (EME). All platforms, systems, subsystems, facilities, weapons, electric or electronic equipment, networks, sensors, fuels, and ordnance, should be taken into consideration before performing experimentation from the shore. If any of these conditions are present within the experiment and/or shore, then an E3 assessment may be necessary.

- Spectrum: For any government stations where an E3 assessment is not required, it is important to be sure that Spectrum Certification compliance has been achieved for telecommunications compliance.
- Cyber Accreditation: Does the system have a current Cyber Accreditation? If not, some questions to consider are the following: 1) Does it pass data? 2) What type of data? 3) Does it connect to anything? 4) What is the security classification? 5) What sites will the system be used with? 6) Will encryption be used? Is it a stand-alone system?
- Does the testing involve weapons systems? If so, the experiment may need to go through the WSESRB. The WSESRB is an overseeing entity for the Navy to assess weapons programs and safety concerns for energetic systems, explosives, combat systems, weapons and weapon-management systems.[32]
- Are there any lasers involved? If so, the experiment may need to go through the LSRB. The LSRB is the Navy's overseeing entity for assessing laser systems to ensure the compliance and safety of lasers.[33]

For other shore facilities (not AEGIS Ashore), a site approval from NAVFAC may be required. The process begins with NAVFAC Form 11010/31, Part 1, Request for Project Site Approval.[34]

[32] SECNAVINST 5000.2F
[33] SECNAVINST 5000.2F
[34] Site Approval Request Process, NAVFACINST 11010.45A

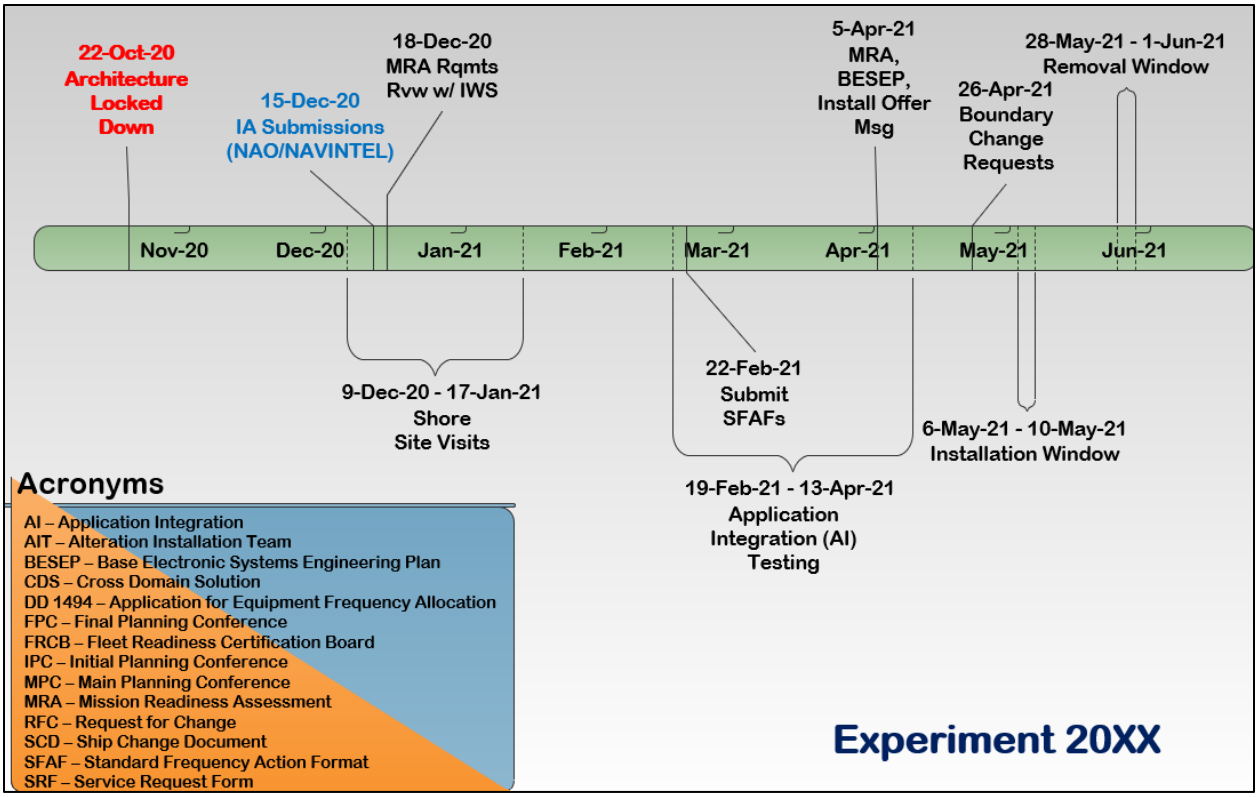

FIGURE 6 SHORE FACILITY INSTALLATION MILESTONES
*DATES ARE FOR REFERENCE ONLY – REPEATABLE TIMELINE

6 Unmanned Systems

Unmanned systems are pilotless, performing tasks autonomously and/or while being remotely controlled. These systems are designed to perform tasks or missions that can risk human life and can also serve as a cost-effective solution. Similar assessments and testing discussed above are applied to understand and mitigate any risks and impacts presented by the experiment. For experimentation activities that occur from the shore or at onshore facilities, the main concerns are electromagnetic interference, use of bandwidth (spectrum) and laser safety.[35]

