

Transiting Exoplanet Survey Satellite (TESS)

DRAFT

Software Acquisition Management Plan (SAMP)

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Goddard Space Flight Center
Greenbelt, Maryland

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Questions or comments concerning this document should be addressed to:

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Introduction

1.1 Purpose and Scope

The purpose of this Software Acquisition Management Plan (SAMP) is to document the management approach and supplier monitoring activities for GSFC's oversight of the acquisition of software for the TESS mission.

These activities are performed by the Acquisition Management Team (AMT), which is composed of the Acquisition Manager (AM) and any direct reports.

This plan does not cover the acquisition planning for other groups such as Procurement, which develops its own plan (see Section 2.2, Acquisition Planning, for more information). The AM is responsible for providing software technical expertise to the Contracting Officer Technical Representative (COTR). See the AMT Roles and Descriptions table in Section 3.1 (AMT Organization Chart) for more details.

The term "software" as used in this document includes code, documentation, and associated data. The TESS mission software elements to be acquired are shown in Table 1.1-1:

Table 1.1-1 TESS Software Acquisitions

Software	Provider
Spacecraft Flight Software	Orbital Sciences Corporation
Instrument Flight Software	MIT Lincoln Laboratory
Mission Operations Ground Software	Orbital Sciences Corporation
Science Operations Ground Software	MIT Lincoln Laboratory

This plan addresses requirements and/or references contractual agreements to be satisfied by the suppliers for all software purchased, contractually acquired, developed, or maintained for the support or execution of the Mission or other customer facilities. This plan is coordinated with the referenced contractual agreements such that no interactions or activities with the supplier(s) are documented herein without being also documented in a contractual agreement. This plan defines the technical monitoring activities for the acquisition; it does not supersede any contractual documentation. It also describes the AMT's relationship to the Code 300 Safety and Mission Assurance organization. The details of the Software Assurance Engineer's (SAE's) responsibilities are documented in the Software Assurance Plan.

This SAMP also provides an overview of the Mission or customer organization and software, and how this relates to the AMT's acquisition responsibilities. It also provides an overview of the acquisition life-cycle and those groups responsible for completing each of the various phases. Section 2.2 describes all the phases; phases that have already been completed are included for informational purposes only and for completeness.

1.2 Document Review, Approval, and Update

This SAMP is developed by the AM and reviewed and approved by the TESS Project Manager and others, as listed on the signature page. The AM will also ensure that the SAMP is reviewed for consistency with other associated plans, and is reviewed by affected stakeholders. The AM is responsible to ensure that the SAMP complies with all appropriate requirements documents referenced in the table below – especially those requirements listed in Goddard Procedural Requirement GPR 7150.3, Software Acquisition. The SAMP presents a snapshot of planning information that is current at the time of signature. It will be reviewed periodically thereafter to ensure currency at major milestones such as System Requirements Review (SRR), Preliminary Design Review (PDR), Critical Design Review (CDR), Test Readiness Review (TRR), and Acceptance Review (AR) or if major project changes occur. This SAMP is completed with best known information at the time it is documented and is updated at the major milestones.

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Upon approval, this document will be placed under configuration control. Approved changes will be listed in the document's Plan Update History located immediately after the signature page.

1.3 References

This document was developed using explicit versions of NASA Procedural Requirements (NPRs), Goddard Procedural Requirements (GPRs), and organizational process and standards documents (see list below). The versions referenced are current at the time of writing. If one of the standards documents changes at a point in the life-cycle after which the referenced process is no longer being used, the reference in this plan will be updated in the history to log the obsolete reference. If there is a change in a standards document relating to a process that has not yet been completed, the change will be evaluated for impact on the content of this plan and the related acquisition process. In this case, the reference may be updated to reflect the new version, along with required changes (if any) to this plan.

NPR 7150.2A provides procedural requirements to the responsible NASA project managers, the AM, and contracting officers for NASA contracts. The NPR 7150.2A is extended to contractors only through contract clauses, specifications, or statements of work in conformance with the NASA Federal Acquisition Regulation (FAR) Supplement.

Note:

NASA Procedural Requirements (NPRs) may be found at http://nodis.gsfc.nasa.gov/main_lib.html.

Goddard Procedural Requirements (GPRs) may be found at <http://gdms.gsfc.nasa.gov/>.

Goddard Space Flight Center (GSFC) Specific Processes and Standards can be found at <http://software.gsfc.nasa.gov>

- NASA-STD-8719.13, NASA Software Safety Standard (rev.B)
- NASA-STD-8739.8, NASA Software Assurance Standard
- NPD 2091.1B, Inventions Made By Government Employees
- Goddard Procedural Directive (GPD) 5101.1A, Requirements for Legal Review of Procurement Matters
- GPR 1710.1H, Corrective and Preventive Action
- GPR 5100.1F, Procurement
- GPR 5100.2B, Supplier Performance Evaluations
- GPR 5100.4D, Goddard Space Flight Center Supplier Quality Audits
- GPR 5100.5A, Government Cost Estimates for Acquisitions Exceeding the Micro-Purchase Threshold
- GPR 5340.2I, Control of Non-conformances
- GPR 7120.4C, Risk Management
- GPR 7150.1, Software Project Process Initiation
- GPR 7150.2, In-house Software Development and Maintenance
- GPR 7150.3, Software Acquisition
- GPR 8700.4G, Integrated Independent Reviews
- GSFC-STD-1000, Rules for the Design, Development, Verification, and Operation of Flight Systems (GOLD Rules rev.E)
- NPD 2210.1C, Release of NASA Software
- NPD 2810.1A, NASA Information Security Policy
- NPD 7120.4D, NASA Engineering and Program/Project Management Policy
- NPR 1441.1D, NASA Records Retention Schedules

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- NPR 2190.1, NASA Export Control Program
- NPR 2210.1C, Release of NASA Software
- NPR 2810.1A, NASA Security of Information Technology
- NPR 3713.1A, Reasonable Accommodation Procedures
- NPR 5800.1E, Grant and Cooperative Agreement Handbook
- NPR 7120.5D, NASA Space Flight Program and Project Management Requirements
- NPR 7120.7, NASA Information Technology and Institutional Infrastructure Program and Project Management Requirements NPR 7123.1A, NASA Systems Engineering Processes and Requirements
- NPR 7150.2A, NASA Software Engineering Requirements
- NPR 8000.4A, Agency Risk Management Procedural Requirements
- NPR 8715.3C, NASA General Safety Program Requirements
- NPR 8735.2A, Management of Government Quality Assurance Functions for NASA Contracts
- Federal Acquisition Regulation (FAR) 7.105: List of requirements that Procurement's Software Acquisition Plan must follow. Access via: http://prod.nais.nasa.gov/cgi-bin/nais/nasa_ref.cgi
- NASA FAR Supplement (NFS) 1807-105: NASA supplement to the FAR that includes additional requirements that must be followed. Access via: http://prod.nais.nasa.gov/cgi-bin/nais/nasa_ref.cgi
- FAR 11, Section 508/Electronic and Information Technology (EIT) Accessibility
- Credit Card Procurement Cardholder Procedures, 210-WI-5100.1.3C: Directive that outlines procedures for Procurement Credit Cardholders. Access via the Goddard Directives Management System (GDMS) at <http://gdms.gsfc.nasa.gov>

1.4 Applicable Documents

The official TESS documents listed below in Table 1.4-1 are managed by the TESS Project and are available through the project's Configuration Management system. See Section 4 for Software Deliverables.

