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Results - Not Efforts!

Enterprise Florida Contract Con 17-176 **August 31, 2018**
Final Deliverables Submittal

FDSTF Grants Manager
101 North Monroe St., Suite 1000
Tallahassee, FL 32301

InDyne, Inc. Proprietary Information

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31 August 2018

Ms. Marcy Muldrow Sanders
FDSTF Grants Manager
101 North Monroe St., Suite 1000
Tallahassee, FL 32301

Re: Enterprise Florida Contract Con 17-176 Final Deliverables Submittal

Dear Ms. Sanders,

InDyne is pleased to submit the final report (attached), which consists of the Systems Engineering Management Plan and attached sub-plans. The process of developing this plan and its supporting documents has been a resounding success. The overall intent of the Grant was to "kick-start" the Gulf Range Enhancement (GRE) project by producing a roadmap to make the first of multiple down-range instrumentation sites "shovel ready." The only difficulty the team has had is that due to the initial success of work on the Carrabelle Site, the USAF rapidly expanded the project with insertion of their funds to include the entire Gulf Range, in addition to the original Carrabelle Site effort. Much of the documentation has morphed to show the overall project, and not limited to the first site. The State of Florida should be very happy that the primary goal has been achieved and the Grant has allowed the GRE project to be progressing at an amazing pace.

In the original proposal for the Grant, several benefits were asserted for this project, and the following will assess how well those were achieved. First, "This project will enhance the 96th TW's competitiveness within the USAF for funding to accelerate implementation of upgrades to eastern Gulf Range capabilities needed to protect Eglin's core missions associated with research and development to field next generation air armament." At the beginning of the FY18 funding allocation, no USAF funding was projected for the GRE. Shortly after the Grant was announced, the 96th TW allocated $200K for long-range planning. The USAF then reallocated funds in the President's Budget for FY19 by pulling funds from future years to increase funding in FY19 from $5.17M to over $10.5M. The GRE project is definitely more competitive now due to the systems engineering work facilitated by the Grant.

Second, the Grant proposal asserted that "The grant project will also provide enhanced insights needed by the Tri-county (Okaloosa, Santa Rosa, Walton) Defense Support Initiatives (DSI) Committee as they work with members of the Florida Congressional Delegation (House and Senate) and the appropriate offices within the Pentagon to increase funding in the FY18 NDAA to get the GRE started earlier and to fully fund the GRE future increments in subsequent NDAAs for enhancing the test and training capabilities in the Complex." Members of the DSI used products from the Grant team to present information to the Florida Congressional Delegation for both the FY18 and FY19 budget cycles. We met with the members, their staffs, the professional staffs of various committees, and cognizant Pentagon officials. These meetings resulted in an increase of $27.4M for FY18 appropriated for the GRE project. To date, in the FY19 budget process, $31.9M has been authorized in the National Defense Authorization Act and we are awaiting results of the appropriations process which should restart after the August recess. Only through the data produced by the work done on the Grant would the DSI members have been successful.

Third, the Grant proposal's main deliverable was the Systems Engineering Management Plan (SEMP) for Carrabelle, which is attached. It should be noted that some of the originally proposed subordinate plans have changed their names at the request of the USAF. For instance, the Requirements Management Plan has been documented in the System of Systems Process and includes the Requirements Verification Traceability Matrix. Also, the Information Assurance Plan has been expanded to be the Cyber Security Compliance Plan. The 96th Test Wing is already using these documents as part of the larger GRE effort for the entire Eastern Gulf of Mexico. The SEMP, and its associated subordinate plans, are essentially the road map for: the design of the site; the construction needed to make the site ready for instrumentation to be installed; the requirements to ensure purchasing the right instrumentation to be installed at the site; and the connectivity needed to make the site fully functional. Due to the efforts in working this Grant, not only is the plan for the site "shovel ready," but significant progress has been made in starting the physical construction. Request for Quotes to install fiber to connect Carrabelle to the Eglin Range Information Grid have been received and we expect fiber installation to be on contract soon. Engineering plans for tower design were funded by the Grant and we are awaiting Government approval to execute them. Instrumentation purchase plans are in place and are merely awaiting federal funds to execute. All of this was made possible by the Grant.

Please feel free to contact me personally should you have questions regarding our submittal. These should satisfy the deliverables promised in the original proposal and associated contract. I can be reached at (850) 420-2739 or at email jheald@indyneinc.com.

Sincerely,

James R. Heald
Vice President, Strategic Programs

Enclosures:
Systems Engineering Management Plan (5 Hard Copies and 3 CDs) with attachments:
Attachment 1: Program Management Plan for Gulf Range Enhancement (GRE) Carrabelle Site
Attachment 2: Carrabelle SoS Process
Attachment 3: Document Management Plan
Attachment 4: Configuration Management Plan
Attachment 5: Interface Control Document – Carrabelle
Attachment 6: Cyber Security Compliance Plan

Systems Engineering Management Plan (SEMP)

August 31, 2018

Revision History

Revision	Description of Change	Effective Date
Original	Original Submission	

Proposal Team

List the office codes and names of personnel who made meaningful contributions to the document. This provides the reader with points of contact to follow-up when questions arise.

Name	Occupation	Fac
Devan Bishop	Engineering Branch Manger	011

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1 Introduction

The Gulf Range Enhancement (GRE) program is an Improvement and Modernization (I&M) effort to enhance the coverage and fidelity of instrumentation coverage of the Eglin Gulf Test and Training Range (EGTTR) water ranges. The program will provide test capability for the next generation intelligent long-range munitions and aircraft. The testing of these systems will require long-range profiles and huge safety footprints. Currently there is no existing DoD range in the Continental Unites States capable of testing next generation weapons capable of testing next generation weapons, GRE will be instrumental in providing the warfighter this capability.

To be successful, the program requires a well-defined Systems Engineering Process (SEP) to support the planning, design, deployment, operations, and maintenance of the GRE program. The program will be conducted in phases to accommodate funding profile and construction.

1.1 Scope of the Systems Engineering (SE) Management

The scope of this Systems Engineering Management Plan (SEMP) is to document the SEP that the GRE Systems engineering team will follow to deliver a successful GRE I&M program. The SEMP enables the Program Manager Office and the Systems Engineering Team to manage the overall GRE program and each of its subcomponents using consistent systems engineering principles and methodologies to maximize the quality of each system, while adhering to the scope, budget, and schedule. Benefits of having a well-defined SEP include:

- Improved stakeholder participation
- More adaptable, resilient, and interoperable systems
- Verified functionality and fewer defects
- Better documentation

1.2 Intended Audience

The GRE program team includes staff from the Eglin Air Force Base (EAFB) 96th Test Wing (96 TW), Reliance Test and Technologies, Leidos, Qualis, and their contractors. This SEMP is intended to provide the entire GRE team with detailed information regarding the systems engineering activities at both the program and individual project level, especially the following:

- The process to manage the relationship between program and project objectives
- The project sequence and dependencies
- The identification of common resources
- The management hierarchy between program and projects

The SEMP identifies resources, processes, and methodologies that can be referenced by the program managers and systems engineers.

1.3 SEMP Update Process

The GRE SEMP will be a living document. As the program evolves, some elements may require refinement to ensure a quality and sustainable system is deployed. The SEMP will be updated as needed to accommodate these changes and refinements to ensure that the GRE program team understands and continues to follow the systems engineering processes. This document will be reviewed quarterly to maintain alignment with the Program Management Plan provided in attachment 1 and reflect the decisions made during major milestones in the concept of operation, systems requirements, procurement, design, testing, and deployments.

1.4 Relation to the PMP

The SEMP describes the technical activities; specifically, the systems engineering processes, responsibilities, and methodologies used on the projects and the relationship of these activities to other project activities. The PMP is the overall master planning document of the GRE program. The PMP documents the actions necessary to define, prepare, integrate, and coordinate the various planning activities. The PMP defines how the project is executed, monitored, and controlled. The PMP is maintained by the 96th TW Government Program Managers.

1.5 Overview of the Document

The document is organized to provide the SE management approach at both the program and project level. This approach is anchored by regular project-level coordination meetings to maintain project progress and regular program-level working group meetings to ensure the program success.

The Department of Defense (DoD) encourages the use of SE to ensure a structured approach to successfully complete programs. SE reduces the risk of schedule and cost overruns and increases the likelihood that the implementation will meet the user's needs. The GRE SEMP will:

- Outline the framework for all SE tasks associated with the program
- Provide the technical plan of the program and the processes used to accomplish it
- Provide detail regarding the engineering tasks, processes to be used for gathering and preparing user needs, defining requirements, etc.
- Identify the needed tasks and any constraints on the performance of a task

The SEMP begins with an overview of the program, and provides an overview of how the engineering activities at the program level will be managed. The SEMP summarizes how all SE activities will be documented at program level.

2 GRE Scope

2.1 Project Description

The Gulf Range Enhancement (GRE) program is an I&M effort to enhance the coverage and fidelity of instrumentation coverage of the EGTTR water ranges.

2.1.1 Background

Eglin Air Force Base is located in northwest Florida between Pensacola and Panama City. The installation is bordered to the south by the Gulf of Mexico, Santa Rosa Island, Santa Rosa Sound, and Choctawhatchee Bay; to the east by U.S. Highway 331; to the north by the Yellow River and U.S. Interstate 10; and to the west by the East Bay and Pensacola Bay.

EAFB is comprised of 724 square statute miles (463,360 acres) of reservation land with approximately 130,000 square nautical miles of over water airspace referred to as the EGTTR. The EGTTR extends south to the Florida Keys, and is the largest water test range in the continental United States. The primary function at EAFB supports the Research, Development, Test and Evaluation (RDT&E) for all conventional weapons and electronic systems and joint training of operational units in the USAF. EAFB is one of several DoD installations congressionally established as a Major Range and Test Facility Base (MRTFB).

Serving several DoD components responsible for developing, testing, and operating weapons systems, the Eglin Test and Training Complex (ETTC) consists of ten auxiliary fields, five active and five inactive, and the only supersonic overland range east of the Mississippi River. The ETTC is one of three major components generally referred to as the schedulable resources: airspace (over land and water), land, and water range (EGTTR). Interstitial areas are defined as areas beyond and between test areas used primarily for safety.

The AFMC 96 TW operates and maintains the ETTC. The 96 TW is the test and evaluation wing for Air Force air-delivered weapons, navigation and guidance systems, Command and Control (C2) systems, and Air Force Special Operations Command systems. The ETTC provides approximately 130,000 square miles (340,000 km2) of over water airspace. A map of the ETTC, including the Gulf of Mexico (GoMex) water test areas is provided on the following page as Figure 1. The 96 TW supports other tenant units on the installation with traditional military services as well as all the services of a small city, to include civil engineering, personnel, logistics, communications, computer, medical, and security. The ETTC is part of the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD[AT&L]) managed MRTFB; a core set of DoD Test and Evaluation (T&E) infrastructure, and is a national asset to provide T&E capabilities to support the DoD acquisition system.

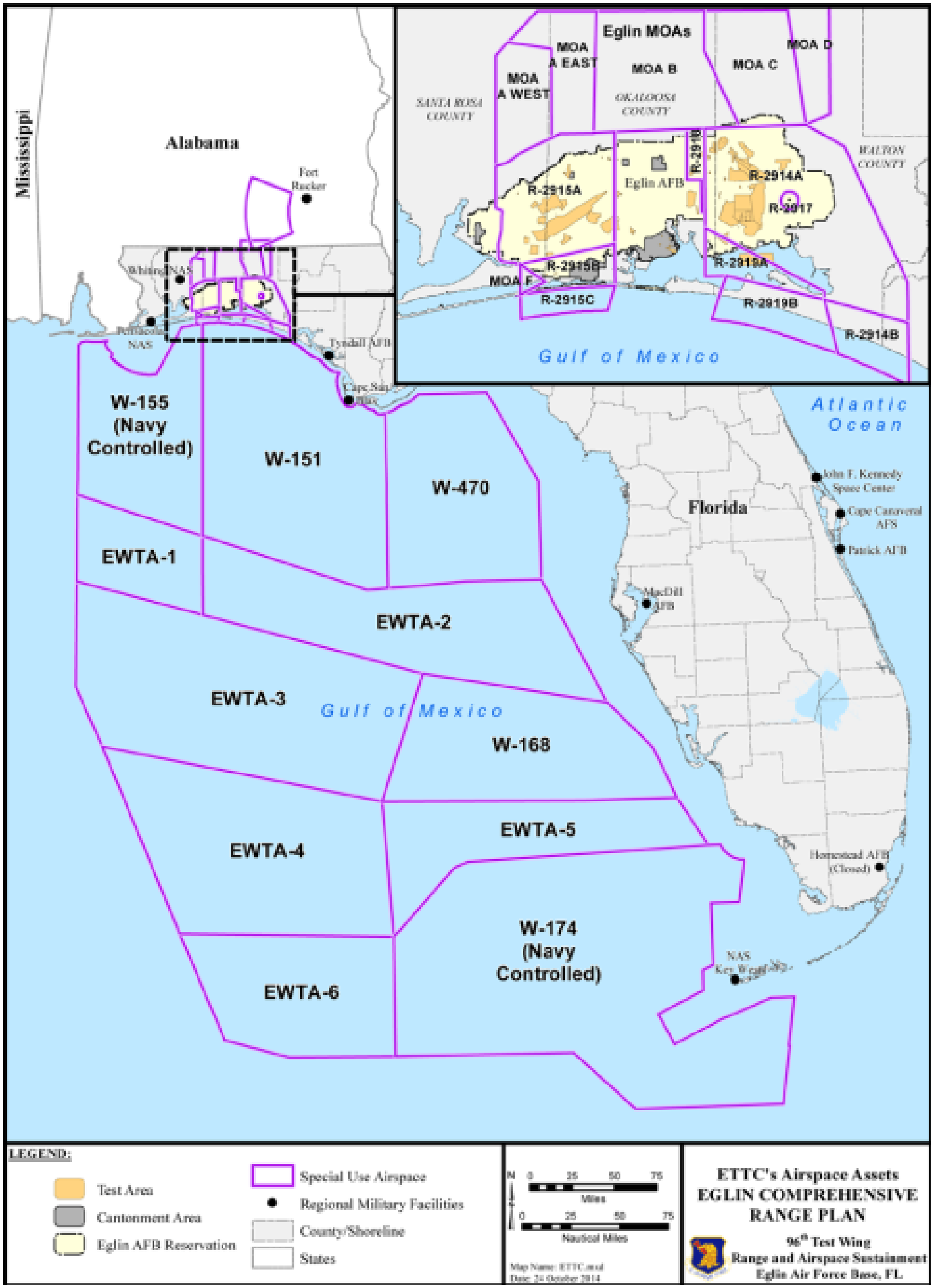


Figure 1. Eglin Test and Training Complex

In the decades of the 1960s and 1970s, a critical mission for the Air Force at Eglin AFB included medium-range missile launch support and testing over the Gulf of Mexico. To accomplish its mission, the Air Force established “downrange” Test Sites (TS) with locations at Tyndall AFB (TS D-1C), Cape Can Blas (TS D-3), Carrabelle (TS D-3C), Anclote Point (TS D-4, Pinellas County), MacDill AFB (TS D-5A), Venice (TS D-6, Sarasota County), Marco Island (TS D-7, Collier County), and Cudjoe Key (TS D-8, Monroe County). The facilities were used to host various mobile radar tracking systems much like those that are currently in use today (AN/FPS-16, MPS-19, MPS-9, and MPQ-31 tracking radars). The facilities were used to track and score missile profiles as they were launched and flew across the Gulf of Mexico.

Over the years leading into the late 1970s, the mission was changed and the downrange facilities were vacated or turned to alternate uses. The light footprints along the shore, left from this critical mission, are barely remembered or even seen.

Today, military mission requirements are driven by extended range weapons, extended mission flight profiles, added activity for training with increased operational tempo, and joint operations. To better serve and support development and conduct of these activities, the need to reconstitute those previous capabilities, provided by those previous test sites, is resurfacing.

A persistent mission, Air Combat Maneuvering (ACM), is evolving its instrumentation from grids of 200-foot tall radio relay towers, built in the 1980’s and positioned in the Gulf around Tyndall AFB and Naval Air Station Key West, to airborne self-contained instrumentation systems. The tower systems demonstrate the historic need to physically extend ACM instrumentation (ACMI) out into the Gulf to support operational testing and training.

Other continuing test and training missions include the Weapons System Effectiveness Program (WSEP) Combat Archer, an aerial combat training exercise of 4th and 5th Generation fighter aircraft including live missile launches over the Gulf against unmanned subscale and full-scale drone aircraft. Secondly is the WESP Combat Hammer, a twice yearly event of air-to-ground training involving more than 700 Air Force and National Guard personnel against realistic fixed and remotely operated mobile land and ocean going boat targets. Both events are designed to practice as we fight and involve both live and inert weapons.

The current requirement to extend use of the Gulf supports weapon systems that can be ground, air, surface, or underwater launched. Targets and instrumentation, in varying degrees of complexity, are required to be positioned near, or positioned far, measuring at a distance (telemetry). The downrange test facilities are a natural asset to this activity.

Foreseen are solutions to the need for enhanced measurement capability extending over-the-horizon (OTH) and beyond line-of-sight (BLOS) into the Gulf. Possible solutions include fiber-optic cables (both on land and underwater), autonomous small floating platforms, satellite, tropospheric scatter communications, network radio frequency (RF) relay, data buoys, towers (similar to air combat maneuvering Instrumentation towers), aerostats, and Unmanned Aerial Systems (UAS). All are being considered in part or collectively as a possible set of tools for meeting the emerging requirements. While all may not be immediately employed, the infrastructure to support them must be put into place.

Today, a sophisticated adapted barge, outfitted with various instrumentation is employed on a limited basis to fill the gap in support of weapons testing along the shoreline (within 50 miles) of the northern Gulf Coast. Unmanned high-speed maritime, as well as the previously mentioned aerial targets, are used. The limit of 50-miles is set by the lack of OTH or BLOS RF communications infrastructure. Water depth of secure anchoring is also a limitation to ensure station-keeping of the barge.

Therefore the vision to reinstate the downrange reach enjoyed in the 1960-1970 timeframe with the chain of test sites extending from Pensacola to Key West, FL, is a cornerstone for future military test and training through the next three decades. The currently planned test sites are shown on Figure 2.

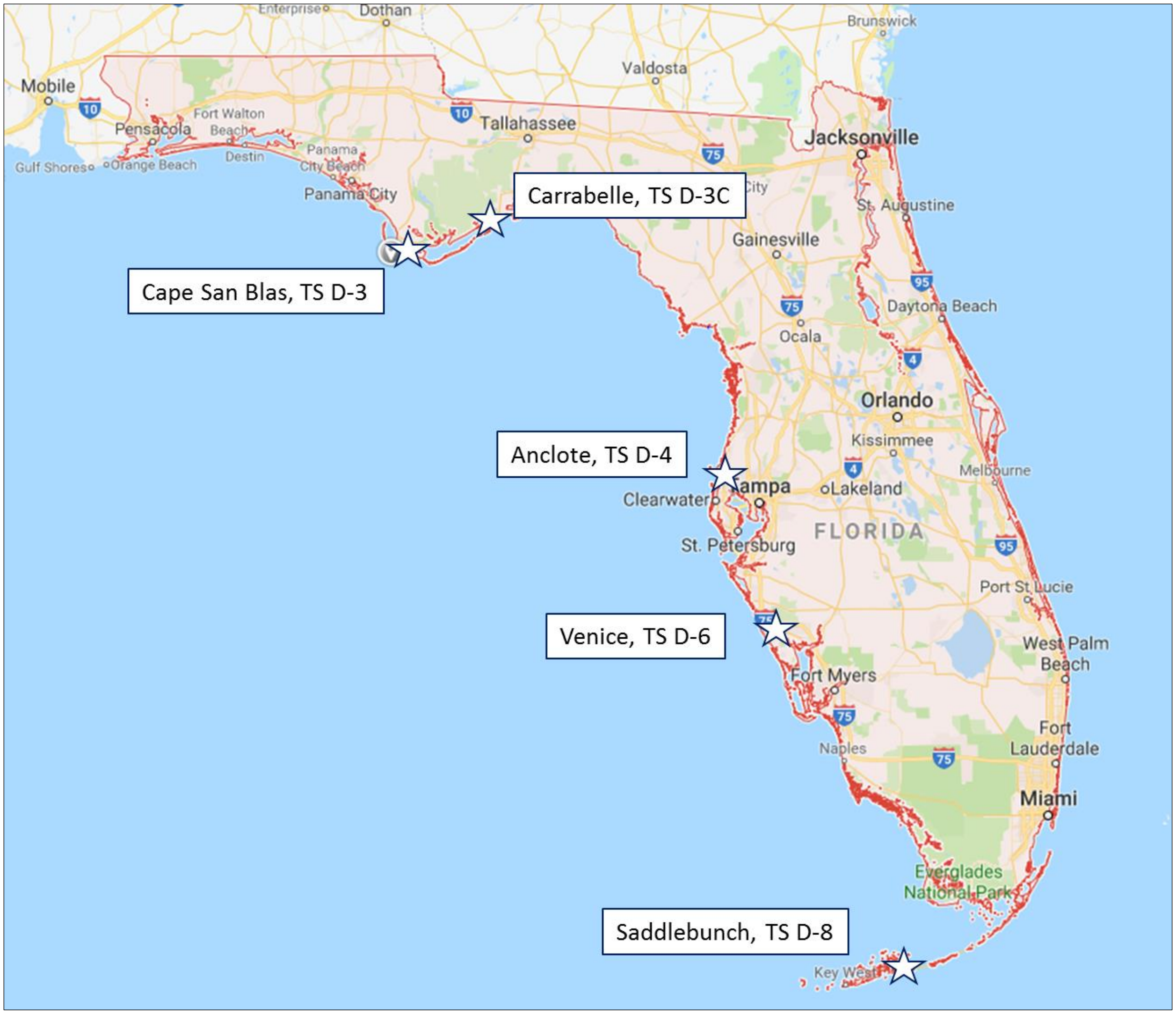


Figure 2. Planned Test Sites

2.1.2 Scope

The United States Air Force at Eglin AFB has a need to enhance its instrumentation and coverage using existing water ranges and airspace to provide a water range capability to both alleviate current test congestion brought on by the F-35 program, and to provide an adequate testing environment for the next generation intelligent long-range munitions and aircraft. The testing of these systems will require long-range profiles and huge safety footprints, of which there is no existing DoD range in the Continental United States having the instrumentation or contiguously instrumented air space to meet these requirements. Real-world representative environments, along with the increase in current test and training operations, are some of the forcing functions driving the need to enhance instrumentation coverage from the W-151 ranges to the eastern W-470 ranges and south to NAS Key West. Thus taking full advantage of the ETTC at Eglin AFB, FL, which controls the airspace over the GoMex from Key West to Pensacola, FL, as well as providing approximately 40 miles of littoral boundary to facilitate test and training ingression into the its land ranges. However, to take full advantage of these assets and be prepared to support 5th and 6th generation aircraft and weapons testing into 2025 and beyond, investments in infrastructure must be made without delay.