A Cybersecurity Waiver or an Authority to Operate (ATO) accompanied by a Cyber Vulnerability Assessment may need to be obtained. It is important to ensure that the UAS complies with National Defense Authorization Act (NDAA) prohibitions regarding products and components coming from China. COTS products that are not a Program of Record (POR) designation will require a waiver from the Deputy Secretary of Defense (also referred to as a DSD Waiver). Refer to the Spectrum section for more information. The waiver requirement does not apply to grant-supported work and basic research funds such as through a university; but when the activities involve military personnel, DoD property or facilities, then the waiver will be required. In some instances, a waiver for Cybersecurity or ATO may need to be obtained and the Chief of Naval Research can request a waiver for experimentation activities.

[35] Electromagnetic Environmental Effects Requirements for Systems, MIL-STD-464C

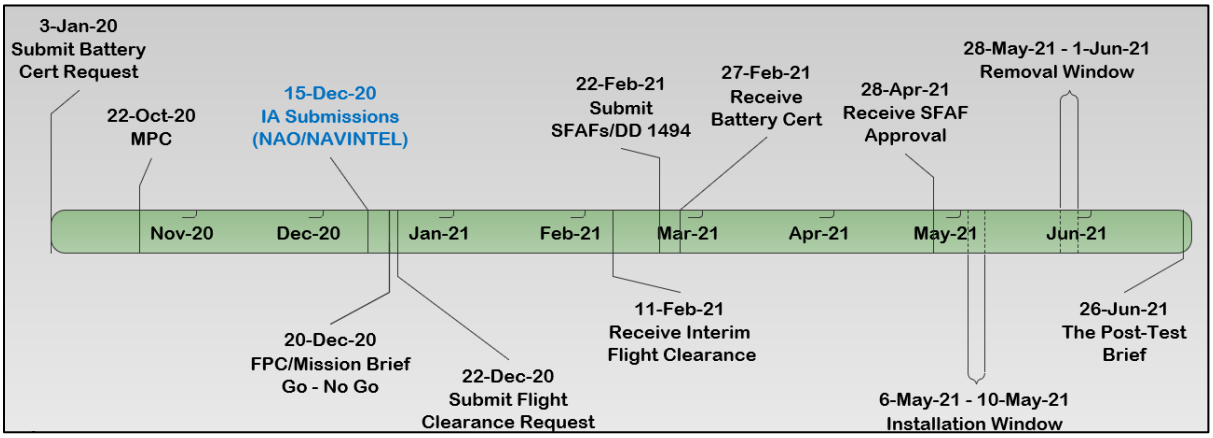

FIGURE 7 UNMANNED INSTALLATION MILESTONES[36]
*DATES ARE FOR REFERENCE ONLY – REPEATABLE TIMELINE

6.1 Unmanned Surface

At this point in time, it is assumed that Unmanned Surface Vehicles (USVs) will adhere to the requirements mentioned above for surface ships and their riders. Unmanned vehicles are similar to manned in that there are a variety of certifications that may or may not be needed to achieve approval. For example, if a lithium battery is involved, there is a ~90-day (sometimes longer) process to gain that approval. Refer to the Engineering Process Guide on the Lithium Battery Safety Program[37] for more detailed process information. If operating with a MSC vessel, refer to the Military Sealift Command Ships section for additional criteria. The Program Executive Office (PEO) Unmanned and Small Combatants is a point of contact for underwater and surface Navy unmanned systems, providing regulation and facilitation.[38]

6.2 Unmanned Subsurface

It is also assumed that Unmanned Underwater Vehicles (UUVs) transported on submarines will adhere to the requirements mentioned above for submarine TEMPALTs. The PEO is also the point of contact for these types of vehicles.

6.3 Unmanned Aerial

When one thinks of aircraft, a helicopter or airplane may come to mind. These are considered manned aircraft, however there are many more vehicles that fit this description as well. Drones, UAS and Unmanned Aerial Vehicles (UAVs) are unmanned vehicles that fit into the aircraft category and require just as many (if not more) permissions and certifications. The result of the approval process will be achieving airworthiness/flight clearance, but other approvals, such as Lithium Battery, may be needed depending on usage. For UAS, the controlling organization/point of contact is NAVAIR. For Non-POR UAS (most often used in experiments), processes move through AIRWorks as an entity of NAVAIR.

[36] Based on a June execution date
[37] https://navysbir.com/sec/docs/C36_0543-1325-23_EPG_Lithium.pdf
[38] Command website: https://www.navsea.navy.mil/Home/PEO-Unmanned-and-Small-Combatants/

UAVs can also adhere to requirements for any Navy ship they ride on or are launched from and recovered back to, as well as IFC[39] requirements. If no previous IFC has been issued by NAVAIR, it may take eight weeks or so to obtain one. In some cases, an FAA Certificate of Waiver or Authorization (COA) may be required for operations in US domestic airspace. If so, then the FAA will respond within 60 days of application.