Table 1.4-1 Mission Documents

Title	Document Number
TESS Project Management Plan	EXP-TESS-PLAN-TBS
TESS Schedule Management Plan	EXP-TESS-PLAN-TBS
TESS Project Review Plan	EXP-TESS-PLAN-TBS
TESS Risk Management Plan	EXP-TESS-PLAN-TBS
TESS Configuration Management Plan	EXP-TESS-PLAN-TBS

2 Overview

2.1 Mission/Customer Overview

2.1.1 Mission Description

The Transiting Exoplanet Survey Satellite (TESS) will discover thousands of exoplanets in orbit around the brightest stars in the sky. In a two-year survey, TESS will monitor 500,000 stars for temporary drops in brightness caused by planetary transits. This first-ever space borne all-sky transit survey will identify planets ranging from Earth-sized to gas giants, around a wide range of stellar types and orbital distances. No ground-based survey can achieve this feat. The stars observed by TESS will be 30-100 times brighter than those in the relatively narrow field-of-view of the Kepler satellite, and therefore TESS planets will be orders-of-magnitude easier to characterize with follow-up observations. At last it will be possible to study the masses, sizes, densities, orbits, and atmospheres of a large cohort of small planets, including a sample of rocky worlds in the habitable zones of their host stars. TESS will provide prime targets for observation with the James Webb Space Telescope (JWST), as well as other large ground-based and space-based telescopes of the future. TESS data will be made public six months after downlink, inviting immediate community-wide efforts to study the new planets. The TESS legacy will be a catalog of the nearest and brightest main-sequence stars hosting transiting exoplanets, which will forever be among the most favorable targets for detailed investigations.

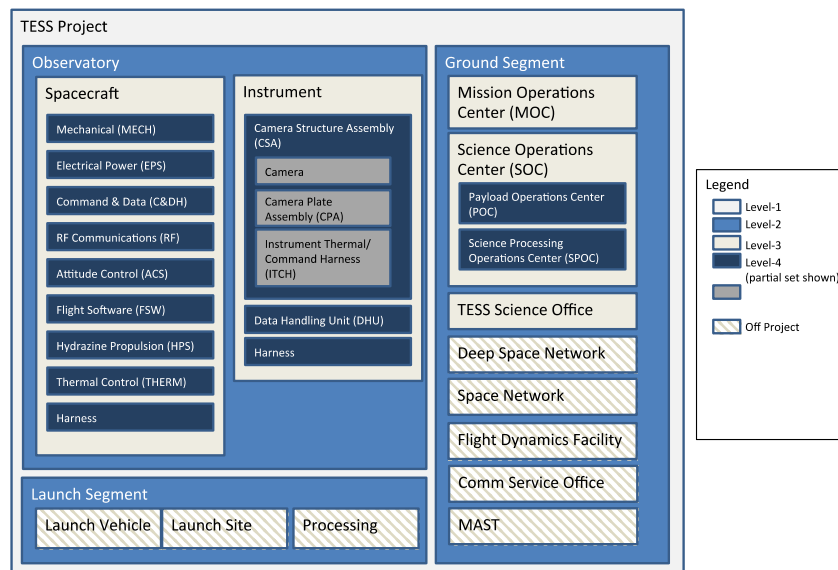
TESS is a low risk, high-value Explorer class planet finder, directly in line with U.S. National Space policy and NASA science goals related to the "...search for planetary bodies and Earth-like planets in orbit around other stars" (2010 NASA Science Plan), as well as the highest priorities defined by the NRC Astro2010 Decadal Survey.

TESS will be ready for launch in August 2017. TESS science objectives are achieved by flying the observatory in a High Earth Orbit (HEO). A 13.7 day, elliptical HEO optimizes the capability of the available Explorer Launch Vehicle performance, minimizes the requirements for the observatory such as propulsion, telecommunications capacity and power, and provides for a benign thermal and attitude disturbance environment, all while satisfying the requirement for a low radiation environment.

TESS is a Principal Investigator (PI)-led mission. The PI is George Ricker, of the Massachusetts Institute of Technology (MIT). He has delegated project management to Goddard Space Flight Center. The GSFC also provides the systems engineering, technical authority, flight dynamics analysis, and safety and mission assurance for the project. The MIT Lincoln Laboratory is responsible for the payload and is home to the TESS Science Center. Orbital Sciences Corporation is responsible for building the spacecraft, integration and test of the flight system, and operating it. NASA Ames Research Center (ARC) is responsible for the data pipeline.

The diagram below in Figure 2.1.1-1 shows the top-level mission elements:

Figure 2.1.1-1 Mission Elements



2.1.2 Mission Schedule

The official Mission Schedule is managed by the TESS Project Office. The major mission milestones are shown below in Table 2.1.2-1 and support a planned August 2017 launch.

Table 2.1.2-1 Top-Level Milestones

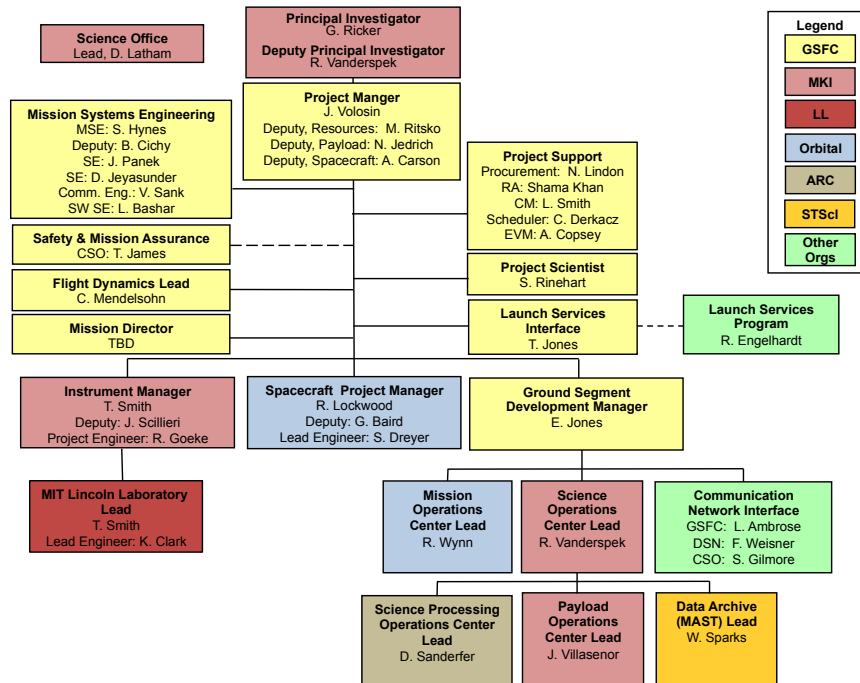
Milestone	Date
System Requirements Review	02/2014
Mission Preliminary Design Review	09/2014
Key Decision Point (KDP) – C	10/2014
Integrated Baseline Review	01/2015
Mission Critical Design Review	04/2015
Mission Operations Review	07/2016
System Integration Review	10/2016
KDP-D	11/2016
Pre-Environmental Review	11/2016
Operations Readiness Review / Flight Operations Review	01/2017
Pre-Ship Review	05/2017
Systems and Mission Safety Review	07/2017
Launch	08/2017
KDP-E (Post Launch Assessment Review)	09/2017
Commissioning Complete	10/2017
End of Prime Mission	10/2019

2.1.3 Mission Organization Chart

The organization chart shown below in Figure 2.1.3-1 depicts the organizations, roles, and responsibilities on the TESS mission.

