System Performance Specification

for the

KNEAD Example System

DCN: KNEADOCD20240221-P1:58

Revision Date: 29 Apr, 2024

Prepared by:

Zachary Steinberg
Garden Control System
Washington, D.C. 20001 USA

DOCUMENT CHANGE HISTORY

The following table is a simple list of released revisions sent for review. Records of reviews and the review artifacts are saved with reviewer information in the The KNEAD Projectartifact repository.

Change Record

Date	Version	Author(s)	Change Reference
21 Feb 2024	P1	Lewis Collier	Preliminary DRAFT version

Each subsequent "section" outlines changes in each release.

Items in this version that are marked with change bars have been modified from the most recent previous version (e.g. P3 changes from P2) or are new as of the current revision.

Draft P1 Preliminary version of this document.

TABLE OF CONTENTS

LIST OF TABLES

Table **Page**

LIST OF FIGURES

Figure **Page**

CHAPTER 1

Scope

ALL-1.0 ::

If applicable, each section has a summary of data item description (DID) information shown in this font. These are displayed in small capital font and are not part of the formal document. Display of these DID information notes can be turned off for formal releases, but are displayed here for reference.

This document provides the System Performance Specification (SPS) for the Garden Control System. The system will be referred to as the GCS.

1.1 Identification

ALL-1.1 :: The Garden Control System is an RP2040 based microcontroller board.

This paragraph shall contain a full identification of the system to which this document applies, including, as applicable, identification number(s), title(s), abbreviation(s), version number(s), and release number(s).

The Garden Control System described in this document shall be known as GCS version 1. However, the System Performance Specification SPS described herein shall be applicable to pre-releases such as Beta-releases for a phased release as listed for each requirement. The major system interfaces and capabilities are fully specified in Chapter 3.

1.2 System Overview

ALL-1.2 :: This paragraph shall briefly state the purpose of the system to which this document applies. It shall describe the general nature of the system; summarize the history of system development, operation, and maintenance; identify the project sponsor, acquirer, user, developer, and support agencies; identify current and planned operating sites; and list other relevant documents.

The Garden Control System will be able to measure moisture levels and control irrigation in raised garden beds. The purpose for GCS is to maintain ideal gardening and growth conditions for fruits, vegetables, and other garden plants throughout a growing season. The goal for GCS is to automate the watering process for DIY gardeners. GCS will monitor temperature, moisture levels, and additionaly environmental factors to determine when to water the plants. Garden Control System is being developed by Zachary Steinberg and sponsored by University of Maryland Graduate Engineering. The operator and maintaner of GCS will also be Zachary Steinberg. The GCS will be operated outside along raised garden beds. GCS is designed to be used by home gardeners. It is not intended for industry. GCS

will be controlled by a Raspberry Pi Pico W microcontroller board.

Figure **??** shows the development kit used for the GCS system. This is an image of

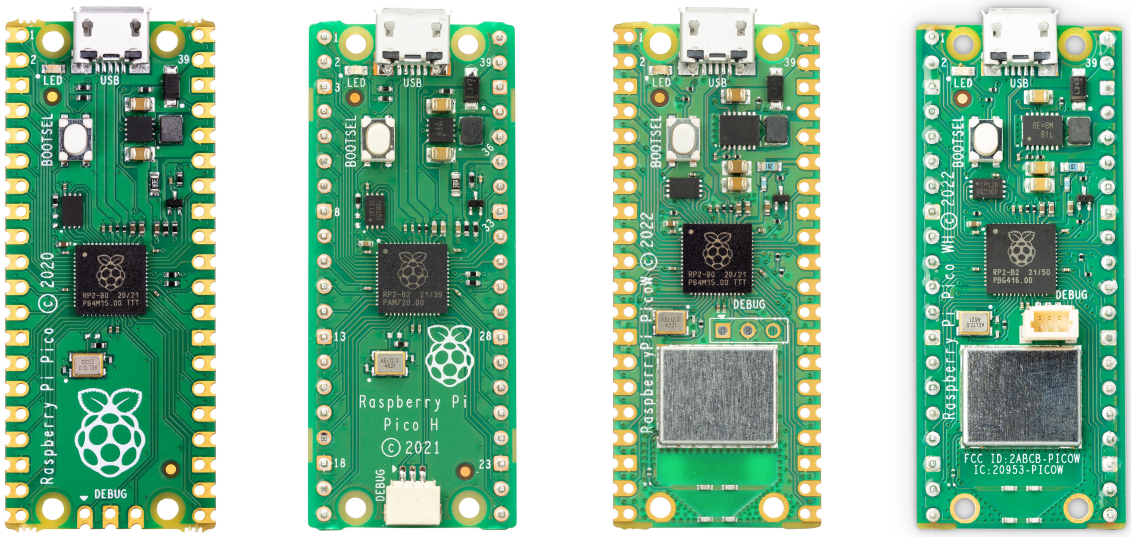

Figure 1: Raspberry Pi Pico W microcontroller board

different versions of the Raspberry Pi Pico microcontroller board. (This is a test image)

1.3 Document Overview

ALL-1.3 :: This paragraph shall summarize the purpose and contents of this document and shall describe any security or privacy considerations associated with its use.

This section provides information about this document's security/privacy considerations, contents, structure, and version information. This section also provides information regarding how specifications are formatted in this artifact and how they can best be understood.

1.3.1 Security and Privacy Considerations

This document is not subject to CUI restrictions.

This section provides information about the format of this document. Some information provides general details about the format of this specification document. This information, such as formatting details, is common across all levels of specification documents. Other information is specific to this particular document. This information is provided to assist the reader in understanding the format and layout of the information contained in this document.

1.3.2 Document Sections

This document format is based upon the guidance in the SRD template from MIL-HDBK-520A [**ref¨MIL˙HDBK˙520**]. The specifications and associated acceptance criteria are documented following the guidelines of ISO-12207 [**ref¨ISO˙12207**] and MIL-STD-498 [**ref¨MIL˙STD˙498**] (from which ISO-12207 originated). The document follows the SSS DID [**ref¨SSS˙DID**], with a few minor tailoring changes.