The GRE Program will be executed in two standalone and complementary phases.

Phase 1 (I&M funding programmed FY17-FY20)

- Design and construct a Centralized Remote Operations facility for efficient operations
- Design and install a communication infrastructure to meet data test demands
- Design and construct two Test Sites to border W-470 (TS D-3C Carrabelle, and TS D-4 Anclote)
- Specify, acquire, test and integrate instrumentation systems
  - Telemetry (TM) Systems
  - Frequency Monitoring Systems (FMS) and Interference Detection Systems (IDS)
  - Flight Termination Systems (FTS) employing Advanced Command Destruct System (ACDS)
  - Time-space-position information (TSPI) Systems
    - Integrate Common Range Integrated Instrumentation System (CRIIS)
    - Remotely Operated TSPI Radar (ROTR)
    - Upgrade RIR-980
- Gulf Range Drone Control System (GRDCS) Integration
- Communications Radios
  - UHF
  - VHF
- Over Water Impact Location (OWIL) System
- Maritime Target Control

Phase 2 (I&M Funding planned FY22-FY23)

- Design and install a communication infrastructure to meet data test demands
- Design and construct two Test Sites to extend south bordering W-168 and W-174 (TS D-6 Venice, and TS D-8 Saddlebunch Key)
- Specify, acquire, test and integrate instrumentation systems
  - TM Systems
  - FMS and IDS
  - FTS employing ACDS
  - TSPI Systems

    - Integrate CRIIS
    - ROTR
    - Multi-Object Tracking TSPI Radar (MOTTR)
  - Communications Radios
    - UHF
    - VHF
  - OWIL System
  - Maritime Target Control
  - Maritime Support Vessels

Alignment with EAFB Strategic Plans and AFMC Airspace and Range Studies

Three foundational plans support the GRE Program. First is the EAFB Installation Development Plan (IDP). The second is the Gulf Regional Airspace Strategic Initiative (GRASI). The third, the AFMC Long-Range Standoff Weapons and Range Study, Airspace and Range Study Update, provides functional range capability requirements for the ETTC to meet future weapon programs developmental, operational, and training needs.

3 Systems Engineering Management

3.1 Engineering Plan Oversight/Roles & Responsibilities

The Eglin Air Force Base 96 Test Wing will serve as the overall program owner, providing oversight and direction to the project teams as needed. The team is divided into segments, and each segment has a lead who is responsible for delivery of the overall project, including deliverables, scope, budget, risks, schedule, and policy. An overall program-level lead systems engineer from the consultant team will have the general responsibility of coordinating the engineering processes and overall technical aspects for the program. The following segments make up the GRE program team:

- Project management segment
- Telemetry
- Facilities
- Network
- Frequency control allocation/FTS
- Radar
- Maritime

Each segment will provide the solutions for their areas to integrate into the overall system. Each segment has a Government lead POC provided by the 96 TW, a contractor subject matter expert, and an operational POC.

In addition to the frequent internal communication among the project teams, there are several regularly scheduled meetings that will ensure program and project priorities and risk are continually addressed. The following meetings are reoccurring working groups:

- Program
  - Weekly Program Leadership meeting – reviews GRE financial and schedule progress

- Technical
    - Weekly technical working groups, focused on engineering focus based on schedule. For example, the current group is focused on facility construction.
    - Biweekly technical requirements review meeting
    - Building requirements meeting – joint meeting with Air Force Civil Engineering group to determine building requirements
    - Weekly network meeting – discuss network requirements and security level
    - Weekly security meeting – discuss physical security

The segment leads, program manager, and systems engineer utilize the weekly program meeting and technical working group to collaborate across segments, as well as provide feedback and lessons learned when applying the processes and procedures described in this document.

The Government GRE Program manager has general oversight for the entire program with individual segment leads having responsibility for their areas. The lead systems engineer ensures SE practices, methods, and processes are applied consistently across all segments. Segment leads have the responsibility of applying the appropriate practices, methods, and process for their project with assistance from the lead systems engineer.

3.2 Program Level Systems Engineering Approach

At the program level, the GRE program will adopt a System of Systems (SoS) approach to SE.

3.2.1 System of Systems

The overall SE approach is shown in Figure 3, based on the current project plan and the stakeholders currently known. The program-level SE approach focuses on developing models of the SoS that support the following objectives:

- Mechanism that supports SoS-level technical discussions with stakeholders
- Mechanism that supports SoS-level technical discussions with the owners of external systems that interact with the SoS
- Framework that can be used to support SE activities at the individual project level

The SoS System Breakdown Structure (SBS) is like the Work Breakdown Structure (WBS) used within the PMP, the SBS provides a hierarchically structured representation of the SoS that identifies the key components of the SoS and provides an identifiable and traceable set of nomenclature that supports the three engineering objectives listed above. The first five steps of Figure 3 summarize the program level SE approach; following this figure is a detailed explanation of all steps in the GRE SE approach.

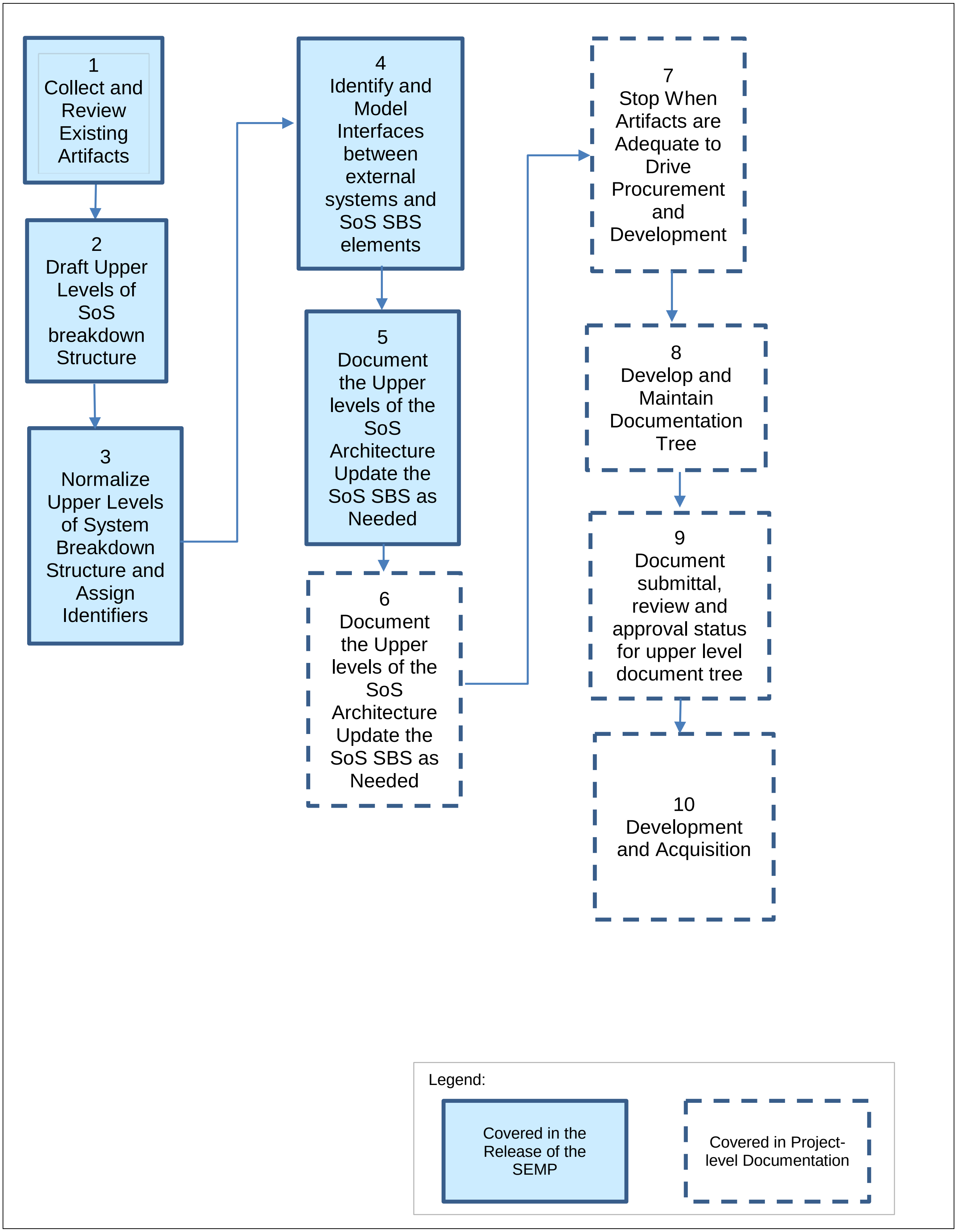


Figure 3. Overall System Engineering Approach

Step 1. The approach begins by collecting and reviewing existing artifacts including the draft Concept of Operations or Trade Studies associated with stakeholder elicitation and early SoS architectural concepts.

Step 2. Based on these artifacts, a top-level SBS for the SoS is drafted.

Step 3. When the SBS seems complete and stable at the SoS level, the nomenclature used for the SBS elements is scrubbed for usability, consistency, and accuracy. As part of this step, unique identifiers will be assigned to the SoS SBS elements in a manner such as the assignment of unique numerical identifiers within a WBS.

Step 4. The SoS will interface with many external systems, many of which have been identified during stakeholder elicitation and early architectural planning. With the SoS SBS in place, more focus can be placed on interfaces to external systems by identifying these interfaces and the corresponding SoS SBS elements. Step 4 consists of these activities:

a) Compile a list of all external systems that interact with the SoS; for the SoS view, the focus will be on the external systems that must interact with the GRE systems. The GRE system context diagram also includes interfaces among other range instrumentation; therefore providing a robust program-level view of the relationships among GRE systems and external systems.
b) Develop a description for each external system that interacts with the SoS, including an overview of critical functionality and data available from the external system.
c) Identify the owner or sponsoring organization for each external system, and who within that organization is the point of contact (PoC) for the system both from an ownership and technical perspective (to account for both authorization and execution of any programmatic work required to establish an interface).
d) For each external system, identify the SoS SBS element that interfaces with the external system.
e) Treat each interface uniquely if an external system has an interface to more than one element of the SoS SBS. Specific interfaces (i.e., needs) for each GRE Segment will be defined in the project-level Concept of Operations (ConOps). Step 4 identifies all SoS-level interfaces to external systems; but more importantly, it identifies the lower-level elements of the SoS which interface to external systems.

Step 5. All information will be compiled into a collection of artifacts that describe the SoS from a variety of perspectives, including a final SoS SBS and an initial SoS context diagram which models all SoS SBS elements, external systems, and interfaces. The main location for this information will be in the SoS ConOps, although additional documents such as the project-level system requirements (SyRS) and design documents will also address interface requirements and how they will be addressed.

Step 6. In project-level SE documents, Steps 6 will drive requirements definition to include functional, performance, interface and other types of requirements for the individual GRE segments and their subcomponents. Documenting these requirements will drive later activities related to procurement, development, integration, and test activities as needed. It should be noted that application of this SE approach at higher levels of the SBS is independent of the acquisition strategies, development methodologies, and integration approaches for the lower-level system and project elements. As the lower levels of the SBS are developed, the acquisition strategy (to include requirements development as needed), development methodology, and integration approach for each lower level element will become clearer and the lower levels of the SBS will be adjusted appropriately. For example, it is anticipated that the SBS will reflect the decomposition of extensive SoS software capabilities into many SBS software elements that could lend themselves to using an off-the-shelf software module or other integration approaches, taking into consideration available software development team resources, the software supplier base, and the Agile development methodologies. It is also anticipated that lower levels of the SBS will be structured to identify and segregate specific partner capabilities to be leveraged into SoS capabilities, and to isolate hardware and physical infrastructure elements so that traditional SE methods can be applied to hardware development and/or hardware procurement, if appropriate.

Step 7. Step 7 indicates the completion of the project-level decomposition and transition to procurement. Step 7 involves the review of the SBS to determine if it is adequate to support acquisition, development, and integration of the lower level SBS elements. Another important criterion for completion of project-level decomposition is that the requirements for the particular system thoroughly describe each system and its subcomponents, thereby sufficiently supporting a vendor partnership or request for proposal.

Step 8. Following Step 7, a complete documentation tree that aligns with the SBS will be developed (Step 8). The upper levels of the documentation tree will contain artifacts common to all projects, such as project-level ConOps, architecture, and requirements documents. Documents for the lower-level elements of the SBS will vary depending on the acquisition strategy, development methodology, and integration approach for each element.

The remainder of Chapters 3 and 4 describes the SE approach in more detail, including the process that will be used to advance the projects, presentation of the high-level SoS SBS, and specific strategies and development methodologies being considered for use during the overall SE program. Attachment 2 provides the Carrabelle SoS documentation to date.

3.2.2 Project Working Groups

The GRE program is adopting an “Agile” type management approach to provide regular and proactive oversight of all projects. The cornerstone of this approach is regular program-level working group meetings to manage program activities. Working group meetings allow clusters of project teams to discuss their work, especially focusing on areas of overlap and integration. In this program, there will be seven segment teams, each one representing an important piece of range instrumentation. The project teams will include both Government and Contractor, and vendors once under contract or partnership.

Each of the segment teams will conduct their own regular project coordination meetings. These meetings will identify any blockers keeping them from delivering on their plans. A traceability requirements matrix (TRM) will be maintained throughout the program linking requirements between systems and identifying derived requirements that must be addressed. Each requirement will be verified and validated. Each segment will be responsible for the development and maintenance of the TRM, the systems engineer will be the overall lead on the TRM. An example of the network TRM is shown on the following page in Table 1.

Table 1. Network Requirements Traceability Matrix

		Bandwidth (Mb)		Latency Data RTT (ms)		Latency Control RTT (ms)			
System	**Time Sensitive Network**	**Threshold**	**Objective**	**Threshold**	**Objective**	**Threshold**	**Objective**	**Redundancy**	**Diversity**
TM	Yes	320	1000	16	10	200	100	Yes	No
Radar	Yes	150	300	200	50	70	50	Yes	No
Spectral Monitoring	Yes	50	100	200	50	150	50	Yes	No
ACDS	Yes	1	1	200	75	250	75	Yes	Yes
Security/ Environmental	No	50	100	n/a	n/a	250	150	Yes	Yes
Network Management	Yes	15	25	n/a	n/a	250	150	Yes	Yes
GRDCS	Yes	1	5			8	8	Yes	Yes
CRIIS	Yes	2	4	20	20			Yes	No
EW									
Video (5 streams)	Yes	25	50	250	10	n/a	n/a	Yes	No
Communications	No	1	2	250	20	n/a	n/a	Yes	No
WIS	No	1	1	n/a	n/a	n/a	n/a	No	No
Total Mb		**613**	**1579**						

3.3 Program Dependencies and Integration

The key subsystem component linking all segments that make up the GRE program is the Requirement Verification Traceability Matrix (RVTM) as it is responsible for functionally linking the SoS subsystem components to each other. The segments will be decomposed into functional blocks that describe the processes that are a part of each segment. These functional blocks will require data sources and data outputs to other functional blocks either internal to the project, external to the project, or external to the program. These segment and program external data sources and outputs are the dependencies that require integration. The segments will produce an Interface Control Document (ICD) provided as Attachment 5 that defines the interfaces required between systems. In most cases these will consist of data exchanges, but could also be functional or performance requirements needed for interoperability between systems.

Operating systems on a Federal level also provides multiple derived requirements that must be defined through DoD regulations. Cybersecurity is a large aspect of the GRE program. The Cybersecurity Management Plan is provided as Attachment 6 on how we will ensure equipment is authorized to operate.

3.4 Project-Level Systems Engineering Approach

At the project level, all segments will begin with the standard SE approach. Following this process will enable the definition of each segment concept, user needs, and system requirements. Currently, the team has begun the process of defining the concept and user needs. Following the program reset in June 2018, the Program Management Office (PMO) and segment teams will gather the remaining user needs and capabilities, document them in the final ConOps and Trade Study documents, and then define and produce systems requirements documents. These requirements will be derived by breaking down the system's requirements (functional, performance, data, security, interface, etc.) reflected in the ConOps and Trade Studies and vendor systems. The system's requirements will be defined at a sufficient level to provide viable procurement documents and identify the necessary interfaces. The requirements will also serve to generate the RVTM to be used for acceptance of the vendor product. The SyRS for ConOps projects, and ICDs for Trade Study projects, will be a key element in the request for proposals (RFP) for vendor solutions, whether the solution is off-the-shelf or customized.

The vendor will deliver all known requirements as specified in their RFP, however, some of the segments will be deploying technology that rapidly evolves. Accordingly vendor contracts will include provisions for emerging requirements to be included post-deployment. In addition, user-facing software products may have release updates that occur post-deployment. This calls for segments to pivot to "Agile" to implement further iterations until agreed upon requirements are met. This should not be considered a scope change, but should be planned in to the deployment methodology. In the case that a project does pivot to Agile after vendor selection, the required deliverables would then be aligned with Agile artifacts.

Specific project-level deliverables associated with the SE processes are described in Chapter 5. In the case of a vendor-provided solution, content and inputs for these deliverables would be specified in their contract, although the Segment Teams would be ultimately responsible for delivery to GRE Program Manager.

3.4.1 Project Advancement Approach

Initial definition of the project advancement approach and how the planned documentation will support it is outlined below. This includes the initial steps to be taken to advance the project – this is the work that the segment team will complete in concert with the project ConOps/Trade Studies and SyRS. It describes the specific steps to drive the segment team to vendor selection and implementation.

Table 2. Description of Project Advancement Steps

Step	Activities
1. Review existing documentation	• Evaluate the work completed to date (draft ConOps and Trade Studies). • Score the readiness of each project (1-5 scale). • Identify steps to finalize ConOps and Trade Studies.
2. Systems Engineering Management Plan	• Develop program-level SBS and update the SEMP. The SEMP will be referenced and provide guidance to the project teams as they complete their ConOps or Trade Studies.
3a. SoS ConOps	• Create an overarching ConOps document that defines the relationship and interactions of the RVTM and the other segments. This step runs concurrently with Identify User Needs, although it will be completed prior to the project-level user needs.
3b. Identify User Needs	• Review the user needs and engage users to ensure essential and desired needs are captured or validated. This step runs concurrently with the SoS ConOps, although it will be finished after the draft SoS ConOps is submitted.
4. Project ConOps or Trade Study	• Incorporate user needs and finalize ConOps or Trade Study.
5. Project System Requirements (ConOps projects) or Interface Control Document (Trade Studies)	• Document project and program requirements (ConOps) or interfaces (Trade Studies) and establish traceability to project user needs. The SyRS or ICD will be the foundation for the request for proposal (if the RFP will be competed among multiple vendors); if the capabilities will be provided by a partner through an agreement, a draft ICD should be prepared before an agreement is finalized. Each project's requirements will vary. In general, the following documents will be incorporated into the SyRS and ICD: system architecture and standards plan; data management plan; data privacy plan; performance measurement plan, etc.
6. Request for Proposal (RFP)	• Develop an RFP based upon the earlier documentation for each project (ConOps or Trade Study, SyRS or ICD). Note, for project capabilities that will developed and delivered by a partner, a final agreement would replace the RFP.
7. Vendor Selection (Decision)	• Review responses and determine the best value based upon technical and cost based merits. • Responses will be evaluated based upon their satisfaction of SyRS or ICD and their approach to doing so. • Note that vendor selection does not apply for projects that delivered by a program partner (under an agreement).
8. Product Development	• Work collaboratively with the selected vendor to ensure scope, schedule, and budget are met.

3.4.2 Project Advancement Initiation (ConOps, User Needs, Trade Studies)

To continue the advancement of each project, the PMO is analyzing all the user needs gathered during the preparation of the ConOps and Trade Studies, and have documented accepted project advancement documentation. Advancement to acquisition will be done with a statement of work to potential vendors or a technical requirements document for development. Each segment will develop these documents and provide the GRE team courses of actions.

Each of the seven segments and their documentation will be reviewed and scored on a scale of one to five. The scoring scale is presented in Table 3. It is intended to help the project teams assess how complete their user needs are and identify the next steps to finalizing the user needs and their documentation (whether it is in a ConOps or Trade Study).

Table 3. Project Evaluation Criteria

Score	Criteria
1	Missing a lot of critical information; a lot more discovery work to perform.
2	Have some information; most critical information is gathered; need more discovery meetings with end-users and stakeholders to complete the picture.
3	Have a lot of information collected but have some work to do to complete the picture, including additional meetings with stakeholders.
4	Document for Acceptance (i.e. ConOps, Trade Study) in decent shape - based on last review / comments from segment, but does require some modifications. No additional meetings required with stakeholders for additional needs.
5	Document for Acceptance (i.e. ConOps, Trade Study) in good shape - based on last review / comments from segment; minor modifications. No additional meetings required with end-users for additional needs.

The PMO will coordinate a meeting with the segment leads to determine if their segment can be executed. Segment evaluations were conducted beginning in September 2017 and the summary of scores are shown below in Table 4 (note program management segment not included).