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Figure 2.1.3-1 Mission Org Chart



The AM for the software acquisitions addressed in this SAMP is the Software Systems Engineer, shown above as a member of the Mission Systems Engineering team.

2.2 Mission/Customer Software Overview

2.2.1 Software Systems Description

As indicated in section 1.1, the software acquisitions for TESS are Spacecraft Flight Software and Mission Operations Software (from Orbital Sciences Corporation), and Instrument Flight Software and Science Operations Software (from MIT Lincoln Labs). This section will be updated with more detailed information as the project proceeds.

2.2.2 Software Classifications

Appendix B describes the software classifications for each software product being acquired. Initial Software Classifications are documented using the [Software Project Initiation Form](#) GSFC 4-56 or available at <http://gdms.gsfc.nasa.gov>.

3 Acquisition Management Approach

3.1 Acquisition Management Team (AMT) Roles and Descriptions

The following Table 3.1-1 describes the responsibilities of the AMT and responsibilities of the related roles.

Table 3.1-1 AMT Roles and Descriptions

Role	Description/Responsibilities
<p>Mission Systems Engineer</p>	<ul style="list-style-type: none"> • Primary point of contact for specific technical and interface issues regarding the project. • Assists in establishing the requirements for the mission. • Provides guidance with respect to the specific technical performance of the mission against the requirements. • Serves as the primary point of contact within the project to provide review and comment on all mission products.
<p>Acquisition Manager (AM)</p>	<ul style="list-style-type: none"> • Review and approve suppliers' software development and management plans • Ensure, at the conclusion of each life cycle phase, that re-estimates of software size, effort, and schedule are made and analyzed • Ensure that suppliers are compliant with appropriate NPRs, GPRs and Capability Maturity Model® Integration (CMMI) requirements as specified in agreements (MOU, contracts, etc) • Ensure that the AM and AMT are compliant with the appropriate NPRs, GPRs and CMMI requirements as specified in the documents in the reference table above and in alignment with each software element's software Class and Safety Critical determination • Ensure that supplier software is delivered in accordance with the Mission Project's master schedule • Monitor and report to Mission Project the technical status from the software suppliers and support contractors, especially on issues which potentially have long term effects on system schedule and cost. • Ensure commonality of software, hardware and tools where possible (with suppliers also) to minimize life-cycle cost to the Mission Project. • Ensure that the supplier's software assurance and configuration management functions are performed. This is monitored in conjunction with the Software Assurance Plan. • Coordinate with the Mission Project systems engineering groups. • Promote effective systems and software engineering for benefit of design, development, Integration & Test and sustaining engineering • Coordinate software requirements and interface definitions both with the Mission / Project and with the supplier(s) • Establish goals, concepts and approaches for strategic and tactical problems and issues related to software development activities • Track baseline products to ensure consistency with build and integration plans • Resolve software end-to-end operational issues
<p>COTR</p>	<ul style="list-style-type: none"> • Performs Task Order administration and closeout activities such as documenting receipt and acceptance of all deliverables according to the terms of the contract, documenting resolution of all open issues, verifying GFE inventory, and preparing and submitting final reports and final

	performance assessment reports. These activities are performed in accordance with the requirements of GPR 5100.1, Procurement.
Software Assurance Engineer	<ul style="list-style-type: none"> Has primary responsibility for the Process and Product Quality Assurance process area. Provides objective assessments of the development team's processes and work products. Provides objective assessments of the AMT against the applicable policies and requirements. This role is usually performed by Code 300 personnel working under the direction of the Project office. If Code 300 support is not available, this role may be assigned to an individual who is within the overall organization, who is also independent of the project.
Mission Chief Safety Officer	<ul style="list-style-type: none"> Performs activities associated with the systematic approach to identifying, analyzing, and tracking software mitigation and control of hazards and hazardous functions (e.g., data and commands) to ensure safer software operation within a Mission system.

3.2 Resources and Staffing Profile

The required resources documented in this section have been negotiated with the customer based on initial planning of manpower needs and other costs. On an ongoing basis, the AM will negotiate Project-funded resource needs and costs and resolve budget issues for this effort with the Project.

3.2.1 Planned Acquisition Management Team (AMT) Resource Requirements

The initial planned staffing levels for the AM and AMT are shown below in Table 3.2.1-1

Table 3.2.1-1 AMT Staffing

Actual/Projected Staff	Role	Subsys	WBS	2014	2014	2015
Bashar, L.	AM	FSW				
TBS	AMT	FSW				

3.3 AMT Work Breakdown Schedule (WBS)

The high-level WBS for the activities of the AMT is shown below in Table 3.3-1

Table 3.3-1 Top-Level AMT WBS

Element Identifier	Element Name
1	Acquisition Planning & Management
1.1	Develop Acquisition Strategy
1.2	Develop Acquisition Schedule
1.3	Develop Acquisition Plan/SAMP
1.4	Manage AMT Ongoing Activities
2	Contract Solicitation, Selection and Award
2.1	Prepare Acquisition Package/Distribute RFP
2.2	Evaluate Proposal and Select Contractor
2.3	Negotiate Contract and Get Signatures
3	Contract Monitoring and Quality Assurance

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Element Identifier	Element Name
3.1	Interpret Technical Requirements
3.2	Evaluate Contractor Progress With Respect to Cost
3.3	Monitor Contractor Skill Mix
3.4	Oversee GFE
3.5	Monitor Contractor Processes
3.6	Manage Documentation
3.7	Report Status to Management
3.8	Monitor Risks
4	Contract Administration
4.1	Review Contractor Invoices and Manage Budget
4.2	Report Contract Issues (to CO)
4.3	Initiate Needed Contract Changes
4.4	Provide Evaluation of Contractor Performance
5	Product Acceptance and Control
5.1	Review Deliverables for Acceptance
5.2	Perform Configuration Management
5.3	Transition Products to Operations and Maintenance
6	Contract Close-Out
6.1	Monitor Completion of Contract Requirements
6.2	Validate GFE Inventory
6.3	Submit Final Reports
6.4	Complete Final Performance Assessment Report

3.4 AMT Schedule

The latest AMT Milestone Schedule can be found at in the TESS Project repository.

A sample AMT schedule for planning purposes is shown below in Table 3.4-1. The updated schedule will be maintained outside the SAMP and reported to management. The actual monitoring of these activities will be accomplished via the Division Progress Reviews (DPRs).

Table 3.4-1 AMT Milestone Schedule

Activity Description	Frequency / Planned Date	Actual Date	Notes
Division Project Reviews (DPRs)	Monthly		

3.5 Risk Management

Risk Management for software acquisition activities will be accomplished as part of the TESS Mission Risk Management processes and the project's Risk Management Tool.

3.6 AMT Measures

This table below, Table 3.6-1, describes the AMT's measurement plan, including the overall measurement objectives.