If research involves an unmanned aircraft system, it is best to coordinate with the Office of Naval Research/ Naval Research Laboratory (ONR/NRL) UAS. AIRWorks is a NAVAIR point of entry for projects that involve rapid prototyping. One of the first considerations is whether the UAS operation is "Public" or Civil." CAO fall under the FAA while in US airspace. Most university experiments fall into the CAO category. Navy or other DoD experiments using UAS are considered PAO and this is where a UAS will likely land when it comes to DON SBIR experimentation.

7 Common Processes

There are several processes that can apply for installations across any platform. For further details, consult the forthcoming individual QRGs.

7.1 Cybersecurity Considerations

As cybersecurity has evolved from a technical consideration to a warfighting domain, its importance during the development process cannot be overlooked nor overstated. The cyber threat landscape is ever-changing, therefore the efforts to secure systems will be continuous throughout the lifecycle of a system. From idea to inception and development to acquisition, the pursuit of system security should be a primary tenet from which a system is matured.

Cybersecurity requirements are the drivers behind reaching a secure, accredited system. Requirements vary by platform, classification, and even event. It is imperative to understand the requirements as early in the experimentation process as possible to ensure the greatest opportunity for success and participation in any given event. Although some experimentation events and platforms may have less restrictive requirements to participate, it benefits the developer and service to work towards the cybersecurity requirements that will be levied by the acquiring service element.

Refer to the figure below for an overview of control systems. CYBERSAFE concepts need to also be considered as a part of the Navy's cybersecurity strategy. The program gives assurance that information technology and its processes and components are resilient. Mission assurance is achieved through disciplined application of the CYBERSAFE program.[40]

[39] Approval of Level 1 and 2 Category 3 Interim Flight Clearances (IFC) for Unmanned Aircraft Systems (UAS), SWP4P00-009

[40] NAVAIR Airworthiness and Cybersafe Process Manual, M-13034.1, pp. 1-7 – 1-8

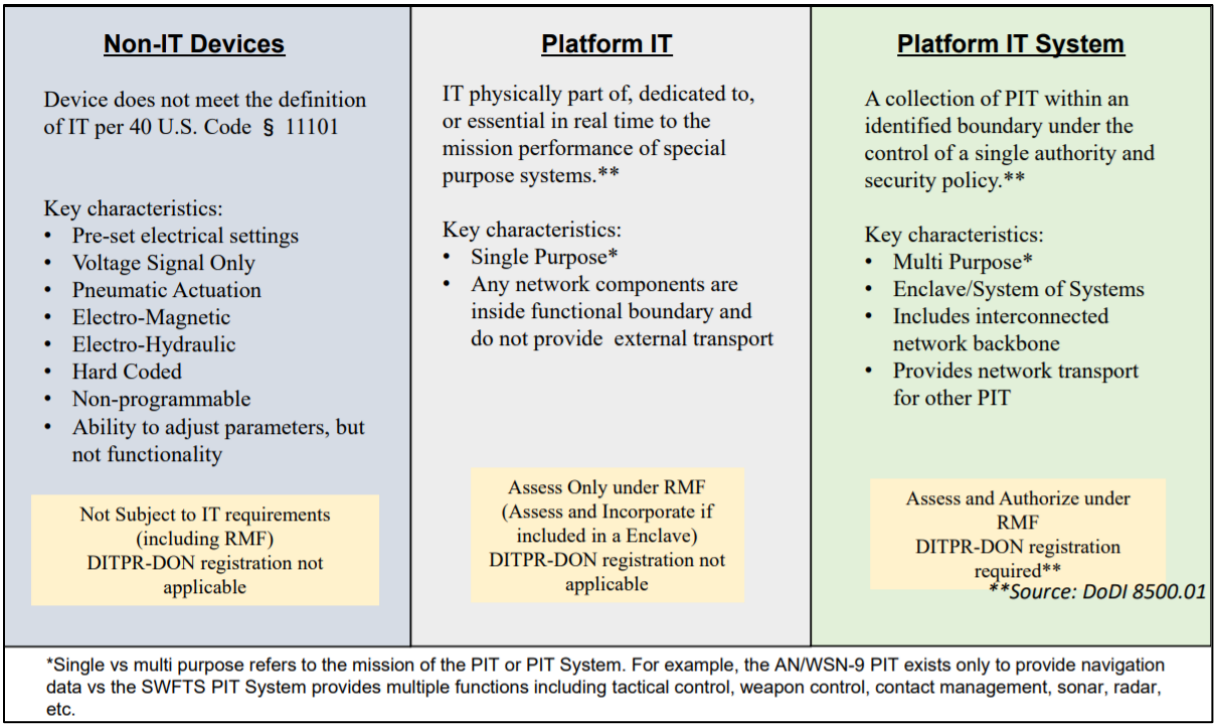

FIGURE 8 CLASSES OF CONTROL SYSTEMS

7.2 Navy Risk Management Framework

The Navy Risk Management Framework (RMF) for Cybersecurity applies to all systems, without exception, that receive, process, store, display, or transmit DoD information, including systems participating in Navy experimentation or technical demonstrations with the goal of obtaining Interim Authorization to Test (IATT) prior to the install date for the event. A streamlined RMF process for experimentation has been developed to achieve IATT authorizations and fulfill Cybersecurity requirements using best practices from DoD partners and the Center for Internet Security (CIS) with the goal of improving RMF IATT processing times in support of experimentation requirements and timelines. The streamlined process may not be guaranteed in every circumstance, so emphasis should be on the earliest possible start for RMF processing to avoid having the experiment stopped due to lack of IATT.[41]