Table 4. Summary of Project Evaluations

Segment	Score	Deliverable
Telemetry	4	TRD to vendors
Radar	1	ConOps/Research
Facilities	1	ConOps/Questionnaire
Network	4	Conops
Frequency Control Allocation	3	TRD
Maritime	1	ConOps/Research

4 Development Methodology

4.1 V-Model

This section describes the process the GRE team will utilize to implement V-Model practices within a development methodology. This section also defines the methodology and provides an overall direction for both development and oversight activities.

The V-Model process should be considered when:

- The segment will deliver products on the critical path.
- The segment will deliver products requiring operations and maintenance (O&M) support beyond the life of the GRE program.
- The development team has previous experience with Waterfall (i.e. V-Model) development processes.

4.1.1 Definition

V-Model is a sequential system development process in which progress flows steadily in a straight line, or downward, through life cycle phase of conception, development, production, utilization, support, and retirement.

4.1.2 Roles and Responsibilities

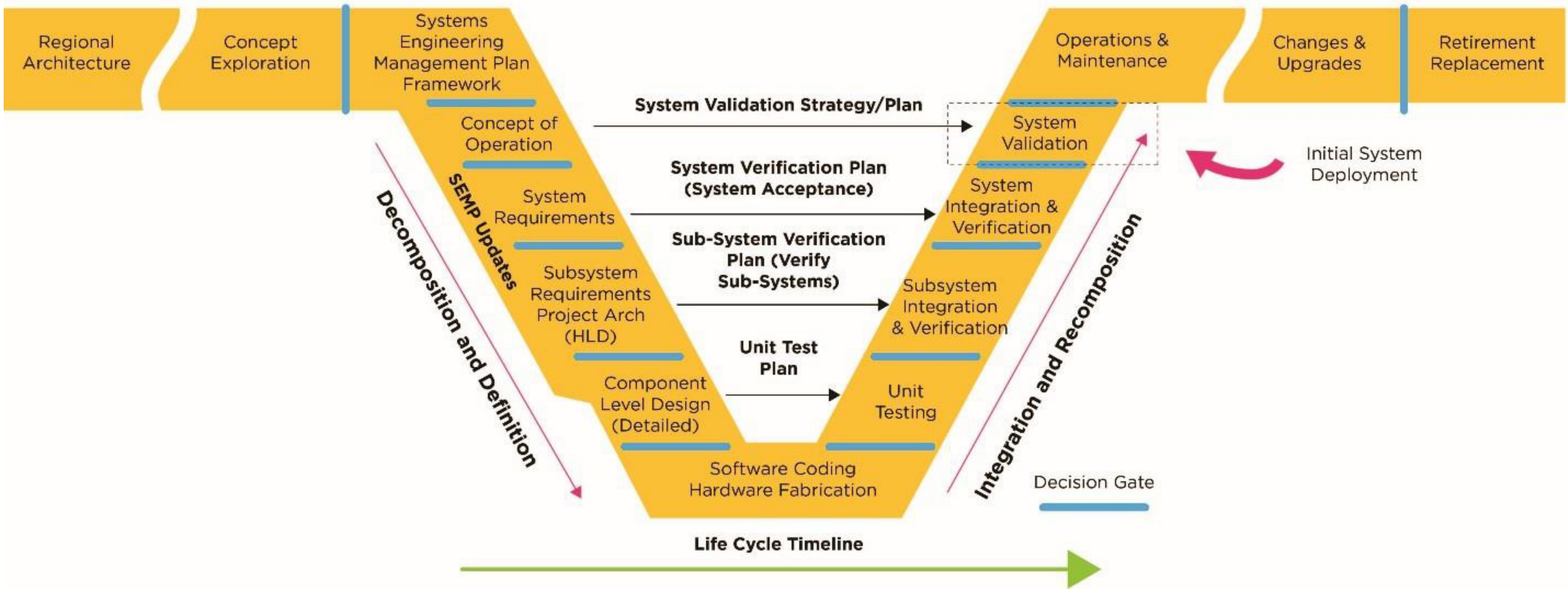
GRE has identified project-level specific roles and responsibilities necessary to implement the GRE V-Model. Key roles and responsibilities are listed in Table 5.

Table 5. V-Model Key Roles and Responsibilities

Role	Description	GRE Considerations
PMO	The Program Owner has overall responsibility for the entire program, providing oversight and direction to individual project teams	96th Test Wing will be the PMO
Segment Lead	The Segment Lead has overall responsibility for delivering a project to the PMO	A 96th Test Wing segment lead is assigned to each segment with a SME
Lead Systems Engineer	The Lead Systems Engineer provides oversight for the engineering processes, guiding projects through the process, answering questions, improving the processes, and updating and distributing process documents.	The Lead Systems Engineer will have overall responsibility for the GRE engineering processes
Technical Team	Typical V-Model teams will consist of a Project Lead, Systems Engineer, software developers, network personnel, installation personnel, and personnel for other specialties as required. The Systems Engineer will conduct verification and validation. The team acts collectively to determine how to achieve their goals.	Each GRE Lead will ensure technical reviews are ready prior to PMO review/engagement and advise the PMO on project progress and assist in providing status updates to the program owner.
Stakeholders	The development team is providing the solution(s) for the stakeholders' desires, wants, and needs.	At the outset of development, the program owner, and Project Lead will identify a list of stakeholders. It is expected that this list will evolve during long duration development efforts.

4.1.3 Workflow

GRE will utilize the V-Model Process as defined in the FHWA Systems Engineering for Intelligent Transportation Systems Guide as illustrated in Figure 4.



Source: City of Columbus, 2017

Figure 4. V-Diagram

In the Decomposition and Definition phase (Feasibility through Detailed Design), user needs are captured and an overall ConOps is defined. User needs are then transformed into System Requirements that define what the system will do. The process by which this occurs begins with the project-level SBS – as articulated earlier in Section 3.2. Breaking down the system into its components and subcomponents will drive requirements definition to include functional, performance, interface and other types of requirements. These requirements drive later activities related to procurement, development, integration, and test activities as needed. It is anticipated that project-level SBS will be structured to identify and segregate specific partner capabilities to be leveraged into SoS capabilities, and to isolate hardware and physical infrastructure elements so that traditional SE V-Model methods can be applied to hardware development and/or hardware procurement if appropriate.

Lastly, a System Design is developed based on the Requirements. Once the design is complete, individual field, vehicle, and back office components are developed and deployed and prepared for testing in the Implementation phase.

During the Integration and Recomposition phase (Unit/Device Testing through Changes and Updates), system components are first tested and evaluated individually and then as a complete system. Testing includes both validating the system addresses the user needs and overall ConOps and verifying the system meets the defined requirements. The Integration and Recomposition Phase (the right "wing" of the V-Model) is intended to mirror and provide the tools to validate the concept, requirements and design elements generated by the SBS and documented in the left "wing" of the V-Model.

4.1.4 Process Updates

In the event a project team has questions concerning certain aspects of the V-Model process described in this section, they should contact the PM and Lead Systems Engineer. The Lead Systems Engineer will collaborate with the Project Lead to resolve the question. If it is determined that an update to the process or clarification is required in the SEMP, the Lead Systems Engineer will develop and submit recommendations to the PM. Once the recommendations are approved, the Lead Systems Engineer will update the document accordingly and publish the update on the SharePoint site. Updates will also be communicated during weekly program calls between the PMs, Segment Leads, and the project staff.

4.1.5 References

This section contains links to references discussed for the V-Model Process as well as other points of reference that could be helpful when developing a project utilizing the V-Model approach.

- INCOSE Systems Engineering Handbook: http://www.incose.org/ProductsPublications/sehandbook
- FHWA Publications: http://www.ops.fhwa.dot.gov/publications/publications.htm
- FHWA Systems Engineering for Intelligent Transportation Systems: http://www.ops.fhwa.dot.gov/publications/seitsguide/seguide.pdf
- ISO/IEC/IEEE 15288 Systems and software engineering -- System life cycle processes: http://www.iso.org/iso/catalogue_detail?csnumber=43564
- Project Performance International Systems Engineering Key Downloads: http://www.ppi-int.com/systems-engineering/downloads.php

4.2 Existing Solutions

Some early on USAF initiatives have provided complete or near complete end-to-end solutions to satisfy project goals and objectives. These solutions will be treated as existing solutions that may not require complete design and build efforts. For these segments, the segment team will prepare a trade study to identify the most balanced technical solutions among a set of proposed viable solutions.

5 Program Documentation

5.1 Program Documentation Management Plan/Archive

The GRE program is comprised of numerous planning, engineering, outreach, and other related documents, all of which are necessary for successful execution of the program. Several of these documents are program-level, encompassing some or all of the projects, whereas other documents are segment-specific. Documents which support or are outputs of the SE process, including this SEMP, follow this same pattern, with both program-level and project-level documentation. Further, specific to the SE process, there are both DoD deliverable items, as identified in the Project Management Plan (PMP), as well as internal engineering documents and artifacts that will be produced. These documents are subject to the process for document management, outlined in Attachment 3, and archiving; however, those identified as deliverable items may have additional levels of review and configuration control implemented.

The configuration management plan is provided in Attachment 4 of this document and to clearly document the process for document management, including collaboration, naming conventions, and access permissions. The SharePoint collaboration portal will be used for documentation collaboration between the GRE Government and contractor teams. This portal will also act as the repository for all document artifacts.

Multiple versions of several documents may be developed throughout the duration of the program. These versions will be maintained on the portal. All document contributors will be granted the necessary permissions to create and edit documentation in this environment, and as such, it is expected that all SE artifacts, both working and complete, shall be maintained on this portal.

5.2 Program Documentation

Several documents and artifacts will be produced over the course of the program; many of which will depend on the specific SE process utilized to design an individual segment. These segment-specific documents are identified in Section 5.3. Program-level documents, which may address one or more projects, include this SEMP, the SoS ConOps, the System Architecture and Standards Plan, the Demonstration Site Map, and the Installation Schedule. Each of these is discussed in the sections below.

5.2.1 System of Systems ConOps

The GRE team will produce a SoS ConOps that will describe the GRE range operations. The ConOps will include a system context diagram, which explicitly identifies all known external systems and interfaces to which the GRE systems will interface, strategy for engaging external system owners to implement these interfaces, a discussion of enhancements to current operational practices, and use cases or scenarios, particularly those that show the interaction between the various projects and the GRE systems.

5.2.2 System Architecture and Standards Plan

A program-level System Architecture and Standards Plan will be developed, comprising all segments. Once the program architecture is developed, individual segment architectures will be added to the System Architecture and Standards Plan to expand on the program architecture.

The Lead Systems Engineer, with assistance from the PMO SE, will oversee the development of the program architecture to ensure consistency between the segments.

This is not a complete list of the standards that will be employed in the System Architecture and Standards plan. Various standards will be employed within and between the various projects, and will also be identified and documented as part of the standards plan.

5.2.3 Demonstration Site Map and Installation Schedule

The GRE program will produce a draft Site Map and Installation Schedule for delivery to Office of Secretary of Defense (OSD). The Site Map will identify the specific geographic area(s) and indicate locations related to key issues, current, and proposed technology locations, and other explanatory features to support the GRE proposed strategies. This will be provided through the I&M reports required to the OSD throughout the program.

5.3 Segment-level Documentation

The segments will deliver a set of documents based on the development methodology that is selected for each segment. The Configuration Management (CM) plan identifies the documents and artifacts to be produced for each project based on CM requirements.

The required deliverables for traditional V-Model Projects [deliverable number from PMP work breakdown structure] are identified in the bullets below.

- Concept of Operations
- Systems Requirements Specification
- Interface Control Document
- System Design Document
- Test Plan
- Testing Documentation
- Operations and Maintenance (O&M) Plan

The System Design Document and O&M Plan in V-Model Projects incorporate installation requirements, and therefore, a stand-alone installation plan is not specified for these projects. The following are the required deliverables for the overall GRE system:

- Interface Control Document (ICD)
- Installation Plan
- Test Plan
- Testing Documentation
- Technical Memo/Trade Study

5.3.1 V-Model Documentation

Documentation is a critical component of the V-Model process, describing each aspect of the system from ConOps to the completion of testing. The GRE Master Schedule will account for a complete review and approval of all required deliverables before moving on to the next phase of the process.

5.3.1.1 Model Management and Collaboration Tools

A key aspect of documentation is the use of software tools that enable development, tracking, and traceability through the process. The tools GRE intends to utilize for the V-Model process are listed in Table 6.

Table 6. V-Model Process Tools

Software Platform	General Use	GRE Applications
SharePoint	Document management and collaboration portal	GRE has established a SharePoint for the program. This platform will be used for storing and sharing documents throughout the development process.
PIMS360™	Requirements and cost tracking	InDyne-developed SW providing cost and schedule tracking of individual segment taskings.

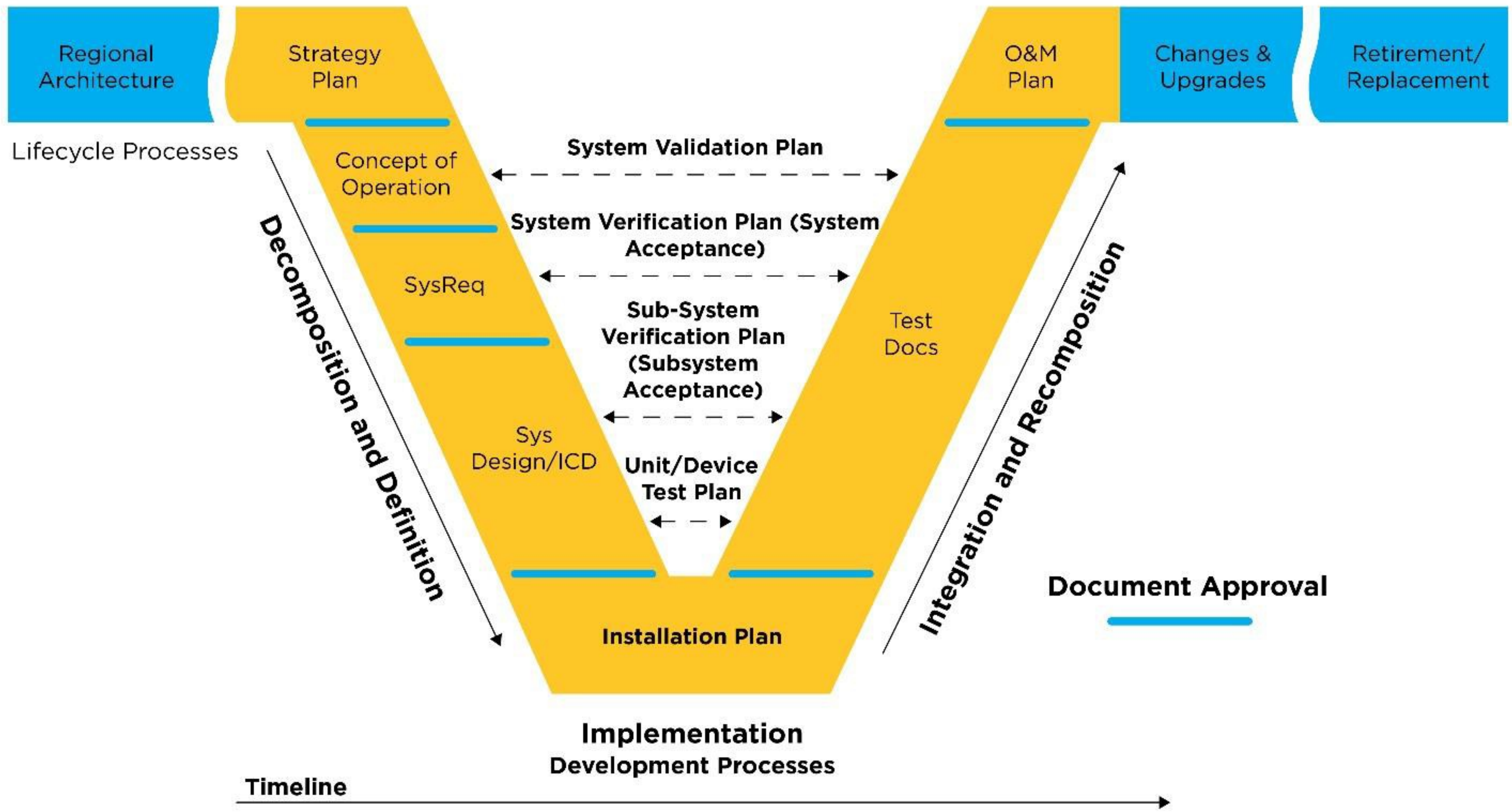
5.3.1.2 V-Model Artifacts

Artifacts developed for projects following the V-Model process are listed in Table 7, along with the standard/reference to be followed.

Table 7. V-Model Artifacts

Artifact	Standard/Reference
ConOps	IEEE 1362-1998 (Concept of Operations) IEEE 1028-1997 (Software Reviews)
Systems Requirements	IEEE 1233-1998 (Systems Requirements) IEEE 1028-1997 (Software Reviews)
System Design	IEEE 1016-1998 (System Design Document)
ICD	TBD
Installation Plan	TBD
Test Documentation	TBD
O&M Plan	TBD

The Test Documentation will describe both system verification and validation and will be developed in conjunction with the ConOps (validation) and System Requirements (verification). Each requirement will be verified or validated using analysis, demonstration, inspection, or test.



Source: City of Columbus, 2017

Figure 5. V-Model Methodology Documents

The segments use Technical Reviews to obtain feedback from appropriate stakeholders throughout the development process. These reviews are essential to ensure that each segment meets its requirements and that the requirements are understood by the development team. The GRE team will continue to conduct technical reviews of ConOps and System Requirements documents throughout the program. The GRE team will conduct the following technical reviews:

1. Preliminary Design Reviews (TM, Radar, etc.)
2. Critical Design Reviews (TM, Radar, etc.)
3. Test Readiness Review

Other V-Model technical reviews will consist of sending documents out for stakeholder review and comment. If comments indicate user needs are not properly addressed or misunderstood, the GRE PMO may choose to conduct a walkthrough of the document.

6 SEMP Summary

The SEMP process and V-Model Methodology provide a roadmap and logical process that are integral to ensuring all program requirements are met, and a successful completion of the GRE program is achieved. Upon successful completion the GRE program will deliver a singular world class test range for 5th and 6th generation weapons that is native to Florida.

Glossary

Acronym	Definition
96 TW	96th Test Wing
AARGM	Advanced Anti-Radiation Guided Missile
ACC	Air Combat Command
ACDS	Advanced Command and Destruct System
ACM	Air Combat Maneuvering
ACMI	ACM Instrumentation
AETC	Air Education & Training Command
AFB	Air Force Base
AFIN	Air Force Information Network
AFRL	Air Force Research Laboratory
AFSOC	Air Force Special Operations Command
ALCM	Air-Launched Cruise Missile
AMRAAM	Advanced Medium Range Air-to-Air Missile
AO	Authorizing Official
AoA	Analysis of Alternatives
ARTM	Advanced Range Telemetry
ASD[R&E]	Under Secretary of Defense for Research and Engineering
ASP	Acquisition Strategy Plan
ATO	Authority to Operate
BLOS	Beyond Line-Of-Sight
BOMARC	Boeing and Michigan Aerospace Research Center
C2	Command and Control
CCB	Configuration Control Board
CCF	Central Control Facility
CCI	Control Correlation Identifier
C-E	Communications-Electronics
CI	Configuration Item
CLIN	Contract Line Item Number
CM	Configuration Management
CMP	Configuration Management Plan

COADI .... Consolidated Operations of Agile Diverse Instrumentation
CONOPS .... Concept of Operations
COTS .... Commercial Off-the-Shelf
CPI .... Critical Program Information
CPM .... Continuous Phase Modulation
CRIIS .... Common Range Integrated Instrumentation System
CTEIP .... Central Test and Evaluation Investment Program
CTT .... Cybersecurity Table Top
DISA .... Defense Information Systems Agency
DoD .... Department of Defense
DTE .... Development, Test, and Evaluation
EAFB .... Eglin Air Force Base
EC .... Executive Committee
EGTTR .... Eglin Gulf Test and Training Range
EMASS .... Enterprise Mission Assurance Support Service
EOD .... Explosive Ordnance Disposal
EOMS .... ETTC Range O&M Support
ERIGE .... Eglin Range Information Grid Enclave
ETMG .... Electronic Trajectory Measurements Group
ETTC .... Eglin Test and Training Complex
FCA .... Frequency Control and Analysis
FISMA .... Federal Information Security Management Act of 2002
FMG .... Frequency Management Group
FMS .... Frequency Monitoring System
FTS .... Flight Termination System
GoMex .... Gulf of Mexico
GPS .... Global Positioning System
GRASI .... Gulf Regional Airspace Strategic Initiative
GRATV .... Gulf Range Armament Test Vessel
GRDCS .... Gulf Range Drone Control System
GRE .... Gulf Range Enhancement
GUIs .... Graphical User Interfaces

GWEF .... Guided Weapons Evaluation Facility
HAL .... Hardware Abstraction Layer
I&M........ Improvement and Modernization
IA .... Information Assurance
IAW........ In Accordance With
ICD........ Interface Control Document
IDP .... Installation Development Plan
IDS .... Interference Detection Systems
IP .... Internet Protocol
IRSP .... Instrumentation Radar Support Program
ISSM .... Information Systems Security Manager
IT........ Information Technology
JASSM .... Joint Air-to-Surface Standoff Missile
JASSM-ER........ JASSM - Extended Range
JPARC........ Joint Pacific Alaska Range Complex
J-PRIMES .... Joint-Preflight Integration of Munitions and Electronics Systems
JSOW .... Joint Standoff Weapon
LOS .... Line-of-Sight
LRSOW........ Long-Range Standoff Weapon
LRT .... Land Remote Terminal
MMSS .... Maintenance Management Support Section
MOTR .... Multi-Object TSPI Radar
MRT .... Maritime Remote Terminal
MRTFB .... Major Range and Test Facility Base
NAS........ Naval Air Station
NASA........ National Aeronautics and Space Administration
NDAA .... National Defense Authorization Act
NGMTE .... Next Generation Munitions Test Environment
NIPRNet........ Non-classified Internet Protocol (IP) Router Network
NIST........ National Institute of Standards
NTTR .... Nevada Test and Training Range
O&M .... Operations and Maintenance