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Table 3.6-1 AMT Measures

Measurement Area	Measurement Objective	Analysis Summary	Measure(s)	Measurement Mechanism/ Artifact	Collected By	Collection Frequency
Software Progress Tracking	Monitor schedule progress to ensure milestones can be met.	Compare planned vs actual schedule; if behind by more than 10% plan to add staff, extend schedule and budget, or de-scope requirements.	Event dates (planned and actual) (NOTE: Collect both milestone dates and process event dates.)	Status Report: Green Light Chart <ul style="list-style-type: none"> Schedule 	AM	Monthly
Software Budget/Cost Tracking	To establish and maintain a realistic project plan throughout the software development life cycle.	Compare estimated (planned or budget) and actual cost parameters; if estimate at completion has changed by more than 25% for either parameter produce a complete replan with new assumptions and a new BOE.	Original and revised planning parameters, by revision. These include Budget (planned cost), actual cost, and whatever work product attributes (e.g., % increased complexity, functionality; # additional requirements) are used to produce an estimate.	Status Report: Green Light Chart <ul style="list-style-type: none"> Budget Cost Note: Budget == Planned Cost == Actual	AM	Monthly
Software Risk Tracking	Ensure project risks are being managed.	Observe changes to risk parameters and priorities; if number of risks increases report issue at BSR. If risk exposure is not changing, verify that the risk has been reviewed as planned.	Risk Management light is determined by verifying that all risks have been reviewed. The Technical light is determined by: Red = new critical risk Yellow = new non-critical risk	Status Report: Green Light Chart <ul style="list-style-type: none"> Risk Mgmt. Technical 	AM	Monthly

3.7 Division Project Reviews (DPRs)

The activities of the AMT are briefed to higher level management via the monthly Division Project Reviews (DPRs). The audience is the Software Engineering Division management team, and the DPR includes status regarding the government's acquisition activities, as well as the supplier.

3.8 Team Training

Branch managers will identify necessary knowledge and skills for each AMT role, and will ensure that the AMT members have the necessary skills or receive appropriate training.

3.9 Stakeholder Involvement

The stakeholders for the software acquisition activities are identified and their involvement described in Table 3.9-1 below.

Table 3.9-1 Stakeholder Involvement

TBD

3.10 Data Management / Configuration Management

The AM, with assistance from the AMT, will maintain a list of project data including work products that will be managed throughout the effort. The list, referred to as the Data Management List (DML), contains information relating to all relevant management and technical artifacts of the effort. The DML will be monitored for completeness on at least a quarterly basis, with each item verified to ensure it is being stored as planned at least once a year. The AM will use the Data Management Tool to document and monitor all items in the DML. A log of all monitoring activities will be maintained within the tool.

In addition to the short name of the item, the DML describes each item as follows:

- Brief description of the item
- Role of the person responsible for updates to the item
- Level of Control
- Physical location of the master version of the item
- Primary process area related to the item
- Frequency of update of the item
- Current version number
- Current version date
- International Traffic in Arms Restricted (ITAR) sensitivity (i.e., is it ITAR sensitive?)
- Quality assurance evaluation need

The initial version of DML for this effort is provided in Appendix E; AMT-generated documents and records referenced throughout this Plan are included.

Configuration Management is accomplished via the Mission Project Configuration Management processes and reviewing/approving boards. This SAMP is the only item for which the AMT has responsibility that is under CM control.

3.11 Technical Requirements Management and Traceability

Describe the requirements flow-down hierarchy from the Mission Project level to the suppliers and who is responsible for managing the requirements and providing bi-directional traceability at each level. Describe how the management of software requirement changes is accomplished and what tool will be used for this process. If changes are made that require contract changes, the AMT will provide information to the CO/COTR and provide any needed support. Note: if this is documented elsewhere, point to documents that state how system requirements are managed or how software requirements are managed, rather

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than using the boilerplate language below. The Software Requirements Development process is defined in PA 2.2.1 on the GSFC PAL at <http://software.gsfc.nasa.gov>.

The sources for the [Mission Project name] software requirements are listed in the [document name]. This document is a Mission Project configuration controlled document and is maintained in [repository name]. This site should be consulted for the current, in force, version of the requirements.

Requirements have been developed for the [Mission Project name] Mission (Level 1), Segments (Level 2), and Elements (Level 3) by the [Mission Project name] Mission Project as part of the work performed during the Concept Phase. The [Mission Project name] Mission Project maintains these requirements in [repository name]. Bi-directional traceability is maintained in the [Mission Project name] Mission Project-controlled traceability database.

These requirements are flowed to the suppliers, who generate detailed (Level 4/5) software requirements and maintain bi-directional requirements traceability to the [Mission Project name] Mission Project-developed parent requirements. Maintaining bi-directional traceability is not the function of the AMT but of the various suppliers for each of their products. Suppliers provide requirements traceability information to the [Mission Project name] Mission Project for Levels 4/5 so that bi-directional traceability can be maintained down to Level 4.

All significant changes to the software baseline requirements requested by any [Mission Project name] Mission Project element will be forwarded to the [Mission Project name] Mission Systems Engineering team electronically. If changes in requirements will result in a change in the software development schedule or cost, the [Mission Project name] Mission Project will be informed of the estimated impact promptly. The [Mission Project name] Mission Project will have final authority for approval of changes affecting cost, schedule or scope. Written authorization for, or concurrence with, the proposed change by the [Mission Project name] Mission Project will be required before any [Mission Project name] Mission Project element will proceed with the change.

Briefly describe requirements CCB process and how this relates to any activity of the AM.

The **[problem/change system]** will be used to track the disposition of requested changes.

4 Supplier Agreements

4.1 Acquisition Identification

See Table 1.1-1 for a listing of the TESS software acquisitions.

The following 4.1.x sections will be completed for each acquisition as that information becomes available.

4.1.1 Supplier Schedule

Provide the initial supplier schedule for product deliveries, reviews, etc.

4.1.2 Supplier Product Reviews

The sections below describe the processes that will be used for the various supplier product reviews. In cases where this information is included in CDRLs, refer to the CDRL rather than repeating the information.

4.1.3 Document Review Description

Describe the process for reviewing supplier documents, differentiating between informational reviews and appraisal reviews, which include the submittal of document change requests.

4.1.4 Milestone Reviews and Support

The Table 4.1.4-1 below lists the major reviews the supplier is required to support.

Table 4.1.4-1 Milestone Reviews

Review	Schedule	AMT plans to attend (Yes, No, or if time allows)
SRR	02/2014	Yes
PDR	09/2014	Yes
CDR	04/2015	Yes
SIR	10/2016	Yes
ORR	01/2017	Yes

4.1.5 COTS, GOTS, MOTS Management

No COT, GOTS, or MOTS software acquisitions on this project.

4.1.6 Description of Monitoring

Detailed descriptions of the activities performed by the AMT to monitor the suppliers' performance against the suppliers' agreements are in Appendix F.

4.1.6.1 Supplier Metrics

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The suppliers will provide the following metrics to the AMT on a monthly basis in a Software Metrics Report. These metrics will be provided on a CSCI-by-CSCI basis, where appropriate.