The first format tailoring change allows for the system interfaces to be specified before the system capabilities. This follows standard structured design practice (e.g. Yourdon's Structured Method) whereby the system context is provided before the design itself. The net result of this change is that system capabilities are presented in section 3.3 instead of 3.2, as prescribed in the SSS template, and external system interfaces are described in section 3.2 instead of section 3.3 as prescribed in the SSS template. This allows the data inputs to the system to be defined *before* they are used in the capabilities section.

The second format tailoring change relates to placement of general material within the document. The qualification provisions and traceability details, if applicable, are listed with each requirement. This formatting, which is allowed in the SSS DID [**ref¨SSS˙DID**], allows the reader to view all relevant information for each requirement in a single location, rather than requiring constant page turning. This information may be duplicated in Sections 4 and 5, respectively, but if done this way, it can be generated automatically to prevent manual

duplication errors. The table of acronyms is also listed in chapter two, versus the notes section, so that it may be parsed by readers before encountering most of the acronyms.

Otherwise, this document follows the listed SSS sub-section order.

Section 1 provides an overview of the system and this document.

Section 2 lists general and application-specific reference documents as well as glossary terms and acronyms.

Section 3 details the specifications for the system.

Section 4 maps the specifications to quality provisions.

Section 5 traces specifications to the original source.

Section 6 if needed, lists any general notes as may be applicable beyond any notes provided in the requirement and expectation tables in section 3.

Appendices if needed, provide additional information as may be needed.

1.3.3 Document Version Information

This document was produced in LaTeX and *BibLaTeX/Biber*. The editing and document preparation were performed using MiKTeX version 2.9 with the build option [LaTeX ⇒ PS ⇒ PDF]. The LaTeX*svn-multi* package was used to glean SVN tracking information, when files are stored in an "SVN" version control system. The style `KNEADdocument` was used to provide the LaTeX and *BibLaTeX/Biber* formatting details.

This revision of this document has the following properties:

Tracking Item	Data
Repository	`https://svn.riouxsvn.com/kneadlatxinputs/ExampleArtifactFolders/2%20-%20SPS/KNEAD_SPS.tex`
Author	
Revision	-2
Rev Date	
Print Date	29 Apr, 2024 04:31
KNEADdocument Version	1.00
KNEADdocument Date	2021/12/05

1.3.4 Specification Formatting

The specifications are listed and numbered by document sections. The fully qualified specification numbers include the sub-section in which it is contained. These specification numbers are tied to the document level thus they are numbered from 1 to N for each sub-section of the requirements section. This is done to allow for additions within a sub-system without affecting the numbering in other sub-systems. Once a specification has been added, it cannot be deleted, only its status may be changed to “inactive” or “deleted” to preserve numbering.

This document allows for marking changes to specifications. All specifications may be marked with a change bar. This generally implies that one or more parts of a specification changed from the prior revision. A note should be provided to indicate the reason for the change, and when, so that future versions of the document, which do not include the change bar, still have rationale included for the current value.

The system specifications are listed in a common table format as shown in Requirement **??**.

Specification 1.3.1 Specification Table Format	
Text	1. The first row of a table provides a unique number and a title for the requirement or expectation. This row is generated from the first 3 arguments. 2. The second row of the table provides the specification text of the requirement. Normally this is a single sentence with a single testable requirement (shall) statement. This example uses an enumerated list in order to describe all the rows in a single table. 3. The next row of the table provides the status for the specification listed in the table. This includes the applicable phases or release versions in which the required feature is supported, where S ∈ {(T)hreshold, (O)bjective, (I)nactive, (D)eleted}. 4. The next row of the table provides the acceptance criteria. This row follows the form of "This requirement shall be verified by V ∈ {inspection, demonstration, test, analysis}." Additional information regarding testing can be provided in the notes section. 5. The next row of the table provides the traceability of the requirement. The traceability connects the requirement to a higher level document that calls out the need for a requirement. The structure of traceability is expected to be of the form "This requirement traces to MIL-STD-498 [**ref˙˙MIL˙STD˙498**] and ISO-12207 [**ref˙˙ISO˙12207**]." Note that the source is expected to be listed in the reference documents section. 6. The final row of the table provides, if applicable, notes for the specification. Notes are not a formal part of the requirement or expectation but provide supporting information regarding the feature.
Status	**All phases** This format is active for all specifications in this document.
Acceptance	This specification is not a testable requirement for the system; it is for demonstration purposes only.
Traceability	**N/A** There is no traceability for this requirement.

P1

The status designations for each specification S ∈ {(T)hreshold, (O)bjective, (I)nactive, (D)eleted} are based on the following criteria.

(T) - Threshold Items marked "(T) - Threshold" are driven by the project threshold needs that must be met in the specified phase.

(O) - Objective Items marked "(O) - Objective" are objective goals of the system in the specified phase. These requirements may stay (O) for all listed phases or may transition from (O) to (T) in future phases. This provides hints as to future expansion of system capabilities so the design can account for the feature without significant later rework.

(I) - Inactive Items marked "(I) - Inactive" are requirements that are not currently to be met by the system in the specified phase. Unlike '(O) - Objective" requirements, (I)

requirements may be in limbo in terms of certain details but their inclusion may also provide hints as to future expansion of system capabilities.

(D) - **Deleted** Requirements that are not to be met by the system are marked by "(D) - Deleted". Use of this status, vice removal of the requirement text, preserves the numbering of subsequent requirements and notes that the requirement once was invoked. The rationale for the deletion should be included in the notes section.

External tools have been written that allow for automatic generation of other documentation. Specially, data for chapters and appendices that follow the requirement specifications, can be gleaned automatically to ensure integrity between the sections of the documents. In addition, the listing of KPP and KSA values into a "B-spec" can be automated. Finally, the full set of requirements, and the associated attributes, are exported to a comprehensive .CSV file for import into external tools such as DOORS™.