OFP .... Operational Flight Programs
OSD .... Office of the Secretary of Defense
OTH .... Over-the-Horizon
OWIL .... Over Water Impact Location
PCM .... Pulse Code Modulation
PE .... Program Element
PM .... Program Management/Program Manager
PMI .... Preventive Maintenance Instruction
PMO .... Program Management Office
PMP .... Program Management Plan
PoC .... Point of Contact
POM .... Program Objective Memorandum
PWS .... Performance Work Statement
RCC .... Range Commanders Council
RDT&E .... Research, Development, Test and Evaluation
RF .... Radio Frequency
RFP .... Request for Proposal
RICS .... Range Instrumentation Control System
RMF .... Risk Management Framework
ROG .... Range Operations Group
ROM .... Rough Order of Magnitude
ROTR .... Remotely Operated TSPI Radar
RSS .... Range Slaving System
RTM .... Requirements Traceability Matrix
RVTM .... Requirement Verification Traceability Matrix
S&T .... Science and Technology
SA .... Situational Awareness
SATCOM .... Satellite Communications
SBS .... System Breakdown Structure
SCORE .... Southern California Offshore Range
SD .... Support Department
SDB .... Small Diameter Bomb

SE .... Systems Engineering
SEMP .... Systems Engineering Management Plan
SEP .... Systems Engineering Process
SME .... Subject Matter Expert
SONET .... Synchronous Optical Network
SoS .... System of Systems
SRC .... Sea Range Complex
SRF .... Spectrum Relocation Fund
SRG .... Security Requirements Guide
SRI .... Santa Rosa Island
SSE .... Systems Security Engineering
SSP .... System Security Plan
STIGs .... Security Technical Implementation Guides
SWCIs .... Software Configuration Items
SyRS .... System Requirements
T&E .... Test and Evaluation
TA .... Test Area
TETRAS .... Test & Evaluation Technologies for Ranges, Armaments & Spectrum
TG .... Telemetry Group
TM .... Telemetry
TMAS .... Technical Management and Advisory Services
TRD .... Technical Requirements Document
TRL .... Technology Readiness Level
TRM .... Traceability Requirements Matrix
TRMC .... Test Resource Management Center
TS .... Test Site
TSPI .... Time-Space-Position Information
TTG .... Timing and Telecommunications Group
TURBO .... Tailored User Requirements Breakdown for Obtaining
UAS .... Unmanned Aerial System
UAV .... Unmanned Aerial Vehicle
UC .... Universal Console

UDS....Universal Data System
UFC.... Unified Facilities Criteria
USAF ....United States Air Force
USD[AT&L].... Under Secretary of Defense for Acquisition, Technology, and Logistics
USG.... Underwater Systems Group
UTTR .... Utah Test and Training Range
V&V....Verify And Validate
WAN.... Wide Area Network
WBS.... Work Breakdown Structure
WEG .... Weapons Evaluation Group
WESP.... Weapon System Evaluation Program

Attachment 1: Program Management Plan (PMP) for Gulf Range Enhancement (GRE) Carrabelle Site

Program Management Plan (PMP) for Gulf Range Enhancement (GRE) Carrabelle Site

August 31, 2018

Revision History

Revision	Description of Change	Effective Date
Original	Original Submission	

Proposal Team

List the office codes and names of personnel who made meaningful contributions to the document. This provides the reader with points of contact to follow-up when questions arise.

Name	Occupation	Fac
Devan Bishop	Engineering Branch Manger	011

Table of Contents

List of Figures

1 Project Description

1.1 Description

The Gulf Range Enhancement (GRE) program is an Improvement & Modernization (I&M) effort to enhance the coverage and fidelity of instrumentation coverage of the Eglin Gulf Test and Training Range (EGTTR) water ranges to support 5th and 6th generation weapons systems. The intent of the program is to provide Eglin Air Force Base the capability to test long-range standoff weapons. The GRE program will establish multiple sites down the cost of Florida to provide instrumentation collection sites for items tested in the Gulf of Mexico. These sites will extend range capability from Pensacola to Key West, FL. This enhancement is the cornerstone for future military test and training through the next three decades.

The currently planned Test Sites are shown in Figure 1.

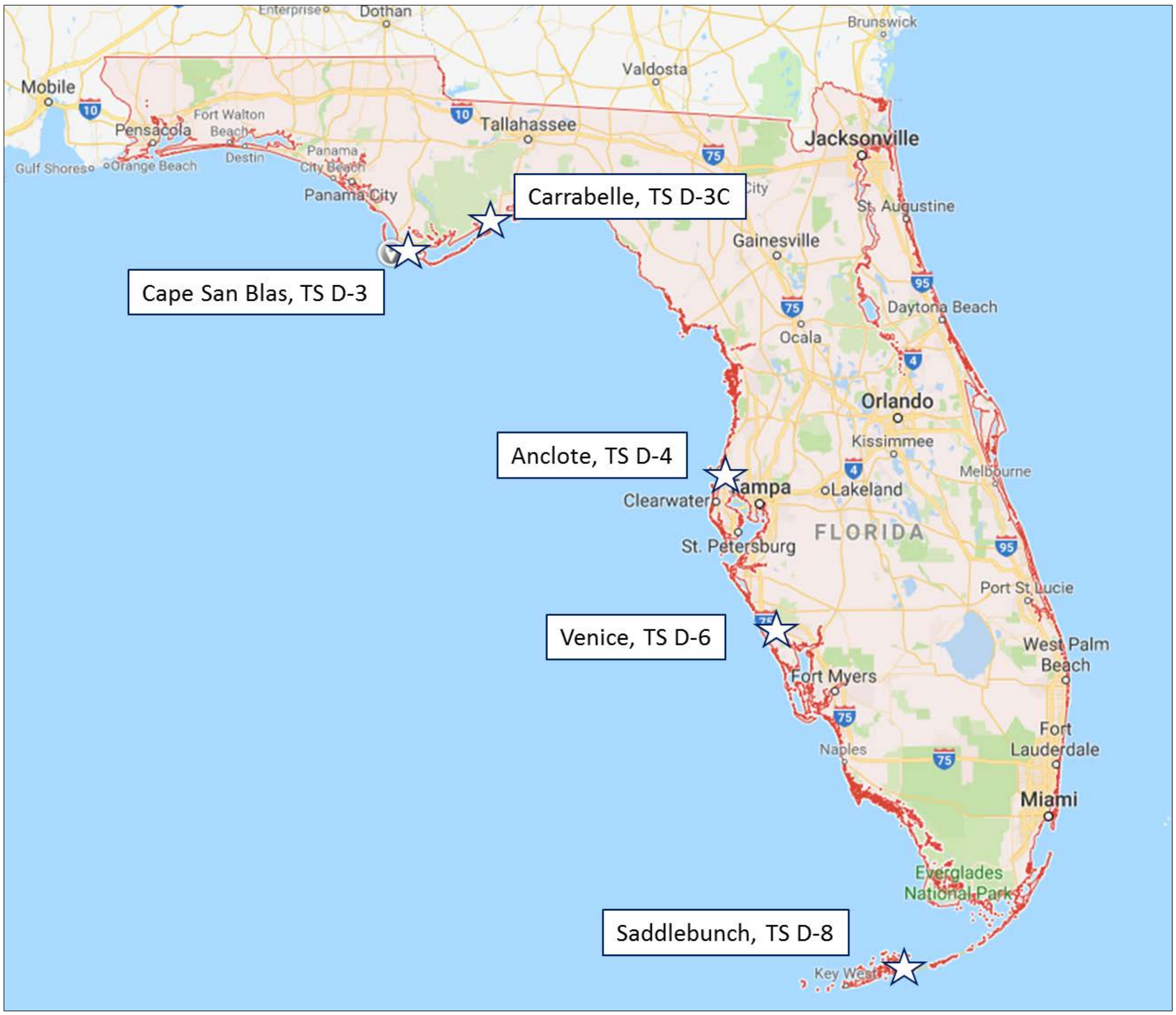


Figure 1. Planned Test Sites

1.1.1 Scope

The GRE Florida State grant provided funding to plan the crucial site D-3C, Carrabelle. Carrabelle is the first planned site for the GRE program and will provide the baseline design for all remaining sites. The Carrabelle site must provide the required instrumentation for test item evaluation and safety considerations. The site will provide the following instrumentation:

- Mobile RADAR
- Telemetry (L, S, and C-Band)
- Spectral Monitoring
- Common Range Integrated Instrumentation System (CRIIS) Tower
- Marine Operations
- Air to Ground Communications
- Fiber connectivity

Figure 2 is an overview of the planned Carrabelle layout.

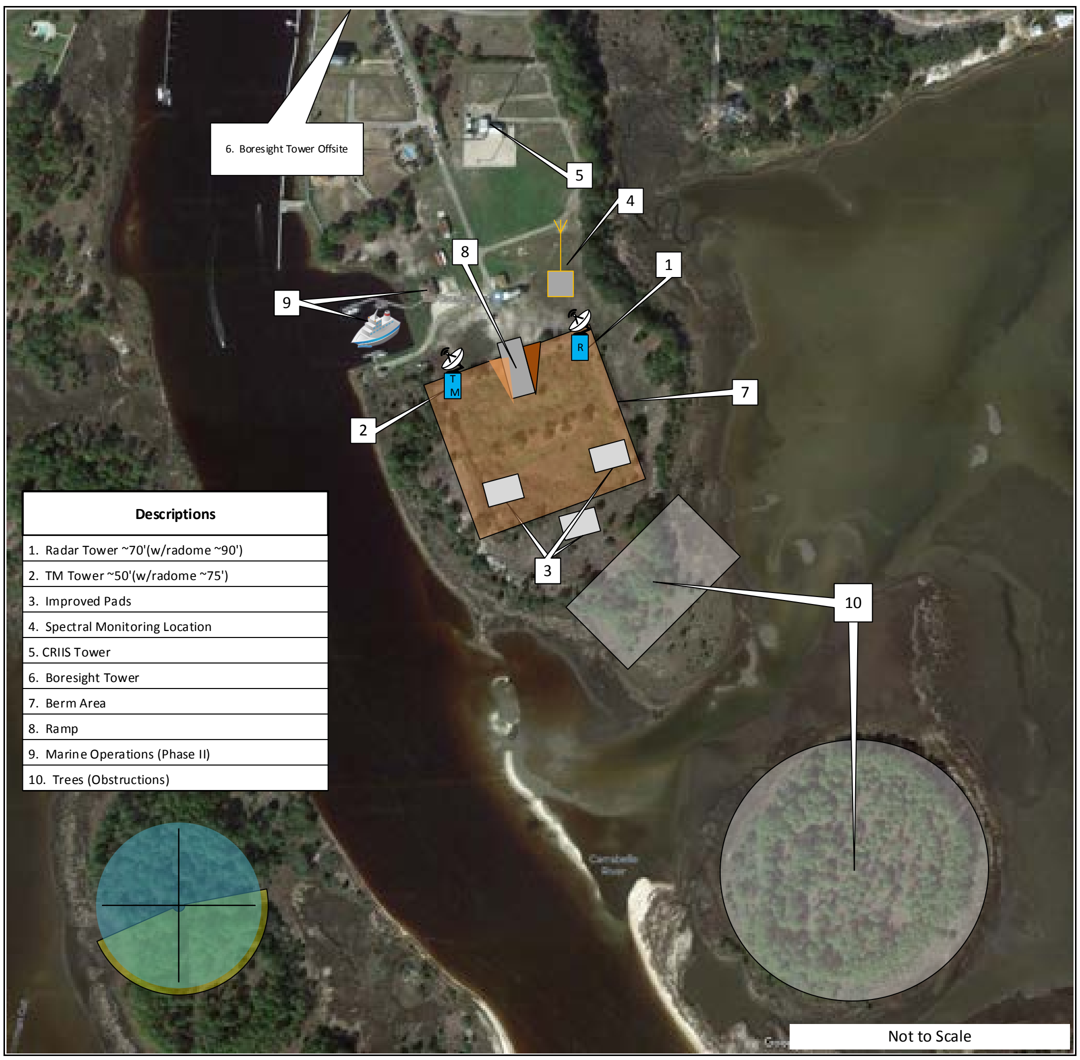


Figure 2. Carrabelle Layout

The Carrabelle site upgrade will be the first site executed in the overall GRE Program and is planned in Phase 1 of the GRE I&M program. Phase 1 will be focused on the site buildup of D-3C and the specification and procurement of the instrumentation. Phase 2 will build up the Maritime operation aspect of Carrabelle, the site provides ideal location for launch of marine vessels.

1.1.1.1 Phase 1 (I&M funding programmed FY17 - FY20)

- Design and install a Communication Infrastructure to meet data test demands
- Design and construct Test Sites (TS) D-3C Carrabelle
- Specify, acquire, test and integrate instrumentation systems
    - Telemetry (TM) Systems
    - Frequency Monitoring Systems (FMS) and Interference Detection Systems (IDS)
    - Flight Termination Systems (FTS) employing Advanced Command Destruct System (ACDS)
    - Time-space-position information (TSPI) Systems
        - Integrate Common Range Integrated Instrumentation System (CRIIS)
        - Remotely Operated TSPI Radar (ROTR)
        - Upgrade RIR-980
    - Communications Radios
        - UHF
        - VHF
    - Maritime Target Control

1.1.1.2 Phase 2 (I&M Funding planned FY22 - FY23)

- Maritime Target Control
- Maritime Support Vessels

1.1.2 Alignment with EAFB Strategic Plans and AFMC Airspace and Range Studies

Three foundational plans support the GRE Program. First is the EAFB Installation Development Plan (IDP). The second is the Gulf Regional Airspace Strategic Initiative (GRASI). The third, the AFMC Long-Range Standoff Weapons and Range Study, Airspace and Range Study Update, provides functional range capability requirements for the Eglin Test and Training Complex (ETTC) to meet future weapon programs developmental, operational and training needs.

1.1.2.1 EAFB Installation Development Plan (IDP)

The EAFB IDP was created in accordance with Air Force Instruction (AFI) 32-7062, Comprehensive Planning, and with principles from Unified Facilities Criteria (UFC) 2-100-01, Installation Master Planning. The content, especially regarding future development planning and plan implementation, was developed in a collaborative process with key stakeholders at EAFB, and it focuses on achieving the goals and objectives for future development at the Installation that were developed during a workshop with the Installation's key decision-makers and the stakeholders as listed above.

The IDP aligns the EAFB vision for the future with the priorities of higher level entities to achieve short- and long-term sustainability of the Installation. Strategic Vision Alignment at the installation level shows how projects work together to accomplish the Installation's vision and to support the national defense strategy. It introduces the concept of the NexGen Eglin.

NexGen Eglin is an implementation strategy, espoused by installation leadership to attain the IDP vision statement. The NexGen Eglin strategy will provide modern, adaptable facilities and infrastructure responsive to customers' delivery schedule, and will address unique security, equipment and personnel requirements demanded by the dynamic EAFB mission. The NexGen Eglin Vision Statement is presented below:

"Deliberately transform a mid-20th century installation into a revitalized 21st century NexGen installation enabling cutting-edge RDT&E programs and Team Eglin missions to produce war-winning capabilities for the warfighter."

The target concept for a NexGen installation is to be ready for tomorrow's technology requirements today utilizing a proactive facility approach. Today, EAFB is faced with a facilities crisis, where 452 facilities are over 50 years old. The IDP introduces 16 planning districts functionally aligning installation facilities with installation physical attributes.

The GRE facility upgrades and the reestablishment of Test Sites (TS) along the panhandle and western coastline of the State of Florida will be guided by and in compliance with the IDP. Beginning this reestablishment with the existing Air Force Carrabelle site is ideal to immediately begin the enhancement of the range and support current weapons systems awaiting the GRE capability.

1.2 Need/Requirement

There exists a requirement to test current and next generation aircraft and weapons in an operationally realistic environment. Current instrumented DoD ranges do not have the instrumented airspace or land area to support these extreme profiles and safety footprints resulting in piecemeal testing that drives cost, schedule, and performance risks to meet the overall objective. Support for current test and evaluation (T&E) requirements are stressing Eglin's existing capabilities over land and into the W-151A airspace. Existing instrumentation is concentrated and fixed primarily on Eglin's western land ranges, with limited capabilities to support deep into the GoMex or fully utilize the eastern airspace (W-151B, W-470A, and W-470B). Many of the current systems are based on 1950's analog designs and thus not conducive to remote operations or high speed and high dynamic test objects. GRE program requires the following at the Carrabelle site to reach further into the GoMex:

a) Instrumentation to support a long-range high dynamic weapon that is launched from the Florida Keys with impact in the GoMex or into one of the Eglin land ranges (approximately 400 miles) with line of sight overlap to D-3 and D-4, at a minimum altitude of 5,000 feet. Carrabelle will require the following: TSPI data capability handoff from D-3 and D-4, weapon telemetry data, Flight Termination System (FTS) control, frequency monitoring, target command and control, end game weapon impact scoring, and data fiber connectivity.

b) No known Science and Technology (S&T) efforts are required to support Carrabelle. Technology Readiness Levels for the specific capabilities currently are:

1. Mobile Radar Upgrade – TRL 9
2. Mobile FTS – TRL 9 (Leverage Advanced Command Destruct System (ACDS) Project
3. Mobile Frequency Monitoring – TRL 9
4. Mobile Telemetry Systems – TRL 9 (Leverage SRF Project)
5. Remote Maritime Target Control (SWARM) – TRL 6 (Leverage Central Test and Evaluation Investment Program [CTEIP] SWARM Project).
6. Data Connectivity – TRL 8/9
7. Maritime support – TRL 9

1.3 Technical Approach

1.3.1 Key Technical Concepts

GRE will provide agile, mobile, remote operable instrumentation assets that can be deployed along the Gulf Coast to provide maritime test support. The Carrabelle location provides the necessary line-of-site requirement for range coverage from shore-based locations.

The Concept of Operations (CONOPs) for the downrange sites will be accomplished up front in Phase 1 and will include considerations for labor requirements, maintenance, and sustainment. All will be driven by forecasted workload, test mission profiles, and data collection requirements.

Range instrumentation required for enhanced site operations is currently available technology. Centralized remote operations would create an efficient, agile, and adaptable range capability and reduce overall Operations and Maintenance (O&M) costs by employing cross-utilization of operators with focused maintenance versus the operator/maintainer construct. Carrabelle will provide the test site to verify and validate the remote operations centralization. Radar upgrades would build upon existing Navy system architecture that is currently in use at the Naval Air Weapons Station (NAWS) China Lake, thus reducing development risks and improving interoperability. Digital FTS control and frequency monitoring systems would mirror existing systems. Mobile remote telemetry systems would leverage existing developments through the Spectrum Relocation Fund (SRF) project, providing additional capability and coverage. Target command and control would leverage the existing Central Test and Evaluation Investment Program (CTEIP) Swarming Maritime Target Command and Control effort and provide multi-boat control and weapon impact scoring. Data connectivity would require dedicated fiber networks to remote sites. A brief description of planned upgrades to each of the areas is described in the following paragraphs.

1.3.1.1 Eglin Range Information Grid Enclave (ERIGE)

Enhancement of the existing communications network of the Eglin Range Information Grid Enclave (ERIGE) is foundational to the ability of the range to transport Command and Control (C2) information necessary for range operations and to securely transport customer data collected during test.

The ERIGE, spread throughout 724 square miles of the land portion of the ETTC, consists of the entire data transport infrastructure. It is the primary means by which RDT&E sensor data is transported throughout the ETTC, including the maritime test areas of the Gulf of Mexico. The

ETTC test areas are equipped with precision instrumentation for data collection, microwave radio systems for data transfer, and land-line communication equipment. The ERIGE is also the means by which sensor data from the range assets, including Range Instrumentation Control System (RICS) data (raw radar data), TM, Timing, serial data streams, voice, video, and guest system data are transported among the various test sites and facilities.

The ERIGE infrastructure is physically and logically separate from the Eglin AFB Non-classified Internet Protocol (IP) Router Network (NIPRNet) and Air Force Information Network (AFIN). The ERIGE is utilized for Developmental and Operational Test and Evaluation, and Joint Test & Training.

Day-to-day test data transport is accomplished on three separate "sub" networks. These networks are:

1. ERIGE Internet Protocol (IP) Network
2. Synchronous Optical Networking (SONET) Network
3. Advanced Range Telemetry (ARTM) Data Network

For maritime operations and for land-based operations where there is no landline or microwave connectivity, the ERIGE also includes a maritime remote terminal (MRT), a land remote terminal (LRT), and a Hub terminal for Satellite Communications (SATCOM) capability. The point-to-point communications signal is initiated from the LRT or MRT and terminated at the Hub terminal establishing a wide area network (WAN) interconnection for the ERIGE.

The ERIGE accreditation boundary encompasses transport network equipment to include Layer 2 (L2) switches, Layer 3 (L3) switches, ACSs, repeaters, media converters, fiber, microwave, SATCOM, transport media - within724 square miles of land area, plus the ERIGE SATCOM and microwave systems, which extend the ERIGE footprint to include 130,000 plus square miles of the Gulf of Mexico.

Current plans for enhancing the ERIGE include: upgrading robustness levels for the network to transport customer data; upgrading network protection tools and classification levels; and extending the boundaries of the land fiber and installing underwater fiber in the Gulf of Mexico. The Carrabelle site will provide the initial fiber connection from the remote operations center to the downrange sites (D-4, D-6, and D-8).

1.3.1.2 Instrumentation/Reference Radar

The primary purpose of the reference radar systems associated with the ETTC is to produce electronic tracking data for generating Time Space Position Information (TSPI) of airborne objects. The secondary purpose is to provide pointing data and tracking information to range equipment throughout the ETTC. Primary TSPI coverage of the ETTC land and water ranges is provided by reference radars located at fixed land sites. Each tracking radar generates range, azimuth, and elevation data for the object being tracked, and outputs this data to the Range Slaving System (RSS), the Universal Data System (UDS), and the Centralized Control Facility (CCF). Transportable Doppler radars on trailers or tripods can also augment the TSPI requirements, but are primarily used to provide ballistic projectile tracking data. Doppler radar systems can be located nearly anywhere on the land ranges or on sea-based vessels or barges.