Software Metrics Report Content

- a. Software progress tracking measures.
 1. Planned versus actual Cost
 2. Planned versus actual Staff
- b. Software functionality measures.
 1. Planned versus delivered requirements per build
- c. Software quality measures.
 1. Defect reporting
- d. Software requirement volatility.
 1. Requirement additions/deletions
 2. Requirements changes
- e. Software characteristics (if appropriate for a given CSCI).
 1. Planned versus actual Central Processing Unit (CPU) Utilization
 2. Planned versus actual memory (volatile and non volatile)
 3. Planned vs Actual CPU Deadlines
 4. Planned vs Actual PCI bus Utilization
 5. Planned vs Actual 1553 Bus Utilization
 6. Planned vs Actual SpaceWire Bus Utilization
 7. Planned vs Actual Universal Asynchronous Receiver/Transmitter (UART)/Serial bus Utilization

4.1.6.2 Supplier Reporting

Describe the process for supplier reporting to the AMT. Include frequency of metrics and format.

If regular scheduled meeting and technical reporting is included in the Monitoring plan, reference to it. The monitoring plan might include items that the AMT is not monitoring, make note if this is the case.

4.1.6.3 Insight Activities

Describe what activities will be performed for this acquisition to obtain the required software development and testing insight (e.g., attending system tests and Technical Interchange Meetings (TIMs)). Reference NPR 7150.2A, SWE-039 for the list of activities. Provide the initial schedule, artifacts, configuration management, and action tracking tool for each activity, as well as the waiver rationale, if applicable. See Software Insight Activities template below. Refer to Appendix G for the field descriptor information.

Table 4.1.6.3-1 Software Insight Activities

Insight Activity	Schedule	Artifacts	CM	Action Tracking Tool	Waiver Rationale (if applicable)
Integration of software					
Verification of adequacy					
Trade study data					
Participate in software reviews					
System Technical Interchange Meeting (TIM)					
Software TIM					
Supplier reporting					

Note: the list of Insight Activities in column 1 are examples only and may be replaced by your own list as appropriate.

4.1.7 Acceptance Criteria for Products

The following Table 4.1.7.1 describes the acceptance criteria for each technical product and the activities that are performed to ensure that the acquired products are technically correct, complete, and meet the standards for documentation as defined in the supplier agreement.

Table 4.1.7-1 Acceptance Criteria

Source Code Designation	System/Subsystem	Acceptance Criteria
A1	XYZ	Successful Systems Test
B1	XYZ	Defined in contract
B2	XYZ	Defined in contract

4.1.8 Transition of Products

Describe the product delivery process for the acquired software and any supplier support required to successfully transition the software into use. This could include support such as Mission Project, user, or Product Development Team training on the acquired software, support for installation of the acquired software, and operation and/or maintenance of the acquired software for some period of time. This would also include any documentation used to operate or maintain the software, such as user's guides, and

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supplier-generated as-built documentation used to maintain the system. Typically, the software is included when the system component is delivered.

If the AMT performs validation testing of the of the acquired software systems, the AM shall adhere to the validation testing requirements listed in GPR 7150.2.

"These are the software products that are defined in your contract as CDRLs/DILs". "A pointer to the CDRL/DIL list is also acceptable"

4.1.9 Deviations/Waivers

No deviations or waivers identified.

5 Safety and Mission Assurance

5.1 Process and Product Audits

Process and process audits will be performed on software acquisition activities by Code 300 per the project's Software Assurance Plan (SAP).

5.2 Independent Verification & Validation (IV&V) Support

The TESS mission has not been currently chosen for If the software project is chosen for Independent Verification and Validation.

Appendix A: Acronyms

AM	Acquisition Manager
AMT	Acquisition Management Team
AR	Acceptance Review
ASR	Acquisition Status Review
BOE	Basis of Estimate
CCB	Configuration Control Board
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CDWG	Cross Domain Working Group
CM	Configuration Management
CMMI	Capability Maturity Model® Integration
CMO	Configuration Management Officer
CO	Contracting Officer
COTR	Contracting Officer's Technical Representative
COTS	Custom Off-The-Shelf
CPU	Central Processing Unit
CSCI	Computer Software Configuration Item
CSO	Chief Safety Officer
DID	Data Item Description
DIL	Deliverables Items List
DML	Data Management List
DPR	Division Progress Review
DRD	Data Acquisition System Requirements Document
EPG	Engineering Process Group
EIT	Electronic and Information Technology
EPG	Engineering Process Group
FAR	Federal Acquisition Regulations
FSW	Flight Software
GDMS	Goddard Directives Management System
GFE	Government-Furnished Equipment
GOTS	Government Off-The-Shelf
GPD	GSFC Procedural Directive
GPR	GSFC Procedural Requirement
GSFC	Goddard Space Flight Center
IPEP	IV&V Program Execution Plan
ITAR	International Traffic in Arms Regulations
IV&V	Independent Verification & Validation
LOE	Level of Effort
MOTS	Modified Off-The-Shelf
MOU	Memorandum of Understanding
MTF	Maintenance and Training Facility
NASA	National Aeronautics and Space Administration
NFS	NASA FAR Supplement
NPD	NASA Procedural Directive
NPR	NASA Procedural Requirement
OTS	Off-The-Shelf
PAL	Process Asset Library
PAP	Procurement Acquisition Package
PCA	Physical Configuration Audit
PDR	Preliminary Design Review
PEP	Program Execution Plan
PM	Project Manager

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QA	Quality Assurance
RFA	Request For Action
SAE	Software Assurance Engineer
SAM	Supplier Agreement Management
SAMP	Software Acquisition Management Plan
SAP	Software Assurance Plan
SED	Software Engineering Division
SEWG	Software Engineering Working Group
SMA	Safety and Mission Assurance
SMP	Software Management Plan
SOW	Statement of Work
SRR	Software Requirements Review
STRR	System Test Readiness Review
SW	Software
SWE	Software Engineering (NPR requirement number)
TESS	Transiting Exoplanet Satellite Survey
TBS	To Be Supplied
TIM	Technical Interchange Meeting
TM	Technical Monitor
TOC	Table of Contents
TRR	Test Readiness Review
WBS	Work Breakdown Structure

Appendix B: Software System/Subsystem Classifications

The following table describes the current software classifications for each software product. Initial software classifications are documented using the [Software Project Initiation Form](#) GSFC 4-56 or at <http://gdms.gsfc.nasa.gov>. This appendix is revisited and updated as necessary and at each major milestone (i.e., PDR, CDR). When software classification changes this table is reviewed and updated.

[Identify the classification of the overall software system in accordance with the software classification definitions in Appendix B of NPR 7150.2. List the subsystems that comprise the system and identify the software classifications of each. Uniquely identify/highlight any subsystems containing safety-critical software.

For each subsystem and CSCI describe proposed software classification (A-H) rationale, and proposed safety-critical classification (Y/N) rationale. Additional space may be used for rationale or a reference to a document containing the rationale.

Code 300 Software Assurance must be a reviewer and signatory to confirm any changes to Software Classification.]

NASA-STD-8719.13c*							
Software / Subsystem Name	CSCI Name	Software Class (A-H)	Safety Critical? **	Mission Critical Software? *** (Y/N)	Acquisition (A) or In-House (I) Development	Org Resp. for Acq / Development	Classification Rationale

* NASA-STD-8719.13c NASA Software Safety Standard -- <https://standards.nasa.gov/documents/nasa>

** Safety-Critical Software - Software that can cause, contribute to, or mitigate human safety hazards or damage to flight hardware and facilities. The software safety assessment and analysis is focused on hazards specific to Integration and Test, launch, and up through spacecraft separation from the launch vehicle (except for International Space Station (ISS) payloads that have constant human presence) and re-entry/recovery (where applicable). Safety-critical software is identified based on the results of the hazard analysis and the results of the Orbital Debris Assessment Report/End-Of-Mission Plan (where applicable). Examples of safety-critical software can be found in all types of systems, including Flight, Ground Support System, Mission Operations Support Systems, and Test Facilities.