This table approach offers other advantages besides automated parsing for import into tools. As can be seen in Table **??**, and in all the specifications, this format groups all information for each specification into a separable and easily viewed structure. The document sections and subsections provide a logical grouping of the specifications but the table allows all pertinent information to be grouped, vice being split across major sections of the document. This grouping allows for easier presentation since each grouping is similar to a "PowerPoint" presentation slide. And, as will be seen in Section **??**, it can help the writer organize specifications. The approach also allows for a "List of Specifications" to be generated. Each table is listed in the list of specifications so that each high level grouping can be quickly located from the list. Of course, the tables are located in the appropriate sections as noted in Section **??** so they can be found in that manner as well.

Another major advantage of the table format is the "Notes" section. As specifications are developed, there will be many issues to be resolved. And, once issues are clarified, tracking the rationale for the decision is just as important as recording the answer [**ref˙˙Brooks˙MMM**]. Thus the notes section helps the reader and the writer. The writer has a logically grouped place to put notes for each specification and the reader can easily find them without having to refer to footnotes, separated sections, or external documentation.

1.3.5 How To Read Specifications

System Performance Specification (SPS) documents, by their very nature, are a collection of independent but interconnected facts. Systems require interfaces from which inputs are consumed and to which outputs are produced. These input data are transformed by the capabilities to produce the outputs. The entire system has myriad other requirements ranging from data formatting through physical limits on things like the enclosure and packaging.

Finally, at the system level, specifications need to dictate *what, and, how well* a system must perform. Likewise, in order to separate documentation functionality, the SPS should not state explicitly *how* the system is to be formed, except in very special circumstances. Given the disparate nature of the requirements, system performance specifications can be hard to digest.

System / sub-system Segmentation Specification (SSS) and Software Requirements Specification (SRS) documents suffer from many of the same issues as do SPS documents. An SSS turns the performance specification into a first level design. Where the SPS has disparate performance requirements, the SSS has disjoint hardware and software configuration items listed as well as a mapping of the two items on to, and in to, each other. For the requirement management function, each element of the system design in the SSS traces back to the overall SPS specifications. Only at the SRS level do the requirements start to focus on a single item. Thus, the SSS and SRS level documents describe share a common contextual issue with the SPS document.

An understanding of the documents' structures is needed to help parse the information. The developers of MIL-STD-498 [**ref¨MIL˙STD˙498**], however, understood this and devised a format that can help manage the information overload. The method by which this is accomplished is to organize requirements into eighteen specific groupings. By understanding these groupings, a reader can improve their understanding of the system described by the requirements by understanding that specific information is listed in specified sections.

These documents follow a *read-forward* mentality so that base information is provided before it is actually needed.[1] For example, the referenced documents (and in this document the list of acronyms and glossary terms) are provided in the second chapter, before most items are actually cited. By presenting this information to the reader before citation, the format allows the reader to glean upfront information about the kind of things that will be covered later on in the document. Presentation of the referenced material ahead of the document body also allows the reader to have a priori information before encountering the symbol in the text. By understanding these formatting clues, the reader is able to be prepared for what is coming further down the road in the document.

Another reason for this organization is that different readers process information differently. There is no one format that will be best for all readers. By having the information

[1] In fact, the read-forward philosophy extends across the documents as well but that topic is beyond the scope of this discussion.

in standardized sections across all such performance specifications, however, readers can use the document as a reference as needed. As an example, Section 3.1 of these documents will always define the system states and modes. If a reader wants to look up this information, it is always in that section. And, since it is listed first, all ensuing sections can reference states and modes in order to qualify their requirements. Likewise, having external interfaces presented *before* the capabilities means that the capabilities can define the transformations without having to worry about how the data is ingested into the system; the data is already "in the system" from a reader's point of view when the data is needed to define the transformation.

This separation between, and the presentation order of, the data and processing is important when the same data supports multiple capabilities. A hierarchical description of "derived" requirements often would have a capability definition leading to the requirements for the data needed by the capability. In the case, which occurs often, where the data is used in two different transformation capabilities, a hierarchical approach of capability leading to external interfaces is met with the problem of which capability gets to have the data interface in its tree. This approach also leads to the dilemma of what to do when that first capability is no longer needed by the system but the second capability, and thus the data defined under the first capability tree, still *is* needed by the system. Just as loosely coupled software is more maintainable, so are loosely coupled requirements.

A final note about reading actually comes from ideas about how to write a requirement document. The document format dictates a linear flow from start to finish. A reader often reads a document the first time from front to back; this is why the *read-forward* approach works.

The writer, however, is *not* constrained in the same linear manner. Thus, while writing requirements about a capability, the idea for a new state or mode may arise. The writer can easily jump to the states and modes section in order to add in the information and then return to complete the capability that led to the new state or mode, safe in his knowledge that when the reader sees this new specification, they should have already seen the newly defined state or mode that is used to qualify the requirement since the state or mode was already presented in an earlier section.

Readers can use this information to enjoy the fact that the writer jumped around in the writing phase to save the reader the same effort when trying to read the document. By understanding the sections and the expected contents of the sections, which are defined in

the SSS DID [**ref˙˙SSS˙DID**] and the related MIL-STD-498 [**ref˙˙MIL˙STD˙498**] document templates, a reader can read cover-to-cover, or jump to the needed information quickly, knowing that the writer put the information in the specified sections to make finding the information easier for the reader.

1.3.6 Specification Traceability

A project typically has several levels of statements of what needs to be done. Often an Operational Concept Description (OCD) is developed to provide a high level description of the system to be developed and its expected uses. A set of documents that follows the MIL-STD-498 [**ref˙˙MIL˙STD˙498**] DID formats is often developed for a project. A Statement of Work (SOW) or a Statement of Objectives (SOO) is often developed to direct contractors on a project. While a SOW or SOO is supposed to be more contractual statements of tasks and objectives rather than actually trying to specify what needs to be built, these documents often, however, do include system requirements. A better method is to have the SOW or SOO reference a formal SPS so that the full scope of the system can be defined. Situations for every project differ so the main thing to understand is that there will be many documents and that their contents need to be related to each other.