Radar requirements for planned downrange sites include upgrading and positioning at TS D-3C to reach further into the Gulf. D-3C will be a mobile radar location utilized when D-3 radar is insufficient for mission requirements.

The Carrabelle test site design is based on permanently locating equipment to withstand environmental conditions including category 5 hurricanes. Figure 3 illustrates the current design for the typical radar tower test site installation. The covered dome provides a suitable environment for protection of the antenna as well as a suitable environment for maintenance. The dome is based on the current dome installed at test site A-5 over a telemetry antenna, as shown below and capable of withstanding wind up to 155mph.

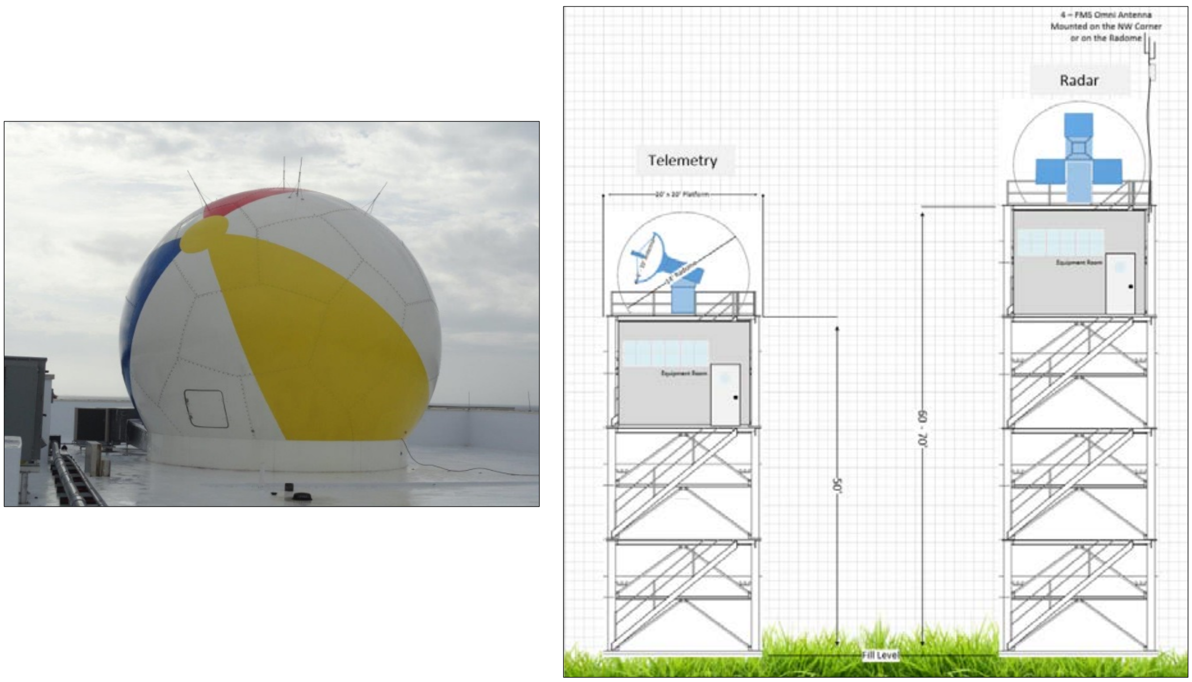


Figure 3. Typical downrange Test Site Telemetry Tower and Radar Tower System

1.3.1.3 Frequency Monitoring Systems (FMS)

FMS at the Carrabelle site will provide RF spectrum surveillance. FMS facilities verify, monitor, measure, display, and record signals in support of scheduled missions. FMS facilities also detect, locate, record, and report unscheduled or unauthorized signals that may interfere, or potentially interfere, with scheduled missions or with authorized frequency users on EAFB.

1.3.1.4 Flight Termination System (FTS)

The purpose of the Flight Termination System (FTS) is to provide signals to control and terminate munitions, drones, and unmanned aerial vehicles (UAVs). The system is ACDS compliant and supports both digital and analog-based flight termination packages. The FTS capabilities at Eglin are located at both fixed and mobile locations. The mobile system is capable of being deployed to provide coverage to remote locations outside the reach of the fixed sites. The RF Command Guidance System is capable of providing both the analog and digital command guidance formats. The RF Command Guidance System commonly supports test and training missions outside of normal business hours. Carrabelle will provide FTS mobile site capability as mission requires.

1.3.1.5 Telemetry (TM)

The ETTC TM System is comprised of fixed and mobile TM reception capabilities including a mixture of high-gain, low-gain, wide beam, and collimation antennas which provide line-of-sight coverage of the Eglin land and water test ranges. High-gain autotrack antennas are typically 15 or 23 feet in diameter and are mounted on steel towers. Low-gain autotrack antennas are smaller antennas typically 4, 6, or 8 feet in diameter and are mounted on fixed mounts or mobile systems. Wide beam antennas are low-gain horn antennas with dual polarization used for close range support typically on impact areas with the mobile TM units. Collimation antennas are used to boresight the TM tracking antennas. The SRF Program, currently in execution through 2025, is upgrading in part the ETTC TM capability. TM capability will be added to the GRE sites to meet mission requirements. Carrabelle will provide TM capability further into the Gulf of Mexico (GoMex).

1.3.2 Schematics, Graphics, and Other Illustrations

The GRE Overview (OV-1) is provided as Figure 4. The figure shows the basic operational view of the GRE concept. It depicts the downrange sites to support long-range tracking, telemetry, and FTS from launch to impact. The figure also depicts the concept of a consolidated range control facility on Eglin Main Base, which is key to extended downrange operations. Carrabelle will be the test bed for proving out the GRE concept and will be the first site online for the program.

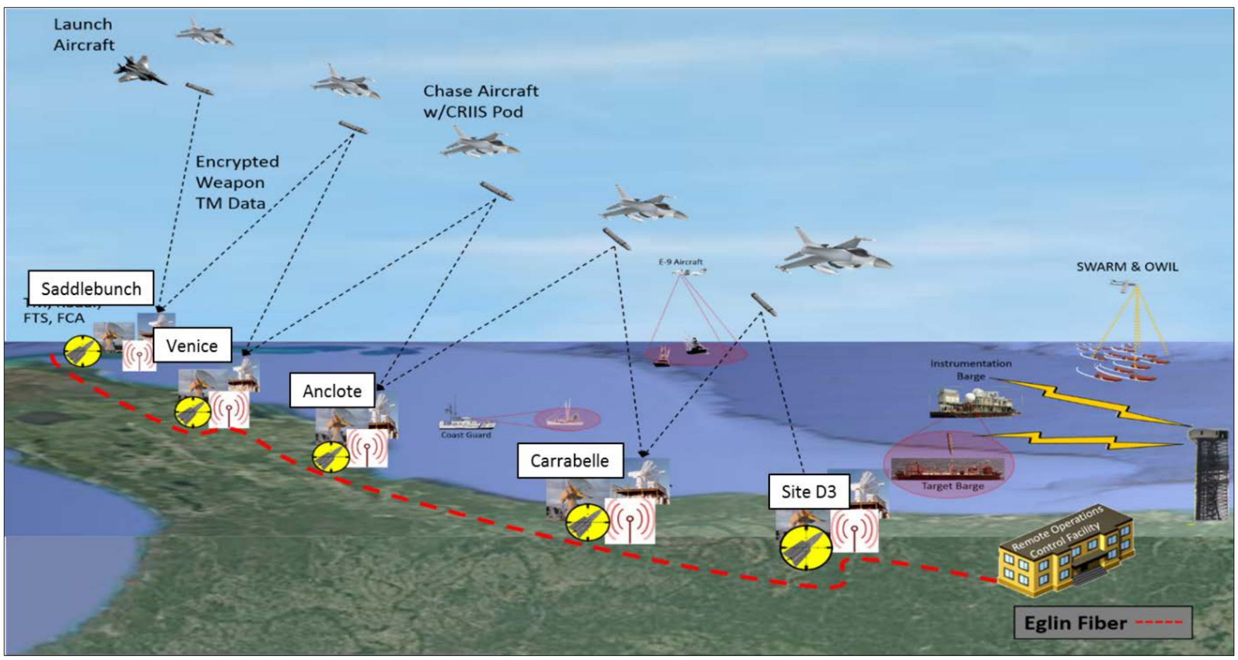


Figure 4. GRE OV-1

1.3.3 Design Approach

The Carrabelle design approach is integrated into the overall phases of the GRE I&M program. Phases 1 and 2 of the GRE program will include the following for the Carrabelle location:

Phase 1: Centralized Remote Operations; Enhance W-470 Instrumentation

- Establish TS D-3C, Carrabelle, and TS D-4, Anclote.
- Centralize Range Instrumentation Operations

- TSPI System Improvements
- Frequency Monitoring System (FMS) Upgrades
- Centralize Operations/Test Site addition
- Network Backbone (Range Information Grid)
- TSPI System
- Impact Scoring and Targets
- SATCOM

Phase 2: Air-to-Surface & Enhance Downrange Instrumentation

- Maritime Support
- TSPI System
- Network Connectivity

GRE will be a combination of commercial off-the-shelf (COTS) and new engineering development. No research and development is required. COTS solutions will be employed to the greatest extent possible. Advancing technologies in both communications for over-the-horizon (OTH) data links and in TSPI instrumentation radar will be sought out as solutions to improving range performance are implemented. No new development is required. The technologies acquired as part of this I&M program are fully developed and available.

2 Critical/Key Issues

2.1 Limitations and Constraints

2.1.1 Technical Feasibility

GRE will take advantage of COTS systems and components to the greatest degree possible. This approach will be feasible due to less constraints on weight, volume, power consumption, and heat dissipation for ground-based instrumentation radar systems. The current technology baseline indicates this program approach is feasible.

Proffered and derived requirements identify the need for a capability to track multiple targets simultaneously in real-time. The current requirement is to track 20 or more non-cooperative targets within a 30 degree field of view at a distances on the order of 100 nautical miles. This capability is targeted to be obtained in Phase 2, assuming industry solutions are at affordable and exist at a TRL level 6 or greater. Multiple object radar tracking has been in existence for many years but affordability and ease of use in real-time operations, with test quality TSPI measurements, has been a challenge. Current active electronically scanned array technology lends itself to this requirement.

Carrabelle will be established to accept a multiple object tracking radar to meet future requirements. In addition:

- Maritime Target Control is being developed under the CTEIP SWARM Program and will be available in FY19.
- Telemetry and FMS systems will be COTS and will be the same as those being acquired under the SRF Program.

- FTS capability is identical to the recently completed ACDS program.
- Components acquired under the CTEIP CRIIS Program will be incorporated.
- An existing TSPI radar upgrade will be accomplished using an existing design by the Instrumentation Radar Support Program (IRSP) contractor.
- Dedicated fiber links are a risk mitigation for cybersecurity identified early in a Cybersecurity Tabletop (CTT) study sponsored by the Under Secretary of Defense for Research and Engineering (ASD[R&E]). Underwater fiber will provide the required bandwidth required in the Gulf.

2.1.2 Schedule Criticality

Existing weapons profiles for current weapon systems, such as the Joint Air-to-Surface Standoff Missile (JASSM), require extended flight profiles exceeding current instrumentation coverage.

Current aircraft engagement profiles for F-22 and F-35 exceed current instrumentation coverage over the water ranges.

There is an immediate requirement to enhance instrumentation coverage into W-470 to increase mission throughput. Congestion currently being experienced can be relieved through instrumentation of W-470 with an increase in T&E mission throughput of over thirty (30) missions per year.

There is a requirement to support Long-Range Standoff Weapons (LRSOWs) weapons in the Gulf of Mexico beginning in 2020.

3 Project Status

3.1 Accomplishments to Date

- Developed program schedule and solutions.
- Identifying long-lead technical requirements and potential test sites downrange. Performed site visits and discussions with down-selected operating location controlling authority/owner for obtaining use agreements.
- Initiated identification of staffing resource requirements.
- Performed a series of site visits to assess proposed test site suitability and initiated use agreements discussions.
- Identified key stakeholder points of contact.
- Developed program management documents.
- Obtained cost estimates for fiber-optic cable land and underwater runs.
- Identified preliminary list of ERIGE end-point hardware requirements based on current performance and security requirements.
- Initial site design to include instrumentation platforms.

4 Management Approach

4.1 Project Organization

4.1.1 Project Office Manning

The GRE project will be manned by both Government civilians and support contractors. Program Manager is a Government civilian overseeing a support staff composed of eleven (11)

Government Civilian positions and twelve (12) support contractor positions. Numerous part-time support of both will be required.

The accelerated pace of the program, accelerated by added up-front funding with Congressional interest, state grant funds, has helped up-front labor support to adequately plan and execute Phase I activities. Staffing and management emphasis is key to the successful accomplishment of GRE.

4.2 Technical Management

Technical Management will be conducted per the Systems Engineering Management Plan (SEMP).

4.2.1 Critical Testing

IAW AFMCI 63-1201, Carrabelle and its components have been evaluated for Critical Program Information (CPI) and it has been determined not to contain any CPI. However, data obtained in the process of providing test support and data collection may involve critical information. Data protection with adequate cybersecurity considerations will be of special interest throughout the program. Authority to Operate (ATO) will be required for all equipment items connected to the Eglin Range Information Grid Enclave (ERIGE). Specific NIST Special Publication 800-53 Revision 4 requirements will be identified and included in each relevant technical requirements document (TRD).

Acceptance testing will be accomplished on individual items before integration begins. End item testing and validation will be accomplished on each major subsystem leading to final range validation testing. A series of final open air full-scale tests will be accomplished to verify CONOPS and validate performance leading to declaring the final system suitable to be used for test support.

4.3 Acquisition Strategy

4.3.1 In-House Vs. Contracted Development

The technology acquired as part of this program will be essentially all commercial off-the-shelf (COTS) variety. Specification development and acceptance testing will be a consideration in high-value custom built items, such as radars.

Acquisition of equipment for GRE will be accomplished via a combination of Government and contractor avenues.

Integration of equipment for GRE will be accomplished by Eglin's O&M Contractor for items to be operated and maintained by the O&M contractor. Some items will be tested and accepted by Government engineering organizations that will be responsible for operation of those items.

4.4 Schedule and Cost Control

Schedule and cost control will be executed using local management tools that apply earned value management techniques. Reporting frequency shall be monthly. A dedicated program management team will be used to execute the program. Sequencing of activities and identification of critical paths with milestone tracking and earned value analysis will be the reasonability of the management team.

4.5 Risk Management

4.5.1 Risk Elements

Effective Program Security and Cyber Security solutions for range command and control links are dependent on Program requirements. Program requirements are diverse, and cyber security is a rapidly changing technical field. Providing agile facility and system solutions that are able to adapt to variable mission security requirements (variable from test program to test program) with robust architecture to serve as a foundation on which to build.

Effective CONOPS will be required for planning, scheduling, and operation of downrange assets. Remote operations, although not entirely new to the ETTC, are successfully implemented at other Major Range and Test Facility Base (MRTFB) ranges, will be developed and validated. Testing and certification of the range for mission support will be required.

4.5.2 Risk Mitigation

All risk elements will fall under one or more of the three overarching classifications: cost, schedule, or performance. Individual risk elements (examples are site integration, performance validation, and schedule dependency) will be addressed, analyzed, and managed using an approach which deals with risk elements in terms of probability of occurrence and degree of impact to the program given an occurrence. Figure below illustrates this approach to risk mitigation.

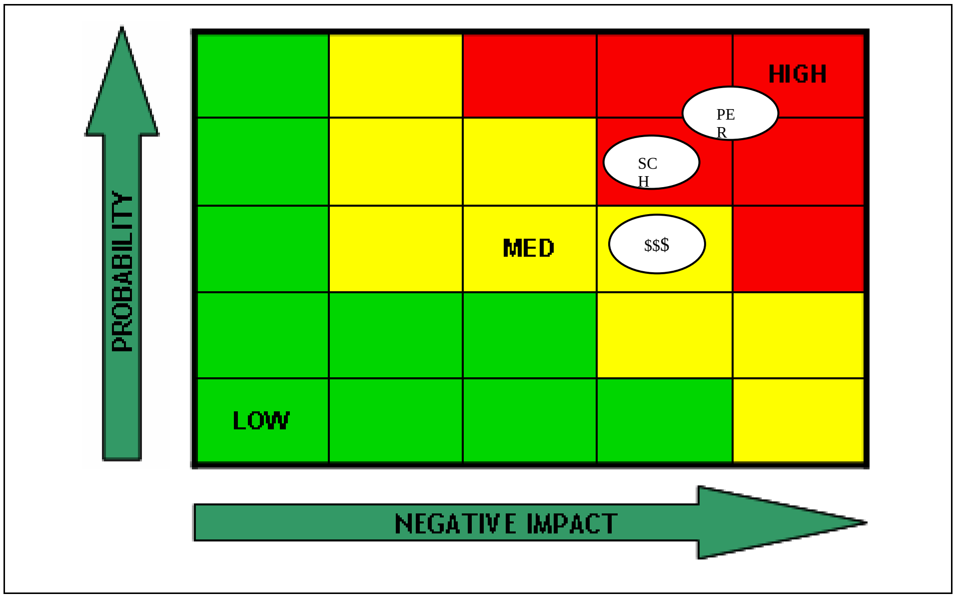


Figure 5. Risk Assessment

All elements of GRE, personnel (PERS), schedule (SCH), and cost ($$$) are currently considered to be at medium to high risk, with personnel being the highest. This rating is due to the accelerated pace of the GRE project due to immediate need of the capabilities.

Program Security requirements will be addressed throughout the life of the GRE Program. Planned and current test customers will be actively engaged in planning activities to review and provide input on performance requirements. Range Commanders Council (RCC) Groups will be leverage by Eglin members to seek out lessons learned from other ranges in range operations and security mitigation issues. Industry proposals will be sought from various leading industry sources to aide in the process of mitigating cyber security risks. The 96 TW has relevant subject matter experts (SMEs) on staff permanently, or can be brought on as support requirements dictate; however, Government personnel support is typically long-lead and poses a significant challenge. Contracted support can mitigate the labor availability shortfall, but not for inherently Government functions.

5 Activation And Test

Individual system testing and site improvements will be accomplished during product acceptance against system specifications and industry standards.

Facility construction acceptance and system testing will be the responsibility of the cognizant real property manager.

Integration and operational suitability and effectiveness testing of the systems will undergo operational tests to prove and exercise mission support activities and use.

Final acceptance testing will be accomplished by conducting open air testing with end-to-end demonstration of a selected weapon employment profile to include launch, midcourse, and impact data collection, real-time display, range control, data collection, and post mission analysis. Final testing will result in declaring subsystems and systems as operationally certified for test support readiness.

Of special consideration will be evaluating network loading and remote instrumentation control during active missions. Testing will include all process elements including scheduling and resource allocation.

Cybersecurity will be accomplished at incremental milestones to assess potential threats and vulnerabilities. Complete system documentation and testing will be accomplished as part of the system certification process.

Individual system test plans will be developed with the final products becoming part of the O&M documentation of the systems. Baseline data will be collected and retained for lifecycle maintenance and upgrade integration testing.

A final test report will be prepared by the 96 OG as the result of the end-to-end GRE test demonstration.

6 Funding and Schedule

Funding and schedule will be maintained by the 96 TW and reported monthly to the Office of Secretary of Defense on a monthly basis.

Attachment 2: Carrabelle Systems of Systems (SoS) Process

The GRE state grant provided the funding for the Systems of Systems (SoS) engineering process to be accomplished on the Carrabelle site. This up-front funding provided the engineering team the ability to work ahead of federal funding and begin the systems engineering (SE) process. The SE process followed is described in the SEMP; this attachment is the Carrabelle site process. The SE Process Steps are described in the following paragraphs.

Step 1: Collect and Review Existing Artifacts

The Carrabelle artifacts include the following documentation:

1. Alternatives and CONOPS Report Gulf Range Enhancement report prepared by Leidos. This report reviews sites down the coast of Florida and provided criteria for selecting sites. In addition, the report provided Long-Range Standoff Weapons information required to define the instrumentation requirements.
2. Requirements were gathered from the 780th Operation Group.
3. Range Commanders Council requirements were reviewed for overall range and safety requirements.
4. Existing range designs were collected.
5. Existing Improvement and Modernization (I&M) project requirement upgrades were collected to include specifications from the Spectrum Relocation Fund and Network Short Range Initiative Programs.

Each artifact was reviewed and used to develop the upper Levels of System of Systems breakdown structure. For the GRE program, the breakdown structure requirements are captured in the Requirements Verification Traceability Matrix (RVTM) and Interface Control Document (ICD).

Steps 2 and 3: Top-Level SoS Developed

The top-level SoS for Carrabelle was documented using a RVTM initially. Gathering the site requirements and documenting them in a format that each subject matter expert could review, and develop derived requirements was instrumental in the engineering process. Table 1 below is the SoS format developed with radar data example, the SoS RVTM numbers each requirement with a unique identifier. The engineering team will continue to identify system requirements.

Table 1. Example SoS Format Developed with Radar Data

1.1	**Remote Sites Requirement**	
1.1.1	**Carrabelle**	
1.2.1	**Communications**	
1.2.1.1	Fiber Optic	Required (local and remote)
1.2.1.2	Air-to-Ground	Required (local and remote)
1.2.1.3	Non-classified Internet Protocol (IP) Router Network (NIPRNet)	VTC
1.2.1.4	Classification	Multi-layered

1.1	Remote Sites Requirement (continued)	
1.3.1	**Radar**	
1.3.1.1	Radar Requirements	Target Altitude: 500-60000 ft.
		Tracking Accuracy: $\leq$ 10 ft. (1 sigma)
		Single Target Tracking
		Min Range 0.5 miles
		Max Range: 150 miles
		Beacon Track
		Skin Track
		Transportable System
		Track pickup from platform to released weapon (bomb, rocket, or missile)
1.3.1.2	Radar Objectives	Multi-Target Tracking
		Multi-Target Acquisition
		Max Range: $\geq$ 150 miles
		Mobile System
		Low RCS Targets
		High Speed Targets

Step 4: External Systems

Range sites will require inputs and outputs to multiple systems internal and external. The Carrabelle site concept shown below, provided the engineering team the concept to move forward and define the requirements for each of the systems planned.