*** Mission Critical Software – Software that can cause, contribute to, or mitigate the loss of capabilities that are essential to the primary mission objectives. The software reliability assessment and analysis is focused on failure modes specific to post-separation mission phases. Mission-critical software is identified based on the results of the Failure Modes and Effects Analyses (FMEA) and the Probabilistic Risk Assessment (PRA). Examples of mission-critical software can be found in all types of systems, including Flight, Ground Support System, Mission Operations Support Systems, and Test Facilities.

GPR 7150.4, *Software Safety and Software Reliability Process* -- <http://gdms.gsfc.nasa.gov>

[Further detail regarding the function of the software, and rationales for Software Classification and Safety-Critical may be provided by reference or in the manner below.]

Software Subsystem CSCI: *[subsystem CSCI name]*

Key Function:

Proposed Software Classification Rationale:

Proposed Safety-Critical Classification Rationale:

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Appendix C: NPR7150.2, GPR7150.1, GPR7150.3 Compliance Matrix

This version of the project’s compliance matrix is derived from NPR 7150.2A, GPR 7150.1, and GPR 7150.3. Please make changes to this matrix as needed to comply with the latest version of these documents. If an NPR requirement is met by following a specific Center-defined process, then the applicable GSFC process asset has been identified. The supplier’s responsibilities are listed in the supplier’s compliance matrix.

NPR Section	Requirement Descriptor	SWE #	GPR 7150.1, GPR 7150.3 Reqmts.	SAMP Section	Specific Process, Tailoring Variants, Waivers or Exceptions
SW Life-Cycle Planning	Software plans	13	G3SW-004 G3SW-005	1.1	
	Execute planning	14	G3SW-036	1.2	
	Cost estimation	15	G3SW-032	3.2.1	
	Schedule	16	G3SW-039	3.4	
	Training	17	G3SW-037, G3SW-038, G3SW-061, G3SW-062	3.9	
	Reviews	18	G3SW-035, G3SW-046, G3SW-051	3.8	
	Software development life cycle or model	19	G3SW-003	2.2, 4.x.2	
	Software classification	20	G1SW-002, G1SW-003, G1SW-004, G3SW-001	Appendix B	
	Software classification changes	21	G3SW-002	Plan Revision History Appendix B Appendix C	
	Software assurance	22	G3SW-044	5.0	
	Software safety	23	G1SW-005, G1SW-006, G3SW-029	Appendix B	
	Plan tracking	24	G3SW-056	3.8	
	Corrective action	25	G3SW-003	3.8	

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NPR Section	Requirement Descriptor	SWE #	GPR 7150.1, GPR 7150.3 Reqmts.	SAMP Section	Specific Process, Tailoring Variants, Waivers or Exceptions
	Changes	26	G3SW-004, G3SW-005, G3SW-035, G3SW-041, G3SW-058	3.10	
Off The Shelf (OTS) SW	COTS, GOTS, MOTS, etc.	27	G3SW-019	4.x.2.4	
Verification & Validation	Verification planning	28	G3SW-003	4.x.4	
	Validation planning	29	G3SW-003, G3SW-059	4.x.4	
	Verification results	30	G3SW-003	4.x.4	
	Validation results	31	G3SW-003, G3SW-059	4.x.4	
Project Formulation	CMMI levels for class A, B, and C software	32	G1SW-023, G3SW-027	4.x	GPR 7150.1 – Appendix E
	Acquisition Assessment	33	G1SW-008, G3SW-006, G3SW-007, G3SW-008	2.2.1	
	Acceptance criteria	34	G3SW-025	4.x.4	
	Supplier selection	35	G3SW-004, G3SW-005, G3SW-033	2.2.3	
	Software processes	36	G3SW-014	3.0	
	Software Milestones	37	G3SW-011, G3SW-013	4.x.2	
	Acquisition planning	38	G3SW-009	2.2.1	
Government Insight	Insight into software activities	39	G3SW-003, G3SW-012, G3SW-015, G3SW-052, G3SW-057	4.x.3.3	GPR 5100.1, "Procurement"
	Access to software products	40	G3SW-016, G3SW-021	4.x.3	GPR 5100.1, "Procurement"
	Open source notification	41	G3SW-018	2.2.3	GPR 5100.1, "Procurement"
	Electronic access to Source code	42	G3SW-020		GPR 5100.1, "Procurement"
Supplier Monitoring	Track change request	43	G3SW-003, G3SW-021, G3SW-057	3.11	

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NPR Section	Requirement Descriptor	SWE #	GPR 7150.1, GPR 7150.3 Reqmts.	SAMP Section	Specific Process, Tailoring Variants, Waivers or Exceptions
	Software measurement data	44	G3SW-003	3.7	
	Joint audits	45	G3SW-053	5.1	
	Software schedule	46	G3SW-003, G3SW-023	3.4	
	Traceability data	47	G3SW-017	3.12	GPR 5100.1, "Procurement"
	Solicitation	48	G3SW-003, G3SW-010, G3SW-022, G3SW-024	2.2.3	
Software Requirements Development	Document	49	G3SW-003, G3SW-030	3.12	
	Software requirements	50	G3SW-003, G3SW-030	3.12	
	Flow-down & derived requirements	51	G3SW-028, G3SW-030, G3SW-045	3.12	
	Bidirectional traceability	52	G3SW-003, G3SW-030	3.12	
	Manage requirements change	53	G3SW-003, G3SW-049	3.12	
	Corrective action	54	G3SW-003, G3SW-049	3.12	
	Requirements validation	55	G3SW-003, G3SW-049	4.x.2	
Software Design	Document design	56	G3SW-003	4.0	
	Software architecture	57	G3SW-003	4.0	
	Detailed design	58	G3SW-003	4.0	
	Bidirectional traceability	59	G3SW-003	3.12	
Software Implementation	Design into code	60	G3SW-003	4.0	
	Coding standards	61	G3SW-003		
	Unit test	62	G3SW-003		
	Version description	63	G3SW-003	4.x.5	
	Bidirectional traceability	64	G3SW-003	3.12	
Software Testing	Plan, procedures, reports	65	G3SW-003, G3SW-059	4.x.3.3	
	Perform testing	66	G3SW-003, G3SW-059	4.x.4	