Note: Utilize the U.S. Navy RMF Process Guide to determine the way ahead to achieve an IATT or ATO. The RMF guide, listed in References & Further Reading, provides direction through the entire process and offers links to overarching guidance, policies, and best practices. The USN RMF Portal (CAC-enabled) is another comprehensive source of information to help navigate the RMF process and will be invaluable in the journey to authorization.

[41] Appendix H, Fleet Experimentation and Technology Demonstration, p. H-23

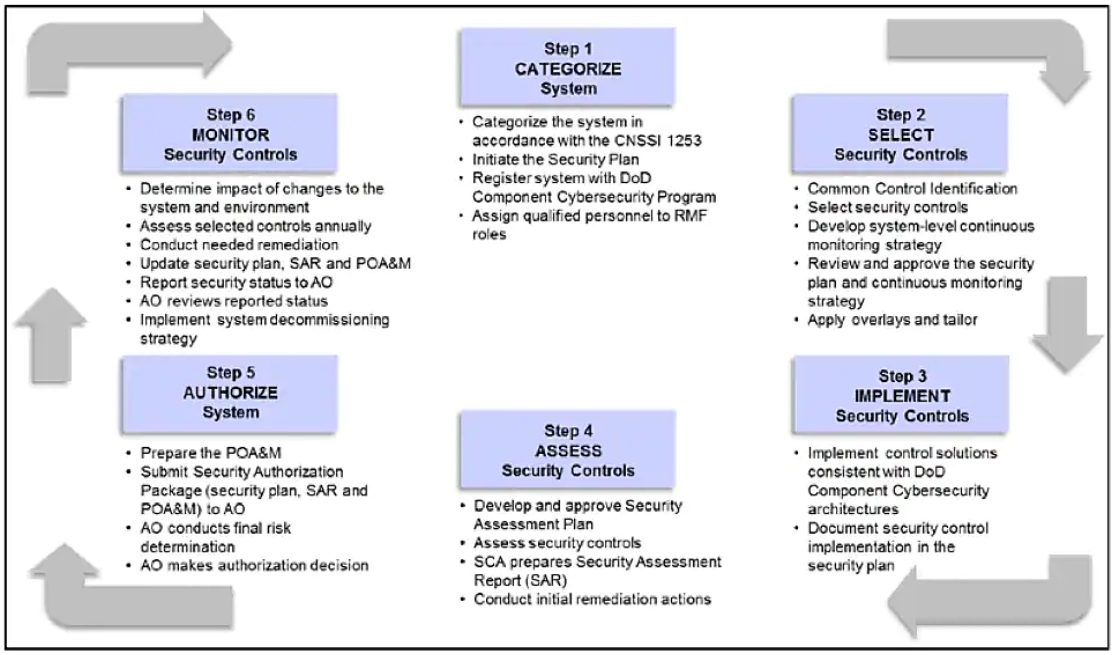

FIGURE 9 RMF PROCESS[42]

As depicted in the RMF Process graphic above, there are a total of 6 steps to achieve an ATO. For experimentation and to achieve an IATT, the first five steps will need to be completed.

When preparing for an event, gain an early, thorough understanding of the operational environment. Depending on the data to be processed, the networks and nodes the technology will be connecting to, and the operating area, different requirements will be levied on the system. The leadership for the specific event can assist in identifying the requirements that will need to be met in order to execute.

All milestones within the RMF process, including IATT, have published business rules that identify anticipated timelines for each milestone. Due to staffing, submission surges, and other constructs outside of process control, these dates can be inaccurate. It is highly recommended to account for double the posted time. Additionally, these turn times do not account for any re-work that must be done. Any remediation to the package dictated by one of these check points will require a resubmission and should anticipate a similar timeframe to re-evaluate. The quality of the package for the system will directly affect the time needed to achieve an IATT. The entire process is collaborative with process stakeholders. Creation of a positive and collaborative line of communication early in the process will improve understanding of the requirements and inform upstream stakeholders of progress.

Once granted, an IATT will be issued for the length of time needed to complete the event. Any subsequent events will require the RMF IATT process again.[43] The U.S. Navy RMF Process Guide is also available as a comprehensive source for the process. The guide is periodically updated; therefore, it is important to utilize the most recent version.

[42] Risk Management Framework (RMF) for DoD IT (DoDI 8510.01)
[43] Refer to DoD Instruction 8500.01 for additional information.