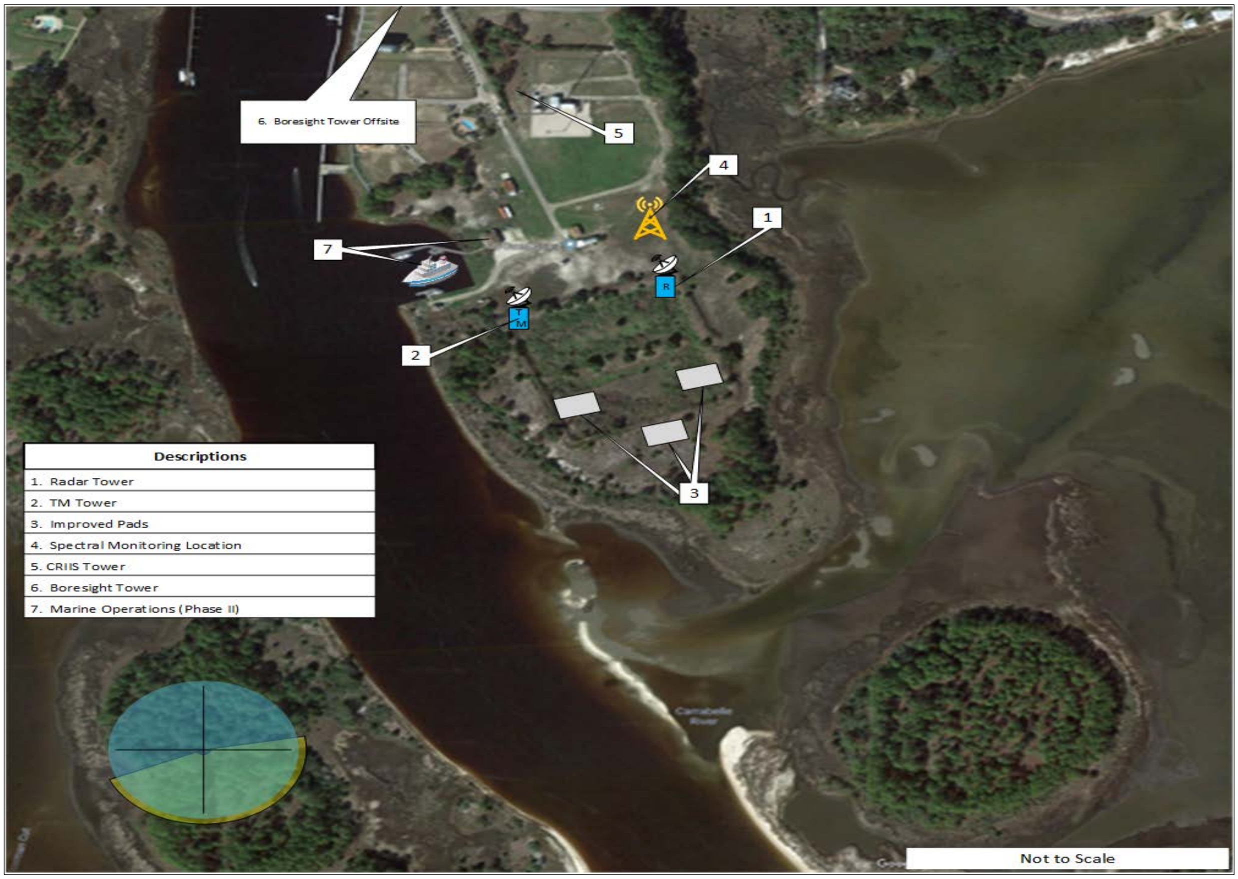


Figure 1. Carrabelle Site Concept

The engineering team continues the SoS steps 4-5 in developing the following models. The below data flow model provides the current data required to run D3, an existing downrange site, with systems like those GRE will be deploying. The data flow model provides the required uses and products required per system. The engineering team will use this data flow model to determine baseline requirements for network design, interfaces, etc.

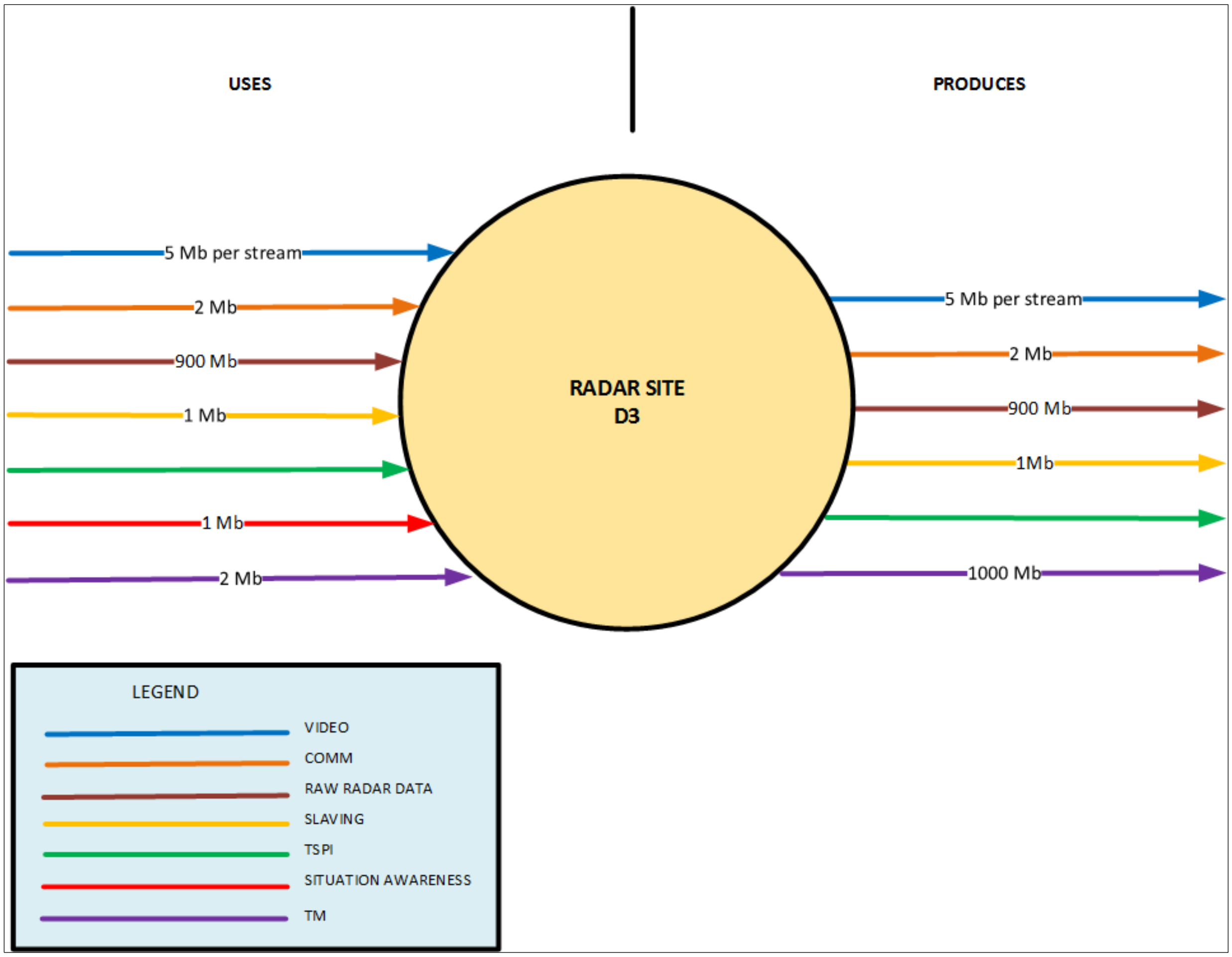


Figure 2. Data Flow Model

In addition to the data flow model, the network engineering SME builds the Carrabelle Site connectivity concept based on the SoS process, gathering the following network requirements. The requirements will be traced in the RVTM for tracking through implementation and verification.

Table 2. Example SoS Format Developed with Radar Data

System	Time Sensitive Network	Bandwidth (Mb)		Latency Data (ms)		Latency Control (ms)		Redundancy	Redundant Bandwidth	Diversity	Diverse Bandwidth
		Threshold	Objective	Threshold	Objective	Threshold	Objective				
TM	Yes	320	1000	200	100	500	100	Yes	1000	No	
Radar	Yes	150	300	200	50	70	50	Yes	300	No	
Spectral Monitoring	Yes	50	100	200	50	150	50	Yes	100	No	
ACDS	Yes	1	1	200	75	250	75	Yes	1	Yes	1
Security/Environmental	No	50	100	n/a	n/a	250	150	Yes	100	Yes	100
Network Management	Yes	15	25	n/a	n/a	250	150	Yes	25	Yes	25
GRDCS	Yes									Yes	
CRIIS	Yes									No	
EW										No	
Video (5 streams)	Yes	25	50	250	10	n/a	n/a	Yes	50	No	
Communications	No	1	2	250	20	n/a	n/a	Yes	2	No	
WIS	No	1	1	n/a	n/a	n/a	n/a	No		No	
Total Mb		**612**	**1578**						**1578**		**126**

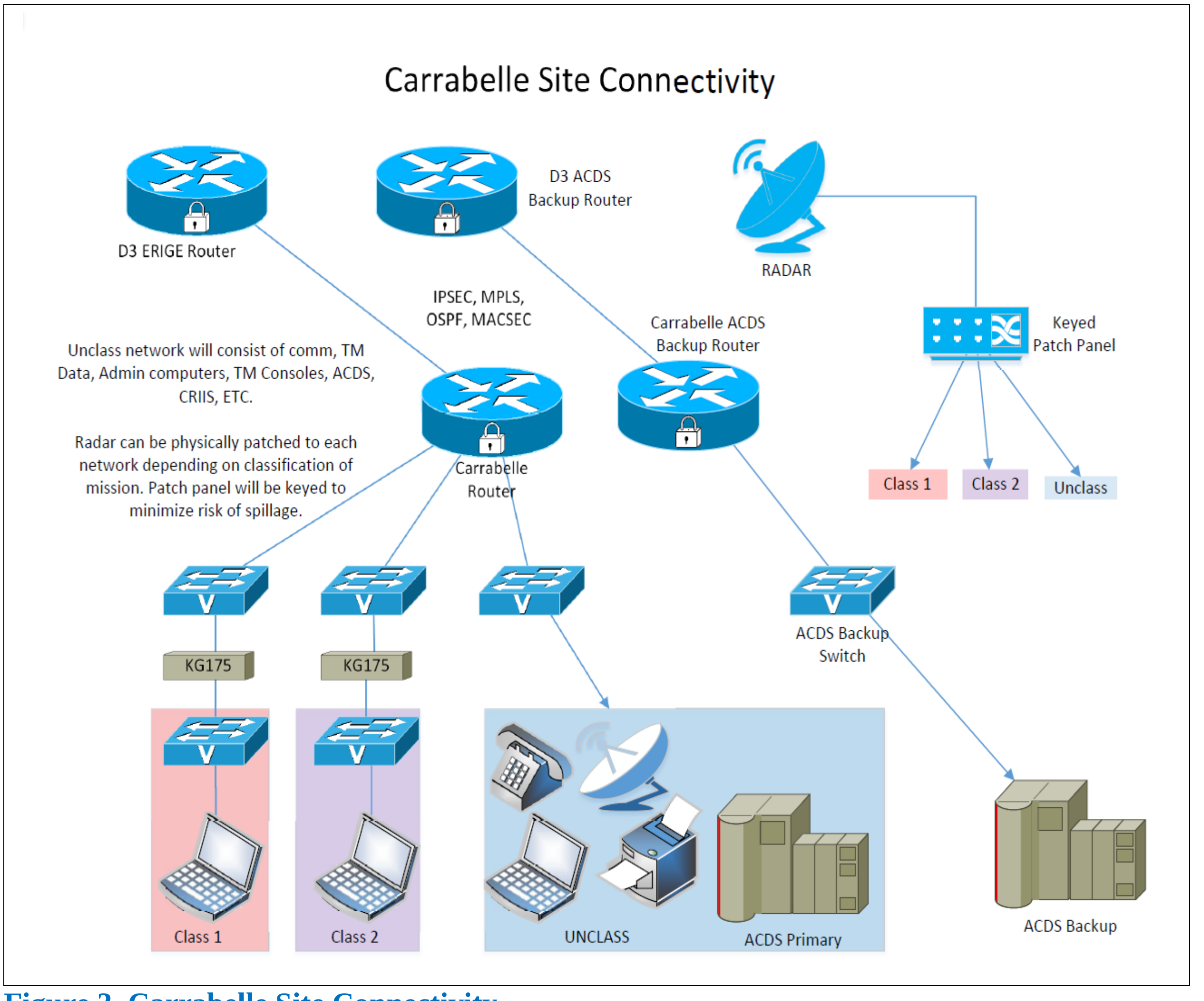


Figure 3. Carrabelle Site Connectivity

Steps 6-8 of the SoS are currently ongoing.

In addition to developing the system requirements per segment, the engineering team has started the system integration plan. Once complete with requirements definition and concept of operations, each segment will provide input into the systems integration plan. The system will be tested in phases as items are complete and one final overall test conducted. The final test will be written to verify and validate (V&V) all requirements defined in the RVTM per one of the four approved V&V methods: test, analysis, demonstration, or inspection. The systems engineer will be responsible for ensuring the V&V methods proposed by the segments fully exercise the requirements.

The current integration plan below outlines the overall integration concept, as more segments complete steps of the SoS the integration plan will be further defined resulting in a test matrix.

Multiple strands of geographically redundant fiber will be procured between Carrabelle site and Eglin AFB. This fiber will provide the backbone and enable high-speed transport of large amounts of data between Carrabelle and Eglin AFB. This will also enable low latency control of instrumentation systems. Bandwidth is expected to be on the order of 100Gb/s between Carrabelle and Eglin.

Civil Works

The Carrabelle site will require civil works to support the installation of range instrumentation assets, platforms, generators, expansion pads, network equipment, and emergency power backup. There are also provision for increased security and upgraded access due to the increased usage of the Carrabelle site. The intent is to fill a portion, if not all, of the berm area and build foundations for the Range Instrumentation Platforms. There will be road work accomplished up to the berm and a ramp to provide access into the raised area on top of the berm.

The entire site will be supported by a dual conversion uninterruptable power supply and a liquid propane power generator.

Range Instrumentation Assets

Range instrumentation assets necessary to support ETTR missions will be installed at the Carrabelle site. These assets include Tri-Band Telemetry Antenna Systems, High Precision Tracking Radar, Advanced Command and Destruct System (ACDS), and Frequency Monitoring Suites.

Telemetry

The Telemetry (TM) system is comprised of a 5.5m parabolic tracking antenna capable of tracking L, S, and C-Band signals. The TM system is used to track and receive sensor data that is being transmitted by the systems under test. The TM system will be installed on a rigid engineered platform and enclosed within a radomes to provide protection from the elements, and to allow tracking and data capture operations to continue in deteriorated weather conditions. The TM system will feed a suite of equipment, including but not limited to, spectrum analyzers, TM receivers, oscilloscopes, pulse code modulation recorders, and data transfer devices. These assets will be rack-mounted in the TM Shelter, which will be located within the TM Platform.

Radar

The instrumentation radar will be used to provide high-precision tracking of systems under test. To provide greater enhancements to the ETTC capabilities, we are investigating Multi Object Tracking Radars that will allow one radar to simultaneously track multiple systems under test. Radars in X-band and C-band are being considered and further study of the radio frequency (RF) environment at Carrabelle will provide clarification as to the proper radar band. The radar system will be installed on a rigid engineered platform and enclosed within a radome to provide protection from the elements, and allow tracking operations to continue in deteriorated weather conditions.

Frequency Monitoring Systems

Frequency Monitoring Systems (FMS) will be installed at the Carrabelle site to provide real-time situational awareness of the radio spectrum. These systems monitor the RF environment to verify all RF emission, whether emanating from ETTC instrumentation, systems under test, commercial entities, or private parties are emitting RF at the proper power lever, frequency, and bandwidth and there is no interference taking place. The FMS will be installed on a platform and within a shelter to keep it secure and safe from weather or possible storm surge.

Advanced Command and Destruct System (ACDS)

ACDS will be installed at the Carrabelle site to extend the ETTC capability and commitment to range safety. The ACDS system allows the Range Safety Officer to execute a destruct signal to any system under test if that system should exceed its safety footprint. The ACDS will be installed on a platform and within a shelter to keep it secure and safe from weather or possible storm surge.

Expansions Pads

As part of the civil works, expansions pads will be installed at Carrabelle. These will consist of multiple large concrete pads that are designed to support expanded operations (i.e. additional Radar or TM assets, Air Defense assets, or currently unknown future training systems).

Situational Awareness Systems

The Carrabelle site will be outfitted with Situational Awareness (SA) systems to provide operators, maintainers, and mission coordinators with every possible piece of data to verify mission success. This system will include video monitoring of equipment and site, temperature sensors in shelters and in critical components of range instrumentation, voltage and current monitoring of range instrumentation, HVAC, UPS, generator, fuel level monitors, exterior temperature and wind sensors, and ingress/egress sensors.

Once the fiber is laid between Eglin and Carrabelle, and all range instrumentation assets are installed and operational, the systems can then be integrated into the ETTC. Each range instrumentation system will undergo testing to verify it meets the required specifications, both technical and cyber. Once it has been verified that the specifications have been met, the systems will then be allowed on the ERIGE. As with most range instrumentation systems, Eglin operators will control these assets remotely from locations on the ETTC.

Steps 6-8 of the SoS are currently ongoing.

Attachment 3: Document Management Plan

Document Management Plan

August 31, 2018

Revision History

Revision	Description of Change	Effective Date
Original	Original Submission	

Proposal Team

List the office codes and names of personnel who made meaningful contributions to the document. This provides the reader with points of contact to follow-up when questions arise.

Name	Occupation	Fac
Devan Bishop	Engineering Branch Manger	011

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1 Purpose

The purpose of this document is to outline the document management approach for the Gulf Range Enhancement (GRE). It provides standard terminology, clear roles and responsibilities, and a detailed description of the expectations of team members in regards to document control. It is designed to guide the project team.

2 Scope

The overall goal of document management is to protect a project from losing track of its work or losing the work itself. Document management provides an accurate and complete archive of project documents to the permanent organization at the end of the project.

2.1 Policy Guidance

The contractor shall establish an effective documentation program, in order to guide the workforce in utilizing the resources available to support the GRE project. To accomplish this objective, the primary focus of the documentation effort should be on using the network shared drive to enable a readily available formatting, publishing, indexing, and retrieval system for documentation.

The guiding principle is to provide access to the necessary program documentation at the point of use, including test sites, facilities, and offices for completion of the GRE project. Specific procedures, processes, and instructions are outlined in more detail in other documents that support these concepts.

2.2 Management Approach

The contractor shall be responsible for establishing an effective approach to document control and dissemination that supports project completion and customer satisfaction.

2.3 Plan Update

This publication will be updated as required to incorporate changes, process improvement, or customer support needs. Changes and revisions will be processed and published in accordance with E-OMS 2010-2003, Document Processing and Control.

3 Responsibilities

3.1 Office of Primary Responsibility (OPR)

The OPR for this publication is O&M Contractor site supervisor. The supervisor is responsible for the content of this publication to include all references, changes, and biennial reviews in accordance with E-OMS 2010-2003, Document Processing and Control.

3.2 Support Department (SD) Director

The SD Director serves as the maintenance manager and has overall responsibility for documentation management. The Maintenance Management Support Section (MMSS) supports the maintenance manager in performing this function. The SD Director is responsible for:

- Ensuring contract-wide compliance with the E-OMS Performance Work Statement (PWS) as it applies to documentation and the content of this publication.
- Maintaining close and direct contact with the 96 TSSQ/RNXC to ensure documents are provided for review and in compliance with government requirements and directives, as required.

- Reviewing and approving all preventive maintenance instructions (PMIs) for communications-electronics (C-E) equipment operated and maintained on the contract.
- Ensuring all other documents are reviewed at the appropriate level, as required.

3.3 Maintenance Management Support Section (MMSS) Manager

The MMSS Manager is responsible for the following:

- Ensuring standardization of all contractor-produced documentation.
- Establishing detailed procedures for this plan's execution and overseeing contract compliance with these guidelines.
- Establishing a document numbering system and forms control in accordance with E-OMS 2010-2003, Document Processing and Control.

3.4 Department Directors. Section Managers, and Team Supervisors

Department Directors, Section, Managers, and Team Supervisors are responsible for the following:

- Preparing, reviewing, submitting and approving documentation, as required, for their functional areas of responsibility.
- Assigning a point of contact (POC) and subject matter expert (SME) for all documentation assigned to organizational function.
- Ensuring explosive safety procedures are established in coordination with the E-OMS safety office and 96 TW/SEW prior to detonation of any explosive test items in accordance with E-OMS 2010-2003, Document Processing and Control.

4 Document Processing And Control

Document processing and control procedures exist to control and manage contract documentation. The processes for meeting all document control requirements are described in E-OMS 2010-2003, Document Processing and Control. The MMSS Manager will establish and manage document processing and control procedures that incorporate the following elements:

4.1 Requirements

Project documentation needed to ensure the effective planning, operation, and control of processes shall be controlled utilizing the following:

- Documents shall be uniquely identified and revision-controlled.
- All GRE publications will be reviewed biennially for adequacy and currency by authorized personnel and updated as necessary.
- Changes and the current revision status of documents, including date of revision or change, shall be identified.
- The most current version of a document will be maintained electronically in the network share drive.
- Every effort will be made to prevent the use of noncurrent printed documents using currency disclaimers (as shown in the footer below), including documents retained for legal and/or knowledge preservation purposes.