NPR Section	Requirement Descriptor	SWE #	GPR 7150.1, GPR 7150.3 Reqmts.	SAMP Section	Specific Process, Tailoring Variants, Waivers or Exceptions
	Verify implementation	67	G3SW-003, G3SW-059	4.x.4	
	Evaluate test results	68	G3SW-003, G3SW-059	4.x.4	
	Document defects & track	69	G3SW-003, G3SW-059	4.x.4	
	Models, simulations, tools	70	G3SW-003, G3SW-059	4.x.4	
	Update plans & procedures	71	G3SW-003, G3SW-059		
	Bidirectional traceability	72	G3SW-003, G3SW-059	3.12	
	Platform or hi-fidelity simulations	73	G3SW-003, G3SW-059	4.x.5	
Software Operations, Maintenance, and Retirement	Document maintenance plan	74	G3SW-003		
	Plan operations, maintenance & retirement	75	G3SW-031		
	Implement plans	76	G3SW-063		
	Deliver software products	77	G3SW-003	4.x.5	
	As-built documentation	78	G3SW-003	4.x.4	
Software Configuration Management	Develop configuration management plan	79	G3SW-042	3.11	
	Track & evaluate changes	80	G3SW-003	3.11	
	Identify software configuration items	81	G3SW-043	3.11	
	Authorizing changes	82	G3SW-003	3.11	
	Maintain records	83	G3SW-003	3.11	
	Configuration audits	84	G3SW-003, G3SW-053	3.11	
Risk Management	Implement procedures	85	G3SW-003	3.11	
	Continuous risk management	86	G3SW-040	3.5	
Software Peer Reviews/ Inspections	Requirements, test plans, design & code	87	G3SW-030, G3SW-050		
	Checklist, criteria & tracking	88	G3SW-054, G3SW-060		
	Basic measurements	89	G3SW-003		

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NPR Section	Requirement Descriptor	SWE #	GPR 7150.1, GPR 7150.3 Reqmts.	SAMP Section	Specific Process, Tailoring Variants, Waivers or Exceptions
Software Measurement	Objectives	90	G3SW-003	3.7	
	Software measurement areas	91	G3SW-003	3.7	
	Collection & storage	92	G3SW-003	3.7	
	Analyze data	93	G3SW-055	3.7	
	Report analysis	94	G3SW-003	3.7	
Software Documentation Requirements	Software development/management plan	102	G3SW-003		
	Software configuration management plan	103	G3SW-003	3.11	
	Software test plan	104	G3SW-003	4.x.3.3	
	Software maintenance plan	105	G3SW-003		
	Software assurance plan	106	G3SW-003	5.0	
Software Documentation Requirements	Software requirements specification	109	G3SW-003		
	Software data dictionary	110	G3SW-003		
	Software design description	111	G3SW-003		
	Interface design description	112	G3SW-003		
	Software change request/ problem report	113	G3SW-003		
	Software test procedures	114	G3SW-003		
	Software users manual	115	G3SW-003		
	Software version description	116	G3SW-003		
	Software metrics report	117	G3SW-003		
	Software test report	118	G3SW-003		
Compliance	Compliance matrix	125	G1SW-031, G1SW-032 G3SW-003	App B	
Software Lifecycle Planning	Software safety plan	130	G3SW-001, G3SW-003	4.x.2.1	
	IV&V Plan	131	G1SW-035 G3SW-059	5.2	

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NPR Section	Requirement Descriptor	SWE #	GPR 7150.1, GPR 7150.3 Reqmts.	SAMP Section	Specific Process, Tailoring Variants, Waivers or Exceptions
	Software Classification	132	G1SW-003	Appendix B	
	Safety Criticality	133	G1SW-004, G1SW-005	4.x.2.3	
	Safety-critical software requirements	134	G3SW-003	4.x.2.3	
Software Implementation	Static analysis	135			
	Validation of software development tools	136	G3SW-003, G3SW-059		
Software Peer Reviews/ Inspections	Peer Review/Inspections of Software plans	137	G3SW-047, G3SW-048	1.2	"Waiver Process" as defined in the appendix of GPR 7150.1 and in GPR 1400.1 "Project Planning" 580-PC-004-04"
Software Documentation Requirements	Software safety plan contents	138	G3SW-003	4.x.2.1	(This SMP/PP template and Appendix C, this chart)

Appendix D: Work Breakdown Structure (WBS)

The detailed WBS for this effort is provided in the following table.

1	Acquisition Planning & Management		In scope for AMT? (Yes/No)
1.1	Develop Acquisition Strategy		
1.1.1	Identify Technical Requirements	Determine and document the functional, operational, and performance requirements for the product to be acquired	
1.1.2	Perform Make or Buy Trades/Market Research	Determine whether there is an existing product (GOTS or COTS) that would meet the requirements; perform market research to assess potential products and technologies; make decisions on whether the product will be custom made, an existing product, or a modified existing product.	
1.1.3	Identify Stakeholders and Risks	Based on requirements and make/buy decisions, determine who the stakeholders will be; identify any risks associated with the acquisition.	
1.1.4	Establish and implement method for software status analysis, reporting and metrics	Negotiate software-specific progress and quality measures and measurement logistics with the customer; establish and implement method for gathering, reporting software status, including software metrics, for requirements definition, software design, implementation, and software test phases.	
1.1.5	Assist in establishing software-related project baseline	Assist in establishing software-related project baseline activities, including build/release reviews, documentation and software version descriptions.	
1.2	Develop Acquisition Schedule	Develop a schedule for the effort, including solicitation, supplier selection, supplier monitoring, and product acceptance and transition to operations (as appropriate.)	
1.3	Develop Acquisition Plan/ SAMP (Contractor Monitoring Plan)	Write, review, and maintain the acquisition plan based on the approved template.	
1.4	Manage AMT ongoing activities	Track and manage AMT ongoing activities to achieve software and programmatic goals, including AMT planning and training.	
2	CONTRACT SOLICITATION, SELECTION & AWARD		In scope for

			AMT? (Yes/No)
2.1	Prepare Acquisition Package/Distribute RFP	Develop the solicitation package, including the SOW. Acceptance criteria, and solicitation constraints; identify potential suppliers and distribute the solicitation package to them.	
2.2	Evaluate Proposals and Select Contractor	Prepare selection criteria, receive the proposals, evaluate proposals based on the criteria, and select the contractor who best meets the criteria.	
2.3	Negotiate Contract and Get Signatures	Meet with the contractor and negotiate details of the contract; finalize the contract with signatures from both government and contractor representatives.	
3	CONTRACT MONITORING & QUALITY ASSURANCE		In scope for AMT? (Yes/No)
3.1	Interpret Technical Requirements	Resolve software requirements issues between the supplier and the government, review contractor-prepared requirements documents to ensure consistency with the original intent, and ensure that the requirements for building security in early, addresses both custom software and COTS/GOTS, and that the software element requirements include delineating software requirements by functions, identifying design drivers and interfaces, and specifying safety/security-specific requirements.	
3.2	Evaluate Contractor Progress With Respect to Cost	Assess financial data provided by the contractor to ensure that the actual and projected budget and cost numbers are consistent with contract terms and conditions.	
3.3	Monitor Contractor Skill Mix	Periodically assess the skill mix provided by the contractor to verify that agreed-upon or required skills and experience levels are being provided.	
3.4	Oversee GFE	Ensure that all agreed-upon government furnished equipment and information is made available to the contractor on a timely basis.	
3.5	Monitor Contractor Processes	Periodically assess processes used by the contractor in performance of the work; ensure the processes conform to any process requirements stated in the contract (e.g., conformance to NPR 7150.2 or CMMI models of a specified level)	
3.6	Manage Documentation	Review and assess the adequacy of	