Given the number of specifications for a system, and all the levels at which the specifications may be written, understanding if all needs of a system are being met is critical. Different documents have different levels of specifications and design materials. A mapping between the specifications at all of the different levels is essential to make sure that the design meets all of the stated needs of the system and that the system does not include capabilities that are not required.

As a system performance specification, the SPS is the highest level of specification of systems requirements. This document defines *what* the system needs to do without saying *how*. Thus, in general, there should be nothing higher to which the requirements in a SPS can be traced. In practice, however, some document such as an OCD for the system, informal customer requirements documents, or a SOW or SOO for the project may be provided that indicates some of the system needs. If the specifications in the SPS meet all the use cases in the OCD then the system meets the needs but only if the use cases are all inclusive. Likewise, if the SOW or SOO tries to list things the system needs to do, these needs must be tracked. And, of course, statements of need in any straw-man requirements documents need to be met. Once the fully developed SPS specifications are captured then the higher level document(s) be examined to make sure that, at a minimum, all of those things listed

are captured in the SPS. This process ensures that the SPS is compliant with the other "defining" stakeholder documents.

To ensure coverage compliance, each of the higher level needs, whether implied or explicitly stated, needs to be mapped to the SPS specification(s) that cover each given need. This is expected to result in a one-to-many relationship where many of the SPS specifications are mapped to a single upper level need. And, each specification in the SPS can be mapped to multiple needs depending on the independence of the needs. The details of how to do this mapping, which is best handled through some relational database tool (e.g. DOORS™), are beyond the scope of this introduction. The important thing to note is that this traceability determines if the SPS covers the known needs of the system. Since a well-formed SPS includes many more facets than an OCD or SOW/ SOO, there may be orphan SPS requirements that do not map directly to the higher level documents. However, there can be no orphan needs from the stakeholder documents that do not map to the SPS. The key here is to perform a mapping between the SPS and any higher level stakeholder documents to ensure that the specifications of the SPS provide compliance to the higher document(s).

Another way of saying this is to summarize the overall design philosophy as follows: a level of design should be carried out and mapped to higher level artifacts rather than simply "deriving" requirements from the higher level documents. This mapping process, thus, is *not* a way to derive a fully defining set of requirements for the SPS. The act of "deriving" specifications of system from a non-specification document such as a OCD, SOW, or SOO does *not* ensure that all the true system needs are captured. In fact if this approach is followed then often many requirements are missed because of the incomplete nature of the OCD, SOW, or SOO list of system needs.

An SPS, just like any level document, needs to be developed using domain knowledge and by following best practices and a well-defined documentation format. All of the things that must be considered for defining a successful system need to be included in the SPS. Note that, obviously, if the SOW did all of this then the SOW would be the SPS. But, in practice, this rarely ever happens, nor should it. The SOW or SOO are programmatic level documents that list things to do to build the system; they are not supposed to define the system. This is the job of the SPS.

The system / sub-system segmentation specification (SSS) is the second level of specification of systems requirements. The SSS starts to define *how* the system will meet the needs and should include a top-level system decomposition (or segmentation) of capabilities from

the SPS to the sub-systems of the system. In a typical documentation set, there should be a higher-level document (i.e. the SPS) to which the specifications in the SSS can be traced. The goal here is to ensure compliance with the higher level document much as was done with the SPS and higher level programmatic documents. If the design specifications in the SSS cover all the performance specifications in the SPS then the system design covers the documented system needs. This does not mean that the system *will* meet the performance specifications, it just means that there are no obvious holes. And, of course, if some SPS specifications are not covered in the SSS then those specifications obviously cannot be met by the system design.

Since the SPS and SSS documents are all explicit statements of requirements, there can be no gaps between the specifications in them. If there is no mapping from at least one SSS requirement to each of the SPS requirements then the system cannot meet the stated requirements of the SPS. While the goal here is to ensure that the specifications of the SSS provide coverage to the higher document, true compliance can only be determined through design analysis and testing efforts. And, if there is an orphan SSS requirement then the questions must be asked: "Why is this requirement included?" and "Can this requirement be deleted?". Taken together, the SPS and SSS documents can form the basis for a well-formed design artifact set: References to higher-level artifacts document where the system goals came from and the code (and hardware) level artifacts (source code and CAD models) should describe the final product details. Coupled with appropriate test documents, this level of design process and documentation generation should adequately allow for successful development while preserving the architectural aspects for future revisions and modifications.

Because this is the overall system performance specification, this document may provide traceability to miscellaneous project documents. This allows for tracking of related doctrine, vendor, and draft specification requirements as the document is being created.

CHAPTER 2

References

This section provides a list of referenced items for this document.

2.1 Acronyms and Abbreviations

This section defines acronyms and abbreviations used in this and related documents.

Table 1: Acronym Definitions

Acronym	Definition
GCS	Garden Control System
UMD	University of Maryland
MAGE	Maryland Applied Graduate Engineering
ENPM	Engineering Professional Masters
End of acronym definition table	

2.2 Glossary and Definitions

This section defines glossary terms used in this and related documents.

Table 2: Glossary Terms and Definitions

Glossary Term	Definition
Communications	Communication is information transfer, among users or processes, according to agreed conventions.
Customer	The local government project lead who is acting as a general manager for the sponsor to ensure that the contractor team executes the project according to stakeholder goals.
End of glossary terms table	

2.3 Referenced Documents

This section lists the referenced documents for this document. The references are categorized into two categories:

External Documents not directly associated with this project.

Project Documents that are directly associated with this project.