4.2 Electronic Availability

Project documentation will be controlled and made accessible through the network share drive with the following exceptions:

- Company-sensitive or classified documentation where limited access is required.
- Subcontractor-specific management documentation, as required.

5 Document Types

The types of documentation used and maintained on the E-OMS contract is extensive and the subject matter varies greatly. For an in-depth description of the various types of documents and publications used on the contract, see E-OMS 2010-2003, Document Processing and Control.

6 Related Documents

Short Title	Title
E-OMS 2010-2003	Document Processing and Control

Attachment 4: Configuration Management Plan

Configuration Management Plan

August 31, 2018

Revision History

Revision	Description of Change	Effective Date
Original	Original Submission	

Proposal Team

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List of Tables

1 Introduction

1.1 Identification

This Configuration Management Plan (CMP) is a tool used to establish the overall approach for the Configuration Management requirement for the GRE program. The CMP will be a dynamic document, and will be updated as work on the GRE program proceeds and the necessity arises.

1.2 Purpose

The purpose of this document is to identify and describe the overall policies and methods for the Configuration Management (CM) activities to be used during the system life cycle of the GRE program. The GRE program is made up of multiple sub-systems that are called segments. Each segment is led by a Program Manager and a Subject Matter Expert as well as a team of various expertise. The primary intention of this CMP is to provide overall information on the CM policy and methods to be adopted and implemented for the GRE program including submitting, planning, approving, and implementing changes to participating segments.

Configuration Management includes maintenance of inventory lists, and includes the following:

1. Requirements Verification Traceability Matrix - all segments must maintain the RVTM and document changes as they occur. The systems engineer will maintain the RVTM and make required changes. Each segment will be notified of changes as they are put into the RVTM and the changes will be discussed at the configuration review boards.
2. Rules for device naming must be agreed on by all segments. The rules must be flexible enough for all segments to be able to name their own devices, but strict enough to prevent naming conflicts.
3. Rules for identifying changes and risks to all program segments.
4. Rules for assigning IDs to incidents must be defined and enforced
5. Rules for Configuration Review Boards and documentation of changes

The CMP identifies the items to be managed, the methods by which they are managed, and the control processes necessary for coordination and control. The CMP focuses on directing the following actions:

1. Configuration management actions in support of the System of Systems (SoS) engineering process. The Segment Leads of each segment (telemetry, network, radar, etc.) will be responsible for identifying and documenting the configuration changes per this documented procedure.
2. Formally document problems associated with the functional interface and the communications network, as reported by users, and additional or changed requirements (e.g., suggested enhancements).
3. Documented changes due to engineering discovery as program is developed and concepts are implemented.

1.3 Document Overview

The CMP will describe the overall technical and administrative direction and control for the GRE program during the implementation stage. We will document all plan changes for historical reference. Upon program completion, standing CM procedures will be followed. The following provide a summary of each section contained within this CMP.

2 Configuration Management

2.1 Purpose and Activities

Configuration management is a systems development discipline that promotes the proper identification of the configuration, control of changes, and records the change implementation status of the physical and functional characteristics of the GRE program and its subsystems.

Configuration Management identifies what is required, designed, and produced. It also provides for the evaluation of changes including effects on technical and operational performance. This leads to making the configuration visible and understood by all the parties involved with the project.

Configuration management will be performed by participating Segment Leads.

Configuration management covers three basic essential interdependent activities:

1. **Configuration Identification –** Configuration identification is for the formal step of identifying the configuration of an item (i.e., name, location, version) and documenting its functional and physical characteristics.
2. **. –** Configuration control is the exercising of established procedures to classify, approve or disapprove, implement, and confirm changes to the agreed-upon specifications and baselines.
3. **Configuration Management Status Accounting –** Configuration accounting is the formal recording and reporting of data relating to configuration identification, approval status of proposed changes, and implementation status of approved changes during all phases of the project. These three activities will be described in more detail in the following sections.

Configuration management is, therefore, the means through which integrity and continuity of the system's design, and decisions made regarding technical performance, producibility, operability, and supportability are recorded, communicated, and controlled.

2.2 Objectives

It is a firm objective that this CMP shall apply through the development and implementation phases of the Interim GRE Program. The O&M current CM plan and procedures will be applied after the implementation phase of the program.

Appropriate baselines are established at the start of the development phase and are applied to each Configuration Item (CI).

For Software Configuration Items (SWCIs) created during the development phase, all development organizations shall implement software configuration management procedures which will be fully compatible with and subject to this CMP. Once becoming available for release to the system (that is, successful completion of the Acceptance Test), the developed SWCI(s) will be subject to the change methods and procedures outlined in this CMP. This will include vendor-developed SW.

3 Configuration Identification

3.1 General

Configuration identification consists of setting and maintaining baselines of each individual Configuration Item (CI) that define the GRE system at any point in time. Depending on the system life cycle phase, different baselines are progressively established. Details of each baseline established throughout the system life cycle shall be maintained.

3.2 Baseline Management

The objective of establishing a baseline is to define a basis for further system life cycle process activity and allow reference to, control of, and traceability among configuration items and to requirements. It serves as the common reference that all system development activity is built on and dictates to the development team the changes that are to be implemented.

- Baselines shall be established for the configuration items. Developmental baselines will be established to aid in controlling the software and hardware development life cycle processes.
- A Production baseline shall be established upon implementation. Further changes to the Production baseline will follow the O&M contractor CM procedures.

Baselines are established in a system development effort to define a formal departure point for controlling future changes that affect performance or design. A baseline, once defined and approved, is placed under CM, after which any changes in the baseline should be formally documented and approved. Each package build should have a unique release label. Product baselines should be reviewed and approved with an approval memo and attachments for the description of any discrepancies that are part of the release.

The following items should go in each center's baseline

- All GRE-related requirement documents
- All GRE-related design documents. At a minimum these should contain:
    - Network design (include bandwidth, classification, configuration)
    - Data output/input into each site captured in the ICD
    - Data requirements for each instrumentation system (radar, TM, etc.)
    - Site layout and design documentation
- All GRE-related test plans and test plan results
- All GRE-related data and configuration files

3.3 Software Configurable Items (SWCI(s))

SWCI(s) shall consist of commercial-off-the-shelf (COTS) products. COTS software can be from subcontractors and shall be tracked as SWCIs. Development software will be kept to a minimum and the software development tools include COTS products such as compilers, editors, and design tools and any custom tools, data files, and development scripts required to build a particular baseline. All the software development tools will be tracked as SWCIs by development organizations developing the software.

3.4 Hardware/Communications Configurable Items (HCCI(s))

Each Segment shall have responsibility for establishing the initial Production baseline of all HCCIs affecting the communications network.

3.5 General

Configuration control covers the evaluation of all Change Requests and Problem Reports and their subsequent approval or disapproval. This includes providing methods and procedures for the systematic proposal, justification, evaluation, coordination, and approval or disapproval of proposed changes to the GRE system.

To enable the configuration control process to operate correctly and effectively, it is necessary for the CCB to oversee changes having the purpose of:

- Providing the relevant information for best decisions on changes to be made
- Determining and implementing decisions
- Reviewing and controlling changes in accordance with policy established by the CCB

3.6 Change Control Tools

In order to provide a central repository from which to manage the change control process, a SharePoint RVTM will provide a platform in which participating segments may:

- Access interface definitions, and interface control documents;
- Access CCB agendas and minutes which document decisions and policy
- Access Any policy or procedural documents
- Access Test plans, procedures, and results
- Submit change requests, repose approved and declined requests and changes pending CCB approval, and implemented changes

3.7 Change Procedures

The configuration control process provides for an orderly incorporation and documentation of approved changes to the formal configuration baseline. Changes can originate as enhancements to existing functionality, hardware problem reports, software problem reports, or notifications of necessary hardware or software upgrades and/or patches that may impact the GRE segments. Note that there are three types of change requests that may be submitted. These are outlined within this section. One form will be used to capture the change requests and problem reports. The three types of reports are defined below:

- Software Change Request (SCR)
  - This will document the nature and functional requirements addressed by a proposed change to the software or Interface Control Documents (ICDs). Requests may be made by participating segments. The process utilized to review, deny, or approve the change is outlined by the form structure and the basic procedure outlined below.
- Problem Report (PR)
  - Problem reports will be the basic mechanism for centers to report data or functionality problems

- Maintenance Change Request (MCR)
  - Regular and periodic upgrades to COTS products needed to keep the system operational.

3.8 SCR/PR/MCR Submittal

Proposed changes to the GRE segments are to be submitted in writing or soft copy to the CCB for approval. Note that in the following process, the CCB may designate a person to coordinate information prior to a CCB meeting. CCB meetings can be scheduled or held at periodic intervals (e.g., the third Tuesday of each month) as determined by PM and engineering lead. The process for submitting a change request follows:

- Submitter completes a GRE Change Request (CR) Form and posts it to the appropriate area of the collaboration tool. The submitter will notify CCB members via email when changes are submitted.
- Prior to a CCB meeting, a member of the CCB or designate will collect together SCR/PR/MCR forms not yet addressed to determine whether further information is needed and from whom.
- The designate will coordinate with submitters to ensure any further information is acquired prior to the CCB meeting.
- The designate will distribute information to CCB members prior to meeting.
- A CCB meeting is scheduled.
- The CCB meets in person or via phone conference and determines the disposition of open (i.e., reports not yet addressed) CR(s), PR(s) and MCR(s).
- The CCB designate documents CCB major decisions in meeting minutes and the final disposition of CR(s), PR(s) and MCR(s) ensures the disposition and other relevant comments are reposed with the report in the selected repository.
- A CCB designate, if necessary, notifies CR/PR submitters of the final disposition.

The review will make sure that adequate evaluation of the effect of the change is performed in advance and a recovery strategy to restore the system to pre-change condition is clearly identified. The test results shall be provided to the CCB minimally one week prior to the CCB meeting.

4 Configuration Control Board (CCB)

4.1 Membership

The primary purpose of Configuration Control Board is to review and approve proposed changes to the GE system by involving the core parties that are interested in or impacted by proposed changes. The CCB shall consist of representative personnel from systems engineering and representatives from participating Segments. The PM will set the initial agenda and schedule for CCB meetings. Voting members of the CCB are representatives of the participating segments. The CCB consists of representatives from the segments shown in Table 1.

Table 1. CCB Representatives

Name	Project Role	Status
Systems Engineering	Sponsor	Voting
Telemetry	Participating Segment	Voting
Radar	Participating Segment	Voting
Facilities	Participating Segment	Voting
Network	Participating Segment	Voting
Frequency Control allocation/FTS	Participating Segment	Voting
Maritime	Participating Segment	Voting

Each CCB meeting will have an agenda and minutes. The general agenda will include status reports from development efforts, change requests, and problem reports received from operations (i.e., centers exchanging data). Minutes will be kept, which identify decisions and approvals made during each CCB meeting as well as requests for future agenda items.

The CCB will review problem reports and requests for changes to interface and network requirements. The CCB will determine the changes needed and a general timeline for development and deployment, which will initially be based upon recommendations and estimates supplied by the segment making the change.

The CCB will coordinate the deployment schedule for new developments at all segment levels.

A CCB meeting may be held after completion of acceptance testing. At that meeting, CCB members would review the results of the acceptance testing to determine whether to approve the change or if the change needs more testing.

5 Configuration Management Status Accounting

5.1 General

Configuration management status accounting provides the necessary reporting mechanism to ensure the integrity of the GRE system configuration at any time. With proper configuration management status accounting, the current and previous configurations of the GRE system can be reported to the CCB and managed appropriately.

5.2 Tools

The project will use the database system to repose SCR(s), PR(s), and MCR(s) submitted by segments. All documents will reside on a SharePoint site with team-only access.

Attachment 5: Interface Control Document – Carrabelle

1 Purpose

This Interface Control Document (ICD) documents and tracks the necessary information required to effectively define the Carrabelle site systems' interfaces, as well as any rules for communicating with them in order to provide the development team guidance on architecture of the system to be developed. The purpose of this ICD is to clearly communicate all possible inputs and outputs from the system for all potential actions, whether they are internal to the system or transparent to system users. This Interface Control is created during the Planning and Design Phases of the project. Its intended audience is the project manager, project team, development team, and stakeholders interested in interfacing with the system. This ICD helps ensure compatibility between system segments and components.

2 Introduction

This ICD describes the relationship between the Instrumentation, Support, and Situational Awareness Systems at Carrabelle site and the ETTC.

This ICD specifies the interface requirements the participating systems must meet. It describes the concept of operations for the interface, defines the message structure and protocols that govern the interchange of data, and identifies the communication paths along which the project team expects data to flow.

2.1 Overview

The Instrumentation and Situational Awareness systems at the Carrabelle site will interface specifically with the Gulf Range Enhancements Hardware Abstraction Layer (HAL). A Request for Information (RFI), attached, has been released to industry with a response date of 14 September, 2018. These responses will allow RT&T to gather very specific data from industry experts on the current state of HAL capabilities and from these responses RT&T will develop a Technical Requirements Document to precisely detail the functionality of the GRE HAL.

3 Assumptions

The GRE Universal Console (UC) and HAL will provide a greater efficiency of space by providing multiple uses on a single console. It will also provide experienced users the ability to modify their specific system user interfaces to a design to which they are accustomed. The UC and HAL will provide commonality of interface and reduce or eliminate the time necessary for technicians and operators to learn Graphical User Interfaces (GUIs) on new systems. In addition, it will reduce costs when new systems are integrated as it will no longer be necessary to rewrite entire test program sets, and it will only be necessary to write a single new interface module.

4 Constraints and Risk

The efficiency and usability of the UC and HAL could be constrained by an improper selection of programming languages, operating systems, or support hardware. As part of the process, RT&T will request that all software be open source and either via support contract or via ownership of the HAL source code RT&T will be able to update, modify, and change the HAL code in any way necessary to provide better and more efficient support to the ETTC. It will also be identified in the HAL Technical Requirements Document (TRD) that the operating system and support hardware must conform to the DoD guidelines documented in the Application and Security Development STIG to avoid any compatibility or lifecycle issues and be developed to allow for expandability and extensibility.

5 General Interface Requirements

The GRE HAL will interface with all systems on the Carrabelle site allowing, for common and vendor-specific commands to be maintained and accessed through a Universal Console design in which Eglin technicians, operators, and maintainers can interface with each component of each system to provide mission essential or preventative maintenance functionality. One robust console design will be flexible enough to interface and control every piece of equipment at Carrabelle site. Figure 1 provides the overall architecture of the Universal Console concept.

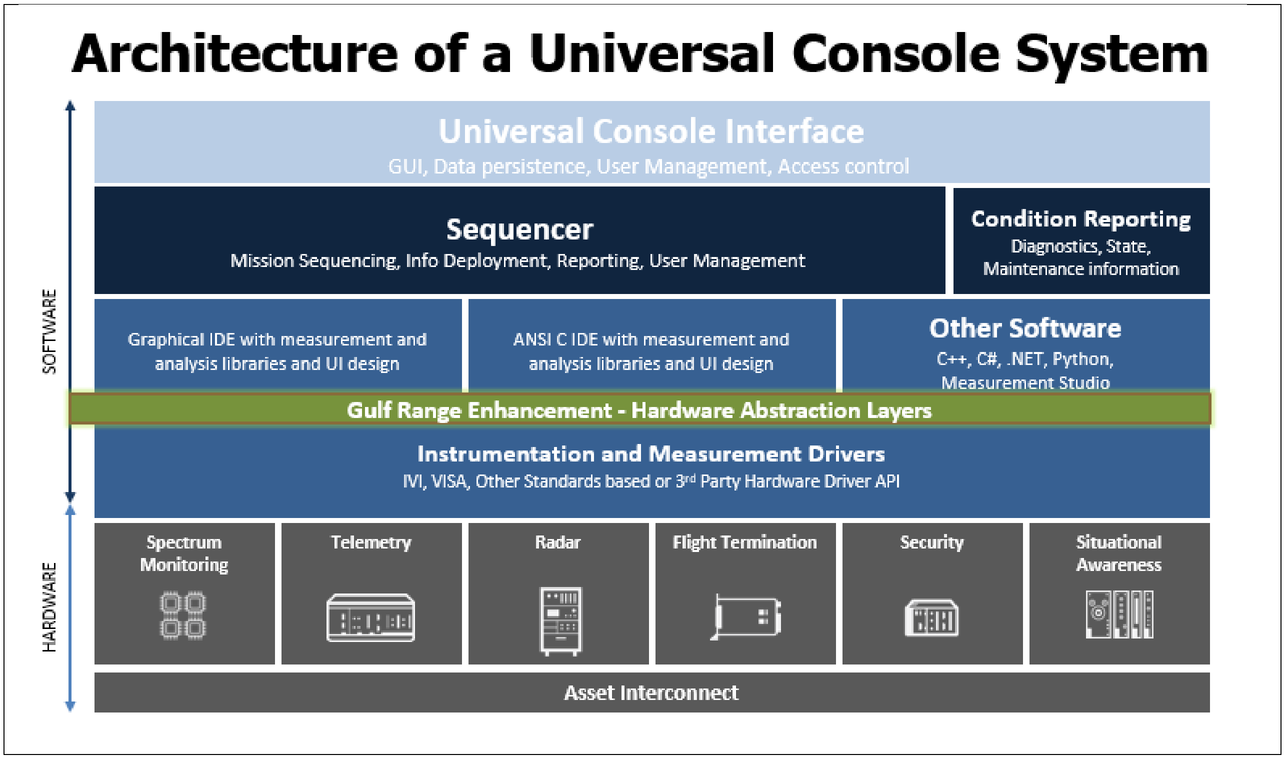

Figure 1. Overall Architecture of the Universal Console Concept

6 Detailed Interface Requirements

The detailed interface requirements will be developed with help from industry using the HAL RFI, HAL TRD, and working through each instrumentation, support, and situational awareness system with individual vendors to verify all functionality is maintained as intended by the original equipment manufacturer.

7 Qualification Method

This section defines a set of qualification methods to be used to verify that the requirements for the interfaces defined in the “Detailed Interface Requirements” section have been met. Qualification methods include:

- Demonstration - The operation of interfacing entities that relies on observable functional operation not requiring the use of instrumentation, special test equipment, or subsequent analysis
- Test - The operation of interfacing entities using instrumentation or special test equipment to collect data for later analysis

- Analysis - The processing of accumulated data obtained from other qualification methods (e.g., reduction, interpretation, or extrapolation of test results)
- Inspection - The visual examination of interfacing entities, documentation, etc.
- Special Qualification Methods - Any special qualification methods for the interfacing entities (e.g., special tools, techniques, procedures, facilities, and acceptance limits)

Exhibit 1: Hardware Abstraction Layer & Universal Instrumentation Console Design Request for Information

RELIANCE TEST & TECHNOLOGY
MISSION FIRST…SAFETY *ALWAYS*

516 Perimeter Road, Suite 1 ♦ Eglin AFB, FL 32542-5654 ♦ Tel: (850) 882-4983 ♦ Fax: (850) 678-9033

REQUEST FOR INFORMATION

Hardware Abstraction Layer & Universal Instrumentation Console Design

21 August 2018

First off, allow me start by saying, thank you for taking the time to read over this RFI and offer your knowledge and expertise. The purpose of this RFI is to gain a better understanding of the capabilities of universal instrumentation consoles and abstraction layer specifics with anticipations for its potential effectiveness for the future.

This announcement constitutes a Request for Information (RFI) for the purpose of determining market capability of sources or obtaining information.

Any replies to this RFI will be utilized as market research by RT&T to determine industry capabilities, and therefore justifying the need for the implementation of a Hardware Abstraction Layer (HAL) and Universal Instrumentation Console (UIC) for potential future operations and solicitations. The responses will also be used to help draft the Technical Requirements Document (TRD) towards available technology.

Please note that this RFI does not constitute a Request for Proposals (RFP), a Request for Quote (RFQ) or an indication that the Reliance Test & Technology (RT&T) or the 96th Range Support Squadron (96RANSS) will contract for any of the items and/or services discussed in this notice.

For this RFI, we are requesting that the individual providing the technical information have said information returned to RT&T, Inc. no later than September 14, 2018.

Very Respectfully,

Dylan C. Hoover
RT&T Program Manager
dylan.hoover.2.ctr@us.af.mil
850-882-5806

REQUEST FOR INFORMATION FOR HARDWARE ABSTRACTION LAYER & UNIVERSAL INSTRUMENTATION CONSOLE DESIGN

FOR

EGLIN ENGINEERING OPERATIONS AND MAINTENANCE SERVICES (E-OMS)

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1.0 DISCLAIMER

This announcement constitutes a Request for Information (RFI) for the purpose of determining market capability of sources or obtaining information. It does not constitute a Request for Proposals (RFP), a Request for Quote (RFQ) or an indication that the Reliance Test & Technology (RT&T) or the 96th Range Support Squadron (96RANSS) will contract for any of the items and/or services discussed in this notice. Any formal solicitation that may subsequently be issued will be announced separately through the release of a Technical Requirements Document (TRD) to qualified companies or through Federal Business Opportunities (FedBizOpps). Information on the specific topics of interest is provided in the following sections of this announcement. Neither RT&T, the 96RANSS, nor any other part of the federal government will be responsible for any cost incurred by responders in furnishing this information.

2.0 PURPOSE

Responses to this notice will be used for market research by RT&T to determine industry capabilities and Technical Readiness Level (TRL) thus validating the requirements for implementation of a Hardware Abstraction Layer (HAL) and Universal Instrumentation Console (UIC) for future solicitations. The responses will also be used to help draft the TRD towards available technology.

3.0 SPECIFIC INFORMATION OF INTEREST

It is anticipated that the papers received will reflect the best available technology assessments from those companies or other entities that are particularly knowledgeable in the fields of hardware abstraction, universal console design and implementation, and integration and remote operation of test equipment. RT&T will analyze the information papers received and reach its own independent conclusions.