		documentation provided by the contractor; provide comments on documents reviewed and verify that those comments, as negotiated with the contractor, are implemented.	
3.7	Report Status to Management	Provide regular status reviews to higher-level management on progress of the acquisition activities (items in this WBS) and of the contractor's progress toward completion of the product.	
3.8	Monitor Risks	Regularly assess the status of identified risks; include any new risks that have been identified; maintain the status in a risk tool; provide regular reports of risk status in the management reviews.	
4	CONTRACT ADMINISTRATION		In scope for AMT? (Yes/No)
4.1	Review Contractor Invoices and Manage Budget	Assess the contractor-provided financial data and invoices monthly to ensure that invoices are correct and that allocated budget has not been exceeded; increase allocated budgets as appropriate.	
4.2	Report Contract Issues (to CO)	Upon identification of any contract-related issues, work with the Contracting Officer in a timely basis to ensure resolution of the issue.	
4.3	Initiate Needed Contract Changes	Upon identification of the need for modification to any terms and conditions of the contract, document the requested change and work with the Contracting Officer in a timely basis to effect the change.	
4.4	Provide Evaluation of Contractor Performance	Evaluate the contractor performance periodically in a manner consistent with the contract; document the evaluation and provide the evaluation to the Contracting Officer.	
5	PRODUCT ACCEPTANCE & CONTROL		In scope for AMT? (Yes/No)
5.1	Review Deliverables for Acceptance	Upon receipt of deliverables from the contractor, evaluate the products based on agreed-upon acceptance criteria (or based on generally accepted standards if no criteria has been established); document the results and work with the contractor to resolve any acceptance issues.	
5.2	Perform Configuration Management	Place formal deliverables received under configuration control.	
5.3	Transition Products to	Following acceptance of delivered	

	Operations and Maintenance	products, support the transition of those products to an operational environment and/or a maintenance environment.	
6	CONTRACT CLOSE-OUT		In scope for AMT? (Yes/No)
6.1	Monitor Completion of Contract Requirements	Verify that all terms and conditions of the contract have been satisfied.	
6.2	Validate GFE Inventory	Verify that all GFE has been returned, as appropriate.	
6.3	Submit Final Reports	Complete final reports as requested by Contracting Officer	
6.4	Complete Final Performance Assessment Report	Provide a final contractor performance evaluation to the Contracting Officer.	

Appendix E: DML

The TOOLS section of the GSFC PAL provides a Data Management Tool that contains instructions on how to develop your DML. You are strongly encouraged to use this tool or, at a minimum, to read and follow its instructions for generating a DML because the tool is specifically designed to meet NPR and CMMI requirements.

The TESS DML is currently in work.

Appendix F: AMT Monitoring Activities

The AMT gains insight into supplier progress and performance through participation in milestone reviews, technical interchange meetings, peer reviews, and various other supplier activities. The table below lists the monitoring activities by Phase and indicates specific artifacts that are examined.

Phase	Specific Monitoring Activities	Artifact(s)
At Project Start	<ul style="list-style-type: none"> • Review and analyze the plans and schedule of software development via TIMs, and other collaborative meetings • Assess supplier's processes and experience with proposed development processes (e.g., SW Dev, SW CM, SW SMA, software safety, etc.) via TIMs, etc. • Characterize the monitoring effort and develop the AMT plan in the SAMP • Negotiate software-specific progress and quality measures and measurement logistics with the supplier • Assist in establishing software-related project baseline activities • Assess preliminary architecture for software security, and to ascertain Element mapping and understand software allocation within the system • Ensure that contractors software development plans and approach contain adequate technical and management processes to address software security, safety, COTS/GOTS implementation, and custom development • Asses software security risks 	Weekly Telecon Charts SAMP Review comments
During Requirements Definition thru SRR	<ul style="list-style-type: none"> • Re-characterize the AMT effort given in the supplier SMP and update the SAMP, as needed • Establish the method for gathering and reporting Software Status, including software metrics • Initiate the implementation of Software Status analysis and reporting for software requirements definition phase including software metrics • Attend TIMs to support Project and AMT activities including identification of risks and mitigation approaches • Resolve software requirements issues between the supplier and government • Review plans to ensure software-related technical and management concerns are addressed • Ensure that Preliminary Element software requirements (functional, non-functional, interface) contains adequate considerations for defining requirements for software elements including 	SRR presentation SAMP DPR Review comments SRR, Requirements review comments Review comments SRR package

Phase	Specific Monitoring Activities	Artifact(s)
	<p>delineating software requirements by functions, identifying design drivers and interfaces, specifying safety/security-specific requirements, and addressing requirements traceability to the subsystem level</p> <ul style="list-style-type: none"> • Review system level architecture for software security, and to ascertain Element mapping and understand software allocation within the system • Verify software requirements traceability is complete. Ensure that the approach and requirements for building security in early, addresses both custom software and COTS/GOTS • Analyze requirements-related peer review data and coordinate with the supplier to ensure software quality, catch errors earlier in the lifecycle, and improve schedule and cost predictability • Make provision for software static analysis and reporting • Review SRR package in preparation for milestone reviews 	
<p>During Preliminary Design</p> <p>SRR thru PDR</p>	<ul style="list-style-type: none"> • Re-characterize the AMT effort and update the SAMP based on the SRR results • Implement the Software Status analysis and reporting for software design phase • Attend TIMs to support Project and AMT architecture and design activities • Resolve software design issues between the supplier and government • Continue to review and assess plans to ensure software-related technical and management concerns are addressed • Ensure that the supplier's software approach and design for building security in early, addresses both custom software and COTS/GOTS Review, and assess software interface design to ensure software requirements are adequately addressed • Ensure that the software architecture solution will address ConOps scenarios, and other software architecture risks and issues • Verify non-functional requirements can be met by the software design solution especially the need for high reliability • Ensure that Project software design has adequate considerations for peer reviews, software safety, traceability from requirements to design, and COTS solutions. Verify software requirements traceability from software requirements to software design • Review and verify completeness of COTS/GOTS list 	<p>DPR</p> <p>DPR</p> <p>Review comments</p> <p>Review comments</p> <p>PDR package</p>

Phase	Specific Monitoring Activities	Artifact(s)
	<p>and associated information including upgrade schedule</p> <ul style="list-style-type: none"> • Review samples of the design-related peer review data and coordinate with the supplier to ensure software quality, catch errors earlier in the lifecycle, and improve schedule predictability • Review PDR packages in preparation for milestone reviews 	
<p>During Critical Design</p> <p>PDR thru CDR</p>	<ul style="list-style-type: none"> • Re-characterize the AMT effort and update the SAMP based on the PDR results • Continue the Software Status analysis and reporting for software design phase • Continue to attend TIMs to support Project and AMT architecture and design activities • Review supplier's plan for modeling and simulation and updates to other plans to ensure software-related technical and management concerns are addressed • Continue oversight on maintenance of COTS/GOTS list and associated information to ensure COTS related issues are addressed • Verify that security is adequately addressed in the final software design for both custom software and COTS/GOTS. Continue to assess software interface design to ensure software requirements are adequately addressed • Verify that the final software architecture solution mitigates identified software-related risks and issues including the need for high reliability • Ensure design adherence of the software architecture • Continue to verify software requirements traceability from software requirements to software design • Continue reviewing and analyzing samples of the design-related peer review data and coordinate with the supplier to ensure software quality, catch errors earlier in the lifecycle, and improve schedule predictability • Review CDR packages in preparation for milestone reviews 	<p>DPR</p> <p>DPR</p> <p>Review comments CDR package</p>