7.3 Assessments

7.3.1 Connecting to a Network

Experiments that need to connect to a surface ship network may need to go through the Application Integration (AI) Assessment. This process is used when an experiment needs to connect to a ship network such as CANES or Automated Digital Network System (ADNS). SBIR communities should be aware that early planning is crucial for acceptance into the lab testing environment; there are criteria and cyber accreditation requirements needed prior to lab environment entry. There are also funding issues that may need to be addressed as labs can have fees of around $50,000 or more.

AI assessment is required only when connecting to a network, for computing hardware or software integrated on any afloat network. For submarine TEMPALTS, any experiment that involves IT, computers, servers, switches, routers, or computer peripheral devices may undergo PEO SUBS Information System Security Manager (ISSM) review and would be related to the Cybersecurity process.[44] Should the need arise to connect to a network in relation to an aircraft, this type of assessment may need to be accomplished through the Cybersecurity process for ATO and the organization supporting the airworthiness of a particular aircraft. Connecting to any network at a shore facility is addressed through NAVFAC and also through the Cybersecurity process for ATO. ***Note***: In the future, "CANES will be installed on all Navy platforms, including ships, submarines, and land sites."[45] Thus, in the future, connecting to any platform could trigger the AI Assessment.

7.3.2 Connecting to a Combat or Tactical System

An experiment connecting to a surface ship combat or tactical system may need to go through the Mission Readiness Assessment (MRA)/Combat Systems Integrated Testing (CSIT). This process is used for surface ships and provides evidence that systems, software applications, and hardware are functioning properly. If an experiment requires connection to the network or other system/equipment on a submarine, it may need to go through the operational and maintenance assessments such as Total Ship Readiness Assessment (TSRA) and/or Combat Systems Assessments (CSA). It may also need continuous operational and maintenance data assessments like Top Management Actions (TMA) and Submarine Continuous Operational and Maintenance Assessment (SubCOMA).[46] Experiments that connect to a combat system in an aircraft would need to go through the program office for the aircraft type since such assessments would be specific to the aircraft, its airworthiness and how it is addressed through Cybersecurity and the ATO.

7.3.3 DON Explosives Safety Program

The explosives safety program is based on explosives safety standards and instructions. Elements of this program are as follows:

- The WSESRB
- Explosives Safety Site Approval

[44] Technical Requirements Manual for Temporary Submarine Alterations, NAVSEA S9070-11-MME-010/SSN/SSBN, P. 7

[45] Machi, 2018

[46] Submarine Regional Maintenance Center (RMC) Fleet Technical Support (FTS) roles and Responsibilities, CNRMCINST 4790.2, p. 4

- Explosives Safety Inspections Ashore and Afloat
- Written Operating Procedures
- Qualification and Certification of Personnel
- Explosives Mishap Reporting and Investigation
- Waivers and Exemptions
- Packaging, Handling, Storage and Transportation
- Hazard Classification
- Explosives Safety Standards
- Ordnance Environmental Security
- A&E Quality Evaluation
- Demilitarization (DEMIL) and Disposal
- Inventory Management
- Lithium Batteries
- A&E Contractor Operations
- Hazards of Electromagnetic Radiation to Ordnance (HERO)

The DON Explosives Safety Command operations encompass protections for land, sea and air environments. As a part of it, the WSESRB is important in experimentation when an experiment connects to a weapon system or might have an impact on ordnance. The WSESRB was established to make certain that safety criteria have been put in place with a weapons system or explosive systems design. It is the authority on weapon safety. The system commands are members of the Board with the Chairperson and Secretariat being from Naval Ordnance Safety and Security Activity (NOSSA).[47] The WSESRB conducts initial installation testing, qualification testing, physical fit checks, status ground fire testing, systems integration lab (SIL), safety analysis, and safe separation test certification.[48] It may be invoked for all platforms depending on the nature of the experiment.

7.3.4 Lithium Battery Safety Program

All lithium batteries must adhere to the safety guidelines for selection, design, testing, evaluation, use, packaging, storage, transportation, and disposal on most Naval platforms. The process is handled through Naval Surface Warfare Center (NSWC) Carderock Division and NSWC Crane Division and takes approximately 90 days to complete. A Safety Data Package (SDP) will need to be completed on batteries that may include some of the more pertinent requirements for batteries including manufacturer information, electrical description, cell/battery configuration, operating life, shelf life, battery chemistry, yield pressure, discharge rate; and how and where the batteries will be stored and charged. [49] The SBIR will need to provide a safe and fireproof storage box for the batteries. Experiments with equipment containing a lithium battery may need approval regardless of platform, depending on the nature of the experiment.