The papers received regarding industry capabilities should fall within the following scope:

- Hardware Abstraction Layer for remote control and monitoring
  - Test Equipment (i.e. oscilloscopes, spectrum analyzers, data recorders, switching equipment, etc.)
  - Instrumentation Systems (i.e. Telemetry Pedestals and ACUs, Tracking Radars, Flight Termination, Spectrum Monitoring, etc.)
  - Situational Awareness Systems (i.e. UPS control, generator control, video, security, HVAC, weather stations, etc.)
  - Defined common commands
  - Vendor specific commands
  - Minimal latency
- Universal Instrumentation Console Design
  - One design to support all HAL clients

- Multiple Clients
- Multiple Consoles
- Multiple Geographic Locations
- Future instrumentation extensibility
- Open source to allow for in-house modification and creation
- User defined GUI
- TEMPEST and Cyber Security requirements
- Hardware requirements

4.0 SUBMISSION INSTRUCTIONS

Responses are requested by **14 September 2018** for possible early FY19 TRD release. Responses received after this date will be considered as time permits.

All responses should be submitted electronically in PDF format and emailed to the Primary POC Ryan Goldberg (ryan.goldberg.1.ctr@us.af.mil) and Alternative POC Ramsey Green (glenn.greene.2.ctr@us.af.mil). The subject line of the email should read as follows: "RFI: Hardware Abstraction Layer and Universal Console Design".

All responses should be submitted **unclassified** and should address the capabilities, past performance, and description of the proposed technical solution in regards to the specific information of interest as identified in section 3.0. No cost or pricing information should be provided.

5.0 QUESTIONS AND POINT OF CONTACT

Questions of a technical nature regarding this RFI may be sent to the following Technical Points of Contact:

Ryan Goldberg

Supervising Engineer

Systems Engineering Directorate

ryan.goldberg.1.ctr@us.af.mil

Ramsey Green

Systems Engineer

Systems Engineering Directorate

glenn.greene.2.ctr@us.af.mil

Attachment 6: Cyber Security Compliance Plan

Cyber Security Compliance Plan

August 31, 2018

Revision History

Revision	Description of Change	Effective Date
Original	Original Submission	

Proposal Team

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Name	Occupation	Fac
Devan Bishop	Engineering Branch Manger	011

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1 Introduction

The Gulf Range Enhancement (GRE) Program Carrabelle site will require information systems security to protect critical mission data. This Cybersecurity Compliance plan provides an overview of the security requirements of the Carrabelle site and describes the process planned for meeting Department of Defense (DoD) requirements for obtaining an authority to operate (ATO).

1.1 Purpose

The goal of this GRE Cybersecurity compliance plan is to ensure cybersecurity is at the forefront of the planning, design, and implementation of the GRE Carrabelle development. Planning the integration of cybersecurity in accordance with the Risk Management Framework (RMF) and through collaboration with the Authorizing Official (AO) ensuring the cybersecurity risk posture of the system is managed and maintained during all operations. The RMF process will be followed to ensure Carrabelle and all GRE sites are in compliance with DoD regulations. RMF is based on the application of security controls, the selection and implementation of which are based on cybersecurity risk assessments and other Systems Security Engineering (SSE) activities conducted throughout the system lifecycle. The RMF process allows the design and integration of cybersecurity early in the system development lifecycle to assist in the development of a trustworthy system that can be operated in the face of a cyber-adversary and to recover from a cyberattack.

The GRE program is highly aware of the steps to identify, evaluate, and affordably address cybersecurity vulnerabilities based on risk throughout the program. We currently operate over 40 systems that require cybersecurity compliance. This plan was written with enterprise cybersecurity process knowledge applied to ensure systems are adequately and affordably protected against external and internal threats and can maintain their mission capabilities in a cyber-contested operational environment.

This plan describes the approach to integrate key cybersecurity activities during all phases of the system lifecycle, including the definition, design, development, assessment, deployment, operation, and maintenance. The Government Program Manager and Reliance Test and Technology Cybersecurity Manager will work closely with the Eglin Air Force Base (EAFB) AO to ensure cybersecurity risks are actively managed consistent with system performance requirements, and are acceptable. This coordination will be key to ensuring the GRE program is successful.

2 Compliance Requirements

The Government PM will ensure the Carrabelle site meets statutory, regulatory, and system requirements, balancing lifecycle cost, schedule, system performance risk, and system security.

The following regulations are applicable to the systems:

- Federal Information Security Management Act of 2002 (FISMA)
- AFPD 33-2 Information Assurance (IA) Program
- DoDI 8500.01 Cybersecurity
- DoDI 8510.01 Risk Management Framework (RMF)
- DoDI 8580.1 Information Assurance (IA) in the Defense Acquisition System

- DoDD 8115.01 Information Technology Portfolio Management
- DoDD 8570.01-M Information assurance Workforce Improvement Program
- DoDD 8140.01 Cyberspace Workforce Management
- NIST Special Publication SP 800-37 Guide for applying the Risk Management Framework to Federal Information Systems; A Security Life Cycle Approach
- NIST SP 800-39 Managing Information Security Risk: Organization, Mission, and Information System View
- NIST SP 800-53A Guide for Assessing the Security Controls in Federal Information Systems and Organizations: Building Effective Security Assessment Plans
- AFI 33-200 Air Force Cybersecurity Program Management
- AFMC Develop, Test and Evaluation Turbo ATO Guide for RMF

The PM and Cybersecurity manager will ensure the site is in compliance with the above regulations and ensure the overall GRE Cybersecurity plan includes the following:

- Confidentiality – the property that information is not disclosed to system entities unless they have been authorized.
- Integrity – the property whereby an entity has not been modified in an unauthorized manner.
- Availability – the property/data is accessible and useable upon demand by an authorized entity.

Program must include design features that promote stability, security, training, and awareness to users, operators, and sustainers. Site must possess the ability to protect, detect, and recover from cyberattacks.

2.1 Carrabelle Cybersecurity

The Carrabelle site will have the potential to be a fully instrumented site connected to EAFB testing critical DoD weapon systems. The site will consist of the following instrumentation: telemetry; radar (optional); spectral monitoring; and possible threat systems. The site will be able to support all range operations through permanent or mobile assets. Figure 1 shows the proposed layout.

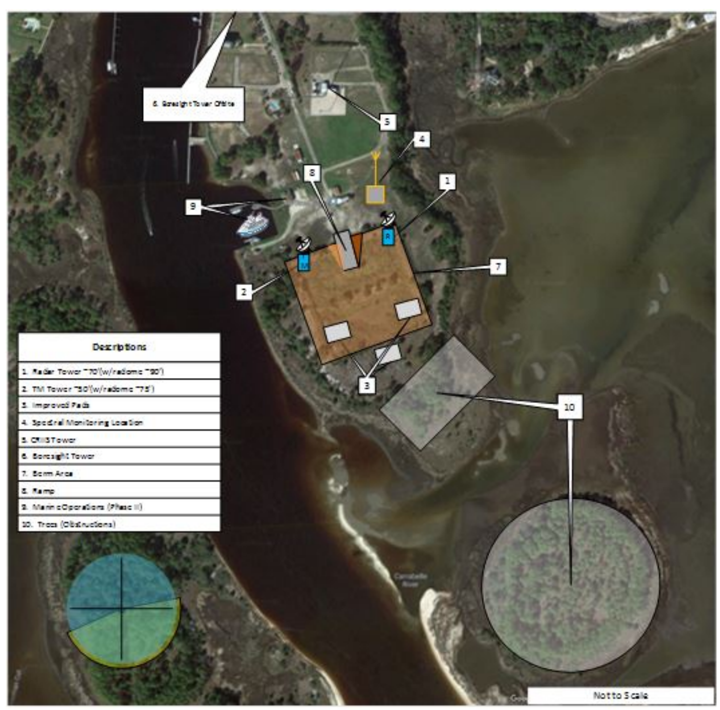

Figure 1 Carrabelle Proposed Layout

Early design and planning is essential to ensure cybersecurity activities, which are meant to protect against the full array of applicable external and internal threats. Cybersecurity compliance for the GRE program and Carrabelle site is divided into three processes:

1. Requirements Generation
2. Acquisition and Program Management
3. Systems Engineering and Test and Evaluation

Each process will be used to develop the cybersecurity requirements to be placed in system requirements and delivered to system designers. The requirements will be tested and validated throughout the GRE program.

The three processes will be overseen by an Information Systems Security Manager (ISSM) for each assigned system of the GRE program. The ISSMs will do the following to ensure GRE and Carrabelle are compliant:

- Ensure compliance with cybersecurity requirements in accordance with DoD and DoD component cybersecurity and information assurance policies and guidance.
- Support the PM in development of a Plan of Action and Milestones (POA&M) and budget that addresses the implementation of cybersecurity requirements throughout the lifecycle of the system.
- Identify a cybersecurity team
- Support the implementation of the RMF
- Maintain and report systems assessment and authorization status and issues in accordance with DoD component guidance
- Provide direction to the ISSO in accordance with DoDI 8500.01
- Coordinate with EAFB A3
- Continuously monitor the system or information environment for security-relevant events and configuration changes that negatively affect security posture
- Periodically assesses the quality of security controls implementation against performance indicators, such as: security controls implementation.

2.1.1 Requirements Generation

For the GRE sites, to include Carrabelle, physical and information assurance security measures must be taken to determine system requirements, and both will be reviewed as stated in the sections below.

2.1.1.1 Site Physical Requirements

Our mission is to provide testing for our customer and collect data. Our physical security measures should prevent anyone from disruption, exfiltration, corruption, or preventing a test event and/or the collection of data. The following phases will be used to determine physical security requirements:

Phase 1 – Identify Criticality of Sites:

Determine sites criticality by evaluating mission and data criticality (defined below). Sites will be placed in one of three categories: Critical, Secondary, or minor.

Critical sites (Risk Level 1): Critical impact due to data loss, exfiltration, or corruption

1. Provides “go” / “no-go” mission data (example: FTS)
2. Provides critical data that determines an items performance (example: scoring video)

3. Network -Provides critical data path for mission data. Core site, multiple data sets, network monitoring and management, cyber security tools

Secondary sites (Risk Level 2): Major impact due to partial data loss, exfiltration, or corruption

1. Provide an access to a location that could disrupt critical site (example: network access location, recorder location, etc.)
2. Could cause interference to critical site (example: 1000W transmitter that could interfere with transmissions)
3. Network – distribution site, multiple data sets, network management

Minor Sites (Risk Level 3): Minor impact due to partial data loss, exfiltration, or corruption

1. Limited access to network or range assets (site that is only used when manned)
2. No mission impact if site is not operational or disrupted
3. Network – access site, single data set

Phase 1 will result in a site matrix with sites listed by criticality and facility type (listed below):

- Type A – occupied during normal working hours
- Type B – Data collection facilities
- Type C – Unmanned Network Transfer facilities
- Type D – Manned Control centers
- Type E – Manned Radar facilities
- Type F – Major Network Hub

Phase 1 output will be a matrix identifying number of critical sites, secondary sites, and minor sites, which will provide a list for a security team to conduct Phase 2, which is assess physical security requirements per site.

Phase 2 – Prioritize and Assess Sites:

1. A security team will be established to conduct site assessments based on the matrix developed in Phase 1. The team will consist of personnel trained in the following:
   a) Physical security – either a consultant or base security officer
   b) Communication/network – NDI and ERNOM personnel
   c) Cyber security – Cyber personnel
   d) RT&T security office – personnel to ensure documents required are accomplished
   e) RT&T lead – to maintain information
   f) 96th RANSS lead

The team will conduct requirement assessments in the following order: critical sites, secondary sites, and minor sites. AFI 31-101, *Integrated Defense*, Chapter 3, *Integrated Defense Risk Management* will also be used to develop the physical security design. The assessment will identify the required physical security implementations to be added to the requirements matrix. Per DoD standards the following types of items will be reviewed based on type and risk level of each site:

- Protective Barriers

- Site Lighting
- Security Forces
- Security Systems
- Facility access control/hours of operation
- Manned/unmanned
- Lock and Key Systems
- Storage containers and facilities

Phase 3 – Implementation:

Requirements determined by the security assessment will be added to the site design reviews. The installation of the physical security requirements will be tested and verified by Base security personnel.

2.1.1.2 Cybersecurity Requirements

To ensure all network and systems are protected through information assurance controls, the GRE Carrabelle site will follow the RMF process using the Air Force Material Command Development, Test, and Evaluation (DTE) Tailored User Requirements Breakdown for Obtaining (TURBO) ATO Guide for the RMF, dated April 29, 2016. The guide provides the process to obtain an ATO for Air Force Materiel Command (AFMC) DTE systems and identifies the critical security controls that must be implemented to protect the system. The process is an integrated process between Reliance Test & Technology, the 96 RANSS, and AFMC/A3. The overall effort is a multi-layered process requiring action by contractor and government agencies.

There are six steps to the RMF process the Carrabelle instrumentation must complete to become approved to operate:

1. Categorize Information System
2. Select Security Controls
3. Implement Security Controls
4. Assess Security Controls
5. Authorize system
6. Monitor Security Controls

Each step will be conducted through the SSE process and will be in coordination with Cyber policies at the national and local level. The Risk Management Framework (RMF) process identifies the risks to the system and security requirements to mitigate those risks. Figure 2 shows each of the steps.

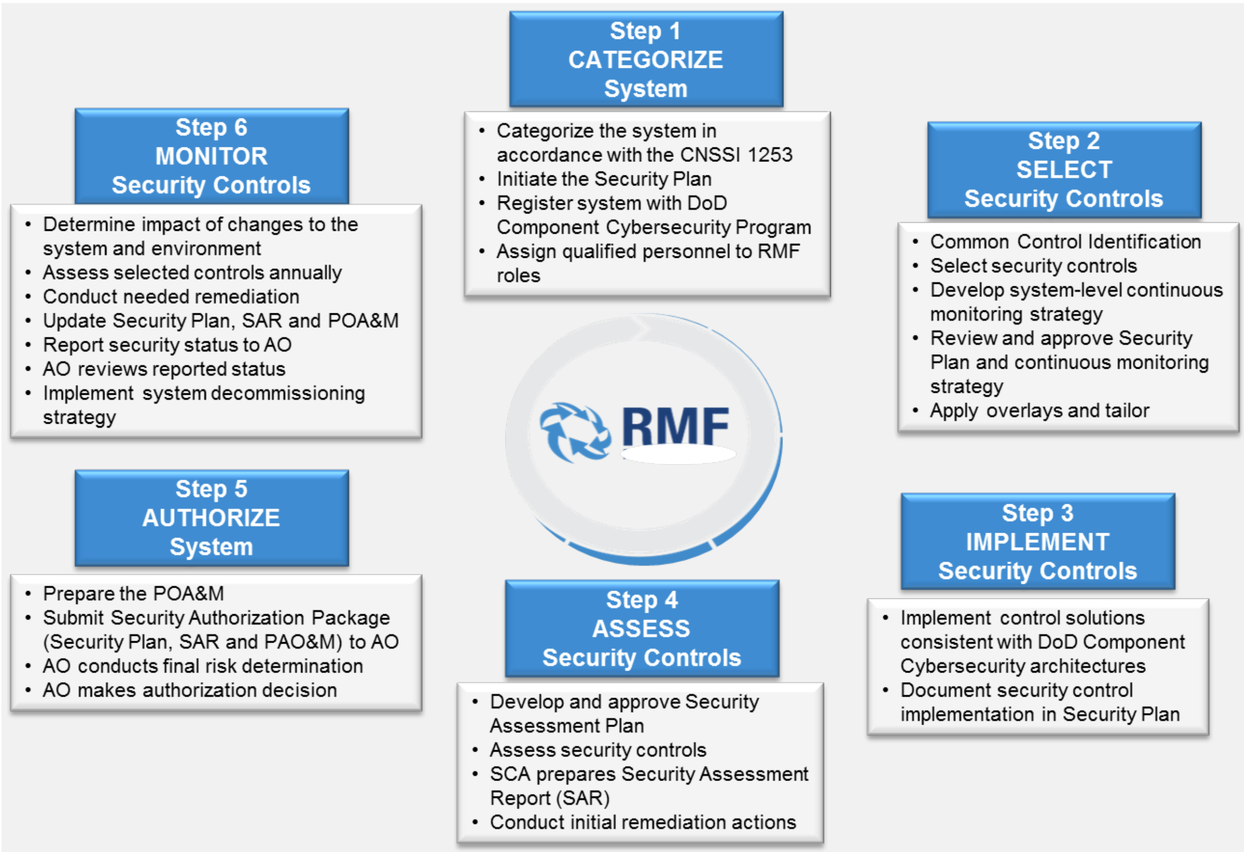

Figure 2. RMF Process per CS105-2-2

Step 1 – Categorize System

This step begins with the Program Manager (PM) of the system preparing a CONOPS package and submitting the information technology (IT) Categorization & Determination form. The GRE PM will submit the overall GRE CONOPS providing the guidance for the AO to determine type of system Carrabelle and GRE sites will be. The systems will be connecting to the Eglin Range Information Grid Enclave (ERIGE), which had been categorized as a collaborative enclave, therefore the GRE systems must meet the same security controls as the ERIGE. The system will be register within the Enterprise Mission Assurance Support Service (EMASS) program and security plan with accreditation boundaries will be submitted for approval.

Step 2 – Select Security Controls

The NIST 800-37 describe the types of security controls as system-specific controls, common controls, and hybrid controls.

- System-specific (or subsystem) controls are security controls that are unique to the system. There will be specific controls to be determined on instrumentation platforms (radar, TM, etc.)
- Common controls (or inheritable controls) are controls that provide a security capability for multiple information systems. Common controls will be applied from the ERIGE required controls.

- Hybrid controls have both system-specific and common characteristics. This will be applied to the network equipment of the GRE systems.

For Eglin the following AFMC DTE Turbo ATO Security Control Framework matrix will provide engineers with the required controls, an example of matrix is shown in Table 1 on the following page.

The baseline security controls are identified via the RMF process in the system security plan (SSP) which will be approved by the AO. During successive iterations of the requirements analysis and refinement processes, the set of security controls will be tailored to ensure the system is protected.

Table 1. AFMC DTE Turbo ATO Security Control Framework Matrix

System Type	SA-III-U	CE-III-U	Common	AFNet	DREN	AFMC	AFTC	Base	SQ		
R	3	28	40	11	7	3	4	11	15		
P	0	7	3								
N/A	32	0	23								
					Inheritable Controls					**System-wide Common Controls**	**Subsystem Specific Controls**
Controls	**SA-III-U**	**CE-III-U**	**Common**	**AFNet**	**DREN**	**AFMC**	**AFTC**	**Base**	**SQ**		
COBR-1	N/A	P	Sub								X
CODB-1	N/A	P	Sub								X
CODP-1	N/A	R	Sub								X
COED-1	N/A	R	Sub								X
COSP-1	N/A	P	Sub								X
COSW-1	N/A	R	Sub								X
COTR-1	N/A	R	Sub								X
DCAR-1	R	R	R							X	X
DCAS-1	R	R	R							X	X
DCBP-1	R	R	R	X						X	X
DCCB-1	N/A	R	Sub						X	X	X
DCCS-1	P	R	R							X	X
DCCT-1	R	R	R							X	X

Step 3 - Implement Security Controls

The ISSM implements the AO-approved SSP and selected security controls. This step includes implementing security controls on the products with information systems in accordance with (IAW) the Security Technical Implementation Guides (STIGs), Security Requirements Guide (SRGs), or Control Correlation Identifiers (CCIs). Implementation teams must be qualified IAW DoD 8570-M. The GRE implementation team will configure and test equipment at EAFB prior to installation at sites.

Step 4 – Assess Security Controls

The PM, ISSM, and 96 RANSS IA Lead will assess the security controls IAW assessment procedures defined in the security assessment plan. A security assessment report documenting issues, findings, and recommendations will be developed for the security control assessment. Initial remediation actions on security controls based on the findings and recommendations of the report will be conducted. Assessment will be conducted IAW NIST 800-30.

Step 5 – Authorize the Information System

The AO formally assumes responsibility and grants an ATO and a termination date for the granted ATO. The team will prepare the plan of action and milestones based on the findings and recommendations of the security assessment report, determine the risk to organizational operations, and assemble the security authorization package and submit the package to the AO. AO renders a final determination of risk to DoD operations and assets, individuals, other organizations, and the Nation from the operation and use of the system.

Step 6 – Monitor Security Controls

Continuous Monitoring requirements are built into the AFMC DTE Turbo ATO Guide and requirements are determined throughout the RMF process. The requirements include weekly, monthly, and annual activities required for reporting, validating, testing and security control implementation. The network design of the GRE sites will include network redundancy, centrally managed machines, back-up recovery, remote network updates and troubleshooting capability to ensure security controls can be monitored and updated as required. Software monitoring tools will automate the monitoring process and identify network issues as quickly as possible.

2.1.2 Acquisition and Program Management

Acquisition and program management provides oversight of the key acquisition and program management processes and documentation. For GRE Cybersecurity requirements will be addressed in all program reviews. Design reviews will consist of entry and exit Cybersecurity requirements. Cybersecurity requirements will be placed in all technical requirements documents to vendors this includes Defense Federal Acquisition Regulation Supplement security standards required for systems that store or transmit controlled unclassified information, which includes the site instrumentation systems.

2.1.3 Systems Engineering Test and Evaluation

Implementation of a disciplined systems engineering process that includes cybersecurity is required for the GRE range. GRE will use the systems security engineering (SSE) process through the requirements definition and RMF process. The SSE process captures and refines cybersecurity requirements and ensures the requirements are integrated into the system. The GRE cyber requirements will be captured in the requirements traceability matrix (RTM) and tested per the Systems Integration and Test Plan. Each requirement will use one of the following verification methods: demonstration; analysis; inspection; or test to verify the requirement was met.

2.2 Summary

The cybersecurity compliance of the GRE system will include the physical security and information assurance security designed into the program. The requirement will be developed through assessments of the criticality of the systems and through following the DoD required RMF process. The critical weapon systems data will be protected through physical and network security.