2.3.1 External Documents

2.3.2 Project Specific Documents

CHAPTER 3

Requirements

SPS/SSS-3.0.0 :: This chapter shall be divided into the following sections to specify the system requirements, that is, those characteristics of the system that are conditions for its acceptance. Each requirement shall be assigned a project-unique identifier to support testing and traceability and shall be stated in such a way that an objective test can be defined for it. Each requirement shall be annotated with associated qualification method(s) (see section 4) and, for subsystems, traceability to system requirements (see section 5.a), if not provided in those sections. The degree of detail to be provided shall be guided by the following rule: Include those characteristics of the system that are conditions for system acceptance; defer to design descriptions those characteristics that the acquirer is willing to leave up to the developer. If there are no requirements in a given paragraph, the paragraph shall so state. If a given requirement fits into more than one paragraph, it may be stated once and referenced from the other paragraphs.

This section provides the requirements that define the performance required of the GCS. These specifications are divided into the major capabilities of the system. Each requirement is listed in the area that provides the specified capability, thus this section provides an immediate mapping of performance requirements to the capability area in which each requirement is met. Each requirement also includes traceability to high-level requirements that drive the specific capability. Validation methodology is provided here but verification traceability is provided in the STS artifacts.

The requirements also are specified in an order that generally allows for all precursor requirements to be stated before they are needed by a successor requirement. Thus, States and Modes are defined at the onset so that they can be used to regulate when external interfaces and processing steps may occur. Likewise, external interfaces are described so that the data from the interfaces may be used in, or created by, the ensuing processing. Once the processing is specified, the internal interface and data requirements are listed, showing how the overall system segments tie together. The remainder of the sections follow a somewhat similar pattern, but these latter sections contain disparate requirements that are separated and organized in a standard way so the contents can be easily scanned to locate specific requirements based on their type and expected location within the SPS.

These specifications also include qualifications for both Threshold (must meet) and Objective (want to meet) requirements for GCS. The reader is cautioned to ensure that the requirement details be understood for the two modifiers.

3.1 States and Modes

SPS/SSS-3.1.0 :: If the system is required to operate in more than one state or mode having requirements distinct from other states or modes, this section shall identify and define each state and mode. Examples of states and modes include: idle, ready, active, post use analysis, training, degraded, emergency, backup, wartime, peacetime. The distinction between states and modes is arbitrary. A system may be described in terms of states only, modes only, states within modes, modes within states, or any other scheme that is useful. If no states or modes are required, this paragraph shall so state, without the need to create artificial distinctions. If states and/or modes are required, each requirement or group of requirements in this specification shall be correlated to the states and modes. The correlation may be indicated by a table or other method in this paragraph, in an appendix referenced from this paragraph, or by annotation of the requirements in the paragraphs where they appear.

This section lists the states, sub-states, modes, and sub-modes that are provided by the system. While these terms can be construed in many ways, for this document, the following meanings are used:

States are the basic configurations of the system.

Sub-states are the effective state of being for the system.

Modes are the basic functions to be performed by the system when in a given state and/or sub-state.

Sub-modes if listed, are specific function modifications to be performed by the system within the given mode/function.

3.1.1 States

A summary of the states is provided in Table **??**. See the formal specifications, if applicable, in the following sections for formal statement of the state requirements, and accompanying notes that provide further clarification on the meanings of the states.

STATES	
State Name	**Summary**
State 1	summary
State 2	summary
State 3	summary

Table 3: Summary of States for Garden Control System

Specification 3.1.1.1 State One	
Text	The system shall provide the State-1 state.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. The State-1 state generalizes the case where the system is ...TBD....

Specification 3.1.1.2 State Two	
Text	The system shall provide the State-2 state.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. The State-2 state generalizes the case where the system is ...TBD....

Specification 3.1.1.3 State Three	
Text	The system shall provide the State-3 state.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. The State-3 state generalizes the case where the system is ...TBD....

3.1.2 Sub-States

A summary of the sub-states is provided in Table **??**. This table also provides a list of the states in which each sub-state is valid. See the formal specifications, if applicable, in the following sections for formal statement of the sub-state requirements, and accompanying notes that provide further clarification on the meanings of the states.

SUB-STATES		
Sub-State Name	**Summary**	**Valid States**
Sub State A	summary	State 1
Sub State B	summary	State 2
Sub State C	summary	State 3

Table 4: Summary of Sub-States for Garden Control System

Specification 3.1.2.1 SubState A	
Text	The system shall provide the SubState-A substate.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. The SubState-A substate generalizes the case where the system is ...TBD....

Specification 3.1.2.2 SubState B	
Text	The system shall provide the SubState-B substate.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. The SubState-B substate generalizes the case where the system is ...TBD....

Specification 3.1.2.3 SubState C	
Text	The system shall provide the SubState-C substate.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. The SubState-C substate generalizes the case where the system is ...TBD....

3.1.3 Modes

A summary of the modes is provided in Table **??**. This table also provides a list of the sub-states in which each mode is valid. See the formal specifications, if applicable, in the following sections for formal statement of the mode requirements, and accompanying notes that provide further clarification on the meanings of the states.

MODES		
Name	**Summary**	**Valid Sub-States**
Mode 1	Mode 1 summary	Sub-State A
Mode 2	Mode 2 summary	Sub-State B
Mode 3	Mode 3 summary	Sub-State C

Table 5: Summary of Modes for Garden Control System

Specification 3.1.3.1 Mode One	
Text	The system shall provide the Mode-1 mode.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. The Mode-1 mode generalizes the case where the system is ...TBD....

Specification 3.1.3.2 Mode Two	
Text	The system shall provide the Mode-2 mode.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. The Mode-2 mode generalizes the case where the system is ...TBD....

Specification 3.1.3.3 Mode Three	
Text	The system shall provide the Mode-3 mode.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. The Mode-3 mode generalizes the case where the system is ...TBD....

3.1.4 Sub-Modes

A summary of the sub-modes is provided in Table **??**. This table also provides a list of the mode in which each sub-mode is valid. See the formal specifications, if applicable, in the following sections for formal statement of the sub-mode requirements, and accompanying notes that provide further clarification on the meanings of the states.

SUB-MODES		
Name	**Summary**	**Valid Sub-States**
Sub-Mode A	Sub-Mode A summary	Mode 1
Sub-Mode B	Sub-Mode B summary	Mode 2
Sub-Mode C	Sub-Mode C summary	Mode 3

Table 6: Summary of Sub-Modes for Garden Control System

Specification 3.1.4.1 SubMode A	
Text	The system shall provide the SubMode-A submode.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. The SubMode-A submode generalizes the case where the system is ...TBD....

Specification 3.1.4.2 SubMode B	
Text	The system shall provide the SubMode-B submode.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. The SubMode-B submode generalizes the case where the system is ...TBD....

Specification 3.1.4.3 SubMode C	
Text	The system shall provide the SubMode-C submode.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. The SubMode-C submode generalizes the case where the system is ...TBD....

3.2 External Interfaces

SPS/SSS-3.2.0 :: This section lists the external interfaces to the system. This section can be organized simply as inputs and outputs or in another logical grouping. The goal is to introduce ALL of the external interfaces so that their data can be defined before the data is used in the processing section. This section is divided as needed to specify the requirements, if any, for the system's external interfaces. This section may reference one or more Interface Requirements Specification (IRS) or other documents containing these requirements.

The external interfaces for this system are shown in Figure **??**. The requirements for these interfaces are described in more detail in the following sections.

User The operator(s) that control the GCS, § **??**

Network The network(s) that connect to the GCS, § **??**

Power The network(s) that connect to the GCS, § **??**

3.2.1 Operator Interfaces

Specification 3.2.1.1 Operator	
Text	All GCS variants shall be capable of connecting to an Operator.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. N/A

3.2.2 Network Interfaces

Specification 3.2.2.1 Approved Network	
Text	All GCS variants shall be capable of connecting to an approved network.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. N/A

../zProjectWideData/images/DFD-C_300dpi_6.5inchesWide-eps-converted-to.pdf

Figure 2: System Context Diagram (DFD-C)

3.2.3 Power Interfaces

Specification 3.2.3.1 Power	
Text	All GCS variants shall be capable of connecting to ...TBD... Power.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. N/A

3.3 Capabilities

SPS/SSS-3.3.0 :: This section shall be divided into subparagraphs to itemize the requirements associated with each capability of the system. A "capability" is defined as a group of related requirements. The word "capability" may be replaced with "function", "subject", "object", or other term useful for presenting the requirements.

This section defines the capability areas for the GCS. The segment design is structured to meet the requirements as specified in the ...TBD... artifacts. Each area provides a subset of the overall capabilities for the GCS segments. These segments are shown in Figure **??**, are summarized below, and are more fully specified in the following subsections.

The capability requirements for these segments are described in more detail in the following sections:

Operator Processing handles the HMI interface to the operator and provides overall control and configuration to the GCS, § **??**.

Network Processing handles the network interface, § **??**.

Power Processing handles the power input and conversions as necessary, § **??**.

Control Processing handles all major capability control, § **??**.

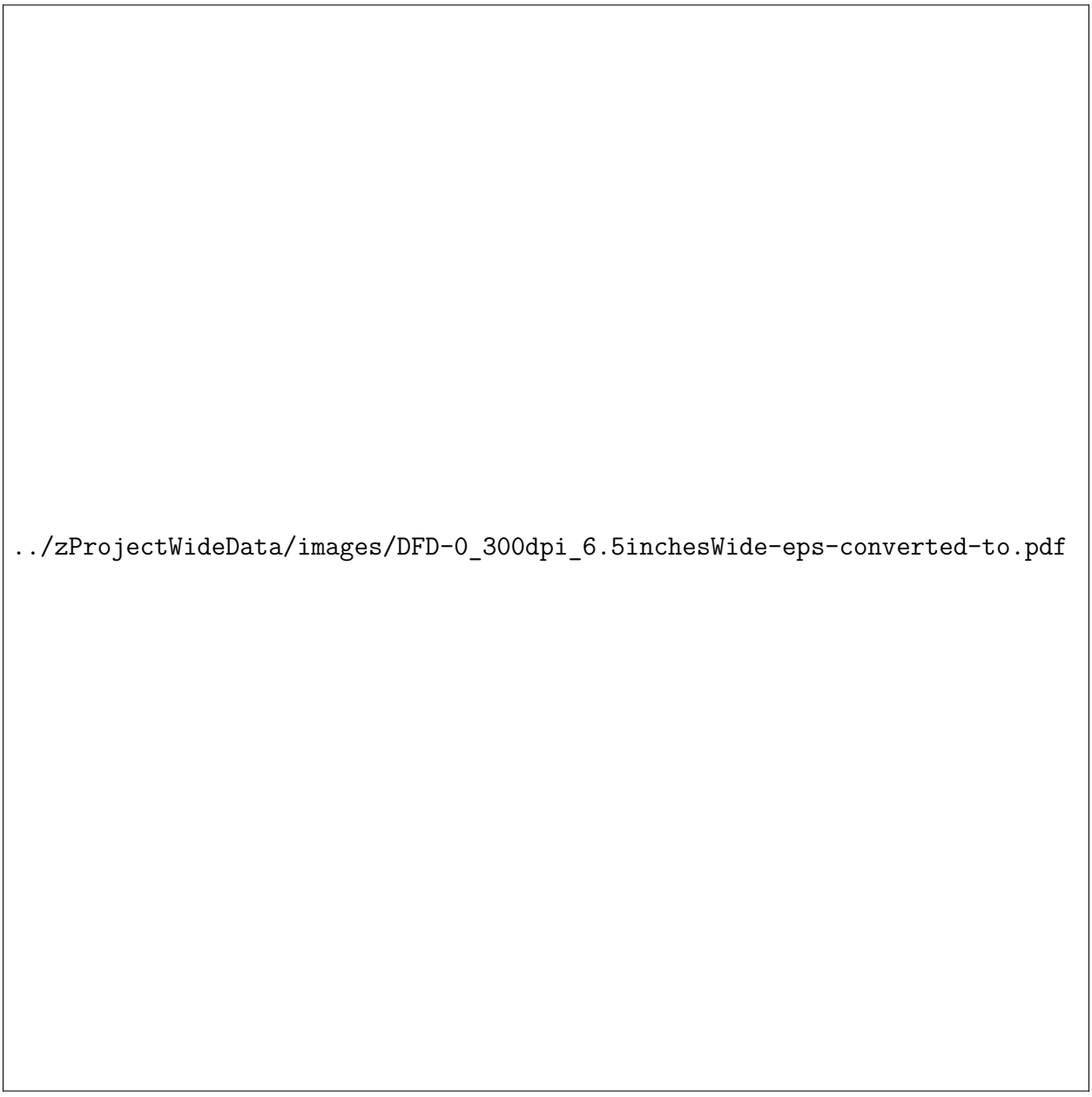

Figure 3: System Top-Level Diagram (DFD-0)

3.3.1 Operator Processing

The operator requirements for Garden Control System are listed below.

Specification 3.3.1.1 Power	
Text	All GCS variants shall be capable of ...TBD... operator inputs.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. Add as many of these as necessary. Split into files, e.g., OperatorInputs.tex and OperatorOutputs.tex, as needed. Just use the RequirementNumberAM and RqtNumberBase commands to keep numbers correct if subsubsections are added.

Specification 3.3.1.2 Power	
Text	All GCS variants shall be capable of ...TBD... operator outputs.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. Add as many of these as necessary. Split into files, e.g., OperatorInputs.tex and OperatorOutputs.tex, as needed. Just use the RequirementNumberAM command to keep numbers correct if subsubsections are added.

3.3.2 Network Processing

The network requirements for Garden Control System are listed below.

Specification 3.3.2.1 Network Types	
Text	All GCS variants shall be capable of ...TBD... network types.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. Add as many of these as necessary. Split into files/folders, e.g., NetworkTypes.tex, NetworkInputs.tex, and NetworkOutputs.tex, etc. as needed. Just use the RequirementNumberAM and RqtNumberBase commands to keep numbers correct if subsubsections are added.

Specification 3.3.2.2 Network Inputs	
Text	All GCS variants shall be capable of ...TBD... network inputs.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. Add as many of these as necessary. Split into files/folders, e.g., NetworkTypes.tex, NetworkInputs.tex, and NetworkOutputs.tex, etc. as needed. Just use the RequirementNumberAM and RqtNumberBase commands to keep numbers correct if subsubsections are added.

Specification 3.3.2.3 Network Outputs	
Text	All GCS variants shall be capable of ...TBD... network outputs.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. Add as many of these as necessary. Split into files/folders, e.g., NetworkTypes.tex, NetworkInputs.tex, and NetworkOutputs.tex, etc. as needed. Just use the RequirementNumberAM and RqtNumberBase commands to keep numbers correct if subsubsections are added.

3.3.3 Power Processing

The power requirements for Garden Control System are listed below.

Specification 3.3.3.1 Power Voltage	
Text	All GCS variants shall be capable of ...TBD... power voltage(s).
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. Add as many of these as necessary. Split into files/folders as needed. Just use the RequirementNumberAM and RqtNumberBase commands to keep numbers correct if subsubsections are added.

Specification 3.3.3.2 Power Current	
Text	All GCS variants shall be capable of ...TBD... power current.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. Add as many of these as necessary. Split into files/folders as needed. Just use the RequirementNumberAM and RqtNumberBase commands to keep numbers correct if subsubsections are added.

3.3.4 Control Processing

The control requirements for Garden Control System are listed below.

Specification 3.3.4.1 Control One	
Text	All GCS variants shall be capable of ...TBD... control one.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. Add as many of these as necessary. Split into files/folders as needed for areas of control capabilities. Just use the RequirementNumberAM and RqtNumberBase commands to keep numbers correct if subsubsections are added.

Specification 3.3.4.2 Control Two	
Text	All GCS variants shall be capable of ...TBD... control two.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. Add as many of these as necessary. Split into files/folders as needed for areas of control capabilities. Just use the RequirementNumberAM and RqtNumberBase commands to keep numbers correct if subsubsections are added.

3.4 Internal Interface Requirements

SPS/SSS-3.4.0 :: This section shall specify the requirements, if any, imposed on interfaces internal to the system. If all internal interfaces are left to the design or to requirement specifications for system components, this fact shall be so stated.

This section provides the internal interface requirements. These requirements for these interfaces are described in more detail in the following sections:

Internal Interface Requirement One stuff

Internal Interface Requirement One more stuff

3.5 Internal Data Requirements

SPS/SSS-3.5.0 :: This section shall specify the requirements, if any, imposed on data internal to the system. Included shall be requirements, if any, on databases and data files to be included in the system. If all decisions about

internal data are left to the design or to requirements specifications for system components, this fact shall be so stated.

This section provides the internal data requirements. The GCS capability is segmented into the following specification groups:

Data Storage provides the data storage requirements, § **??**.

Report Logs provides the report log requirement, § **??**.

3.5.1 Data Storage

Specification 3.5.1.1 Data Storage	
Text	All Garden Control System variants shall store digital files received for transmission using 2 TB of internal storage.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This is a base requirement.
Notes	1. N/A

Specification 3.5.1.2 Information Transport	
Text	All Garden Control System variants shall be able to manually upload and download digital files using external SD card, CD, and DVD formats.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This is a base requirement.
Notes	1. N/A

3.5.2 Report Logs

Specification 3.5.2.1 Report Logs	
Text	The system shall locally store reports for up to 12 months and be capable of exporting in .txt, .csv, and .xml formats.
Status	**Phase 1** T=O
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This is a base requirement.
Notes	1. Where does this information come from? ...TBD....

3.6 Adaptation Requirements

SPS/SSS-3.6.0 :: This section shall specify the requirements, if any, concerning installation-dependent data that the system is required to provide (such as site dependent latitude and longitude or site-dependent state tax codes) and operational parameters that the system is required to use that may vary according to operational needs (such as parameters indicating operation-dependent targeting constants or data recording).

This section is provided for future expansion.

3.7 Safety Requirements

SPS/SSS-3.7.0 :: This section shall specify the system requirements, if any, concerned with preventing or minimizing unintended hazards to personnel, property, and the physical environment. Examples include restricting the use of dangerous materials; classifying explosives for purposes of shipping, handling, and storing; abort/escape provisions from enclosures; gas detection and warning devices; grounding of electrical systems; decontamination; and explosion proofing. This paragraph shall include the system requirements, if any, for nuclear components, including, as applicable, requirements for component design, prevention of inadvertent detonation, and compliance with nuclear safety rules.

This section lists the safety requirements for the system. The GCS capability is segmented into the following specification groups:

Electromagnetic Radiation describes the safety requirements pertaining to the presence of EMR, § **??**.

3.7.1 Electromagnetic Radiation

Specification 3.7.1.1 EMR Hazards	
Text	Hazards of Electromagnetic Radiation to Ordnance (HERO) and Hazards of Electromagnetic Radiation to Fuel (HERF) are not applicable to GCS. There is no Hazard of Electromagnetic Radiation to Personnel (HERP) when GCS is properly installed and operated.
Status	T=O
Acceptance	This requirement shall be verified by inspection.
Traceability	**N/A** This is a base requirement.
Notes	1. N/A

Specification 3.7.1.2 EMR Safety	
Text	We shall identify, evaluate, assess, and mitigate any safety, health, or ergonomic hazards associated with the use, transport, maintenance, storage, and handling of GCS.
Status	T=O
Acceptance	This requirement shall be verified by inspection.
Traceability	**N/A** This is a base requirement.
Notes	1. N/A

3.8 Security and Privacy Requirements

SPS/SSS-3.8.0 :: This section shall specify the system requirements, if any, concerned with maintaining security and privacy. The requirements shall include, as applicable, the security/privacy environment in which the system must operate, the type and degree of security or privacy to be provided, the security/privacy risks the system must withstand, required safeguards to reduce those risks, the security/privacy policy that must be met, the security/privacy accountability the system must provide, and the criteria that must be met for security/privacy certification/accreditation.

This section provides the security and privacy requirements for GCS. The GCS capability is segmented into the following specification groups:

Security Requirements provides the physical and cyber security requirements of the system, § **??**.

Privacy Requirements provides the privacy requirements of the system, § **??**.

3.8.1 Security Requirements

3.8.1.1 Physical Security

Specification 3.8.1.1.1 Anti-Tamper	
Text	The Garden Control System shall deter all unauthorized alterations, countermeasure development, and system exploitation.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by testing.
Traceability	**N/A** This is a base requirement.
Notes	1. N/A

3.8.1.2 Cyber Security

This section is provided for future expansion.

3.8.2 Privacy Requirements

This section is provided for future expansion.

Specification 3.8.1 Privacy	
Text	The system shall ...TBD....
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This is a base requirement.
Notes	1. ...TBD....

3.9 Environmental Requirements

SPS/SSS-3.9.0 :: This section shall specify the requirements, if any, regarding the environment in which the system must operate. Examples for a software system are the computer hardware and operating system on which the software must run. (Additional requirements concerning computer resources are given in the next paragraph). Examples for a hardware-software system include the environmental conditions that the system must withstand during transportation, storage, and operation, such as conditions in the natural environment (wind, rain, temperature, geographic location), the induced environment (motion, shock, noise, electromagnetic radiation), and environments due to enemy action (explosions, radiation).

This section defines the environmental requirements for GCS.

3.10 Technology Resource Requirements

SPS/SSS-3.10.0 :: This section shall be divided into the following subsections. Depending upon the nature of the system, the computer resources covered in these subsections may constitute the environment of the system (as for a software system) or components of the system (as for a hardware-software system).

This section provides the overall technology resource requirements for the system. These capabilities are divided into the following sections:

Hardware details about the hardware to be used.

Software details about the software to be used.

Communications details about the communications to be used.

Other details about other technology resource requirements not covered above.

Utilization details about the resource utilization.

3.11 System Quality Requirements

SPS/SSS-3.11.0 :: This section shall specify the requirements, if any, pertaining to system quality factors. Examples include quantitative requirements concerning system functionality (the ability to perform all required functions), reliability (the ability to perform with correct, consistent results – such as mean time between failure for equipment), maintainability (the ability to be easily serviced, repaired, or corrected), availability (the ability to be accessed and operated when needed), flexibility (the ability to be easily adapted to changing requirements), portability of software (the ability to be easily modified for a new environment), reusability (the ability to be used in multiple applications), testability (the ability to be easily and thoroughly tested), usability (the ability to be easily learned and used), and other attributes.

This section specifies the GCS quality requirements.

3.11.1 Quality Systems

Specification 3.11.1.1 Development Quality	
Text	The system design and development shall follow the implementers' certified processes.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by inspection.
Traceability	**N/A** This requirement is a base requirement.

3.11.2 Operational Quality

This Section is ...TBD....

3.11.3 Quantitative Metrics

This section provides the metrics that can be defined with quantitative measures.

3.11.3.1 Object Detection Metrics

3.11.3.2 Object Identification Metrics

3.11.4 Qualitative Metrics

This section provides the metrics that are defined with qualitative measures.

3.11.4.1 Media Selection Metrics

This Section is ...TBD....

3.12 Design and Construction Requirements

SPS/SSS-