[47] DON Explosives Safety Policy, MCO P8020.11 W ERRATUM, Encl 1, p. 1-2 – 2-1
[48] Information Document: WSESRB and Navy Small Arms/ ADA223469
[49] Navy Lithium Battery Safety Program Responsibilities and Procedures

7.3.5 Laser Safety Review Board

Laser safety is governed by the Navy Laser Hazards Control Program and the Range Laser Safety Handbook. These sources discuss the categories of lasers through the incorporated Reference (b), the ANSI Z136.1, Safe Use of Lasers (NOTAL).[50] The instruction then references back to the ANSI categories when describing laser hazards which indicates that only ANSI Categories 3B and 4 are covered by its conditions. There are instances (such as when a laser falls into the least-harmful Category 1) but may still need to go through the review board due to other factors such as how much power is involved and how the laser will be used on the ship. Some conditions may present a greater hazard than indicated by a cursory understanding of an ANSI category. Early assessment of laser safety is essential, as the process for getting through the LSRB can take up to six months.[51]

8 Unique Circumstances & Specialized Processes

There are some situations that may require additional planning and consideration. While not highly typical, it is important to identify these special circumstances in the project to build an accurate timeline. Contact Systems Level Command for further information on proceeding.

8.1 Spectrum Perspectives

Communications technology is a critical foundation for U.S. defense modernization programs and national security. SBIR technologies can benefit from the ability to provide streamlined access to spectrum bands and mature fiber/wireless infrastructure, to support new or improved needs, and to conduct controlled experimentation with dynamic spectrum sharing.

Defining the bandwidth of the experiment is vital to successful preparation and execution. Bandwidth allocation refers to the process of designating radio frequencies to different applications. The radio spectrum is a limited resource, which means there is great need for effective and fair allocation. As is the case with any installation described in this guidebook, safety and operational effectiveness of military systems and platforms is also of priority. Therefore, the equipment (and its usage) fielded in this environment must be validated.

When using the word “system” in this context, it refers to a combination of equipment, subsystems, skilled personnel, and methods capable of performing or supporting a defined operational role. A comprehensive system includes the related facilities, equipment, materials, services, and staff required for its operation to the degree that it can be considered autonomous within its environment.

The system operational performance is a set of minimal acceptable parameters tailored to the platform and reflecting top level capabilities such as range, probability of kill, probability of survival, operational availability, etc. A primary aspect of acquisition related to this definition are key performance parameters, which are used to specify essential system characteristics for successful mission accomplishment. These parameters are tracked during development to evaluate system efficacy. For the purposes of this document, the set of parameters under

[50] OPNAVINST 5100.27B, MIL-HDBK-828C
[51] OPNAVINST 5100.27B, MIL-HDBK-828C and OPNAVINST 2400.20F

consideration would normally extend beyond this limited set of parameters to address other details of system performance that may be less critical but still have a substantial impact on system effectiveness.[52]

The following subsections describe the main authorities to obtain when working with Spectrum Dependent (S-D) technologies and systems. Spectrum allocation and approval is governed by the Telecommunications and Information Administration (NTIA) and Military Communications – Electronics Board (MCEB). Naval experiments consult experts for specialized processing and approvals, starting with the Navy Marine Corps Spectrum Office (NMCSO) and Area Frequency Coordinators. Note that because Spectrum is limited, international regulations must be considered when operating abroad.

8.2 Permissions & Assessments

There are assessments, such as the Standard Frequency Action Format (SFAF) and Electromagnetic Environmental Effects (E3) that may apply in some situations but not all. For more detailed information, consult the forthcoming Spectrum QRG. Other unique considerations are summarized below.

8.2.1 Ship Checks and Shore Site Visits

For surface ships, ship checks and visits are performed in conjunction with the planning yard and the sponsor. Tasking and funding must be in place before they can begin. Ship Installation Drawings (SIDs), if needed, will be developed from information obtained through the Ship Check.[53]

8.2.2 Commercial-Off-the-Shelf Waiver

COTS equipment can be mixed with DoD-developed supplies, but it is different in that it is readily available (like its name suggests) and can be adapted to customer needs. COTS waivers are submitted through DON and if approved, will list dates for use, constraints and mitigation. It is important to note that waivers are granted for the use of equipment over an allocated period. Below is an example of milestones for the process:

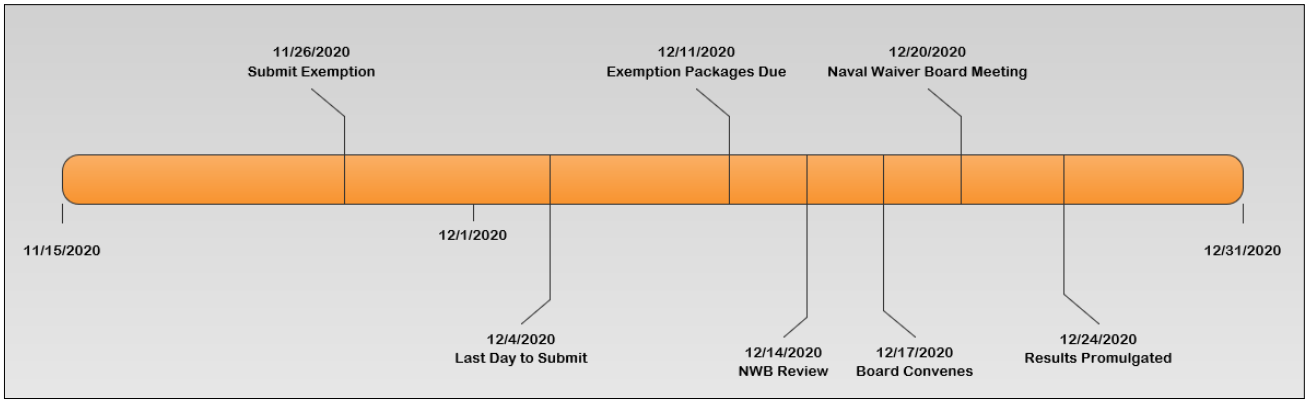

FIGURE 10 COTS WAIVER PROCESS MILESTONES
*DATES ARE FOR REFERENCE ONLY – REPEATABLE TIMELINE

[52] MIL-STD-464C, pp. 7-8
[53] Appendix H, p. H-23

9 Summary & Closing

Advanced planning and a full understanding of how the proposed technology interfaces with Navy vessels and systems, while taking into consideration the impacts to ship, aircraft, unmanned system, or shore facility, will bring about a smooth installation of experimental technology. This will enable SBIR companies to run experiments, gather data, adjust design as needed, gather feedback from Navy stakeholders, and showcase their technologies with an eye to moving into the acquisition phase and helping to fill the Navy's warfighting gaps.

10 Acronym List

#
3-M Maintenance Action Form
2M Miniature/Microminiature
3-MC Maintenance and Material Management Coordinator
3-MPR 3-M Performance Rate

A
ACO Airworthiness and CYBERSAFE Office
ACR Alteration Completion Report
ADNS Automated Digital Network System
AI Application Integration
AIT Alteration Installation Teams
AIRS Airworthiness Issue Resolution System
ANTX Advanced Naval Technology Exercise
AP Acquisition Plan
APMSE Assistant Program Manager System Engineer
AS Acquisition Strategy
ASN(RDA) Assistant Secretary of the Navy (Research, Development and Acquisition)
ATO Authority to Operate
AVCERT Aviation Certification

B
B Billion
BAA Broad Agency Announcement

C
CAO Civil Aircraft Operations
CBA Cost Benefit Analysis
CCB Configuration Control Board
CDA Commercial Derivative Aircraft
CFR Code of Federal Regulations
CIS Center for Internet Security
CIVMAR Civil Service Mariners
CLA Constraints, Limitations, and Assumptions
CM Change Manager

COCO Contractor Owned and Operated
CONOPS Concept of Operations
COTS Commercial-Off-the-Shelf
CPAF Cost Plus Award Fee
CPAT Cost Plus Award Term
CPIF Cost Plus Incentive Fee
CSIT Combat Systems Integrated Testing
CUI Controlled Unclassified Information

D
DAA Detect and Avoid
DCAP Data Collection and Analysis Plan
DCR DOTMLPF Change Request
DEVGRU Development Group
DFARS Defense FAR Supplement
DMO Distributed Maritime Operations
DoD Department of Defense
DoDI Department of Defense Instruction
DON Department of Navy
DON-SEC Department of the Navy SBIR Experimentation Cell
DPM Deputy Program Manager
DRAMOC Due Regard Alternative Means of Compliance

E
E3 Electromagnetic Environmental Effects
EABO Expeditionary Advance Base Operations
EMI Electromagnetic Influences
ESD Electrostatic Discharge
ESH Environmental Safety & Occupational Health

F
FAA Federal Aviation Administration
FACSFAC Fleet Area Control and Surveillance Facilities
FAR Federal Acquisition Regulation
FBP Fleet Battle Problems
FFF Form Fit Function
FFRDC Federally Funded Research and Development Center
FIMS FLEX Information Management System
FLEX Fleet Landing Exercises
FNFF Fight the Naval Force Forward
FPC Final Planning Conference
FRC Fleet Readiness Center
FY Fiscal Year

G
GFRC Ground and Flight Risk Clause

GRSL Groupsail

H
HERO/HERF/HERP Hazards of Electromagnetic Radiation to Ordnance/Fuel/Personnel
HCA Head of Contracting Activity

I
IA Information Assurance
IAW In Accordance With
IC Interim Change
ICS Integrated Combat Systems
IPL Integrated Priority Lists
ICPL Integrated Prioritized Capability List
IDEF Integration Definition
IFC Interim Flight Clearance
ILS Integrated Logistics Support
IP Intellectual Property
IPL Integrated Priority Lists
IWS Integrated Warfare Systems

J
J&A Justification and Approval
JCA Joint Capability Areas
JCIDS Joint Capabilities Integration and Development System
JFCOM Joint Forces Command
JIFX Joint Interagency Field Experimentation
JTFX Joint Task Force Exercise

K
KO Contracting Officer

L
LAA Limited Airworthiness Agent
LAR Liaison Action Request
LCC Life Cycle Cost
LCM Life Cycle Manager
LCS Littoral Combat Ships
LMA Lead Maintenance Activity
LOA Light-Off Assessment
LOCE Littoral Operations in a Contested Environment
LOI Line of Inquiry
LSE Large Scale Experiments
LSRB Laser Safety Review Board
LTD Limited Technology Demonstrations

M

M Million
M&S Modeling and Simulation
MCO Military Certification Office
MCSC Marine Corps Systems Command
MDD Material Development Decision
MFOM-SAS Maintenance Figure of Merit - Submarine Acquisition and Support
MIL-PERF Military Performance Specification
MIL-SPEC Military Specification
MIL-STD Military Standard
MPC Main Planning Conference
MRA Mission Readiness Assessment
MSC Military Sealift Command

N
NAS National Airspace System
NAT National Airworthiness Team
NATIP Naval Aviation Technical Information Product
NATOPS Naval Air Training and Operating Procedures Standardization
NAVAIR Naval Air Systems Command
NAVCERT Navigation Certification
NAVFAC Naval Facilities Engineering Command
NAVAIRINST NAVAIR Instruction
NAVSEA Naval Sea Systems Command
NAVSUP Naval Supply Systems Command
NAVWAR Naval Information Warfare Command
NAWC Naval Air Warfare Center
NDAA National Defense Authorization Act
NDE-NM Navy Data Environment – Navy Modernization
NDS National Defense Strategy
NICE Naval Integration in Contested Environments
NIPR Non-classified Internet Protocol (IP) Router
NIWC Naval Information Warfare Systems Command
NLLIS Navy Lessons Learned Information System
NMCSO Navy Marine Corps Spectrum Office
NMP-MOM Navy Modernization Process Management and Operations Manual
NNMSB Non-Nuclear Munitions Safety Board
NTIRA-SMART Navy Tool for Interoperability and Risk Assessment/Submarine Modernization and Alteration Requirements Tool
NSA Naval Supervisory Authority
NSWC Naval Surface Warfare Center
NWB Naval Waiver Board

O
ONR/NRL Office of Naval Research/ Naval Research Laboratory
OPNAV Office of the Chief of Naval Operations

OPNAVINST OPNAV Instruction
OPSEC Operations Security
OPTASK Operational Tasking Orders
ORM Operational Risk Management
OSD Office of the Secretary of Defense
OSHA Occupational Safety and Health Administration
OSIC On-Site Installation Coordinator
OT Operational Test
OWLD Obligating Work Limiting Date

P
P&E Prototypes and Experiments
PAO Public Aircraft Operation
PD Policy Directive
PEO Program Executive Office
PFC Permanent Flight Clearance
PICO Pre-Installation Check Out
PLOA Probability of Loss of Aircraft
PM Program Manager
PMAP Protective Measures Assessment Protocol
POAM Plan of Action & Milestones
POC Point of Contact
PoR Program of Record
PY Planning Yard

Q
QA Quality Assurance
QLR Quick Look Report
QMS Quality Management System
QRG Quick Reference Guide

R
R/R&D Research/Research and Development
RDT&E Research, Development, Technology and Engineering
RFF/RFS Request for Forces/Support
RFP Request for Proposal
RMMCO Regional Maintenance and Modernization Coordination Office
RPED Rapid Prototyping, Experimentation and Demonstration

S
S&T Science & Technology
SAA Sense and Avoid
SBA Small Business Administration
SBIR Small Business Innovation Research
SC Ship Change
SCD Ship Change Document

SCN Ship Conversion Navy
S-D Spectrum Dependent
SDCP Shock Deficiency Correction Plan
SDM Ship Design Manager
SE Early Systems Engineering
SFAF Standard Frequency Action Format
SHAPM Ship Acquisition Program Manager
SIL Systems Integration Lab
SIPR Secret Internet Protocol Router
SME Subject Matter Expert
SMS Safety Management System
SOF Safety of Flight
SOVT Systems Operational Verification Testing
SPM Ship Program Manager
SRF Service Request Form
SSRA System Safety Risk Assessment
STTR Small Business Technology Transfer
SUPSHIP Supervisor of Shipbuilding
SV Systems View
SWP Standard Work Package
SYSCOM Systems Command

T
TAA Test Airworthiness Agent
TAE Technical Area Expert
TAMS TYCOM Alteration Management System
TAT Technical Assessment Team
TDP Technical Data Package
T&E Test and Evaluation
TE Technical Experimentation
TECT Test and Experimentation Coordination Team
TEMPALT Temporary Alterations
TIG Technology Innovation Games
TNTE2 Tactics and Technology Exploration and Experimentation
TPOC Technical Points of Contact
TRANSALT Transportation Alteration
TRL Technology Readiness Level
TSCE Total Ship Computing Environment
TTA Technology Transition Agreement
TTP Tactics, Techniques, and Procedures
TWH Technical Warrant Holder
TYCOM Type Commander

U
UAV Unmanned Aerial Vehicle
UAS Unmanned Aircraft System

UCMJ Uniform Code of Military Justice
USN US Navy
USSOCOM United States Special Operations Command
USV Unmanned Surface Vehicle
UUV Underwater Unmanned Vehicle

W
WG Working Group
WSESRB Weapon System Explosive Safety Review Board

X
X-RIC Pseudo-Repairable Identification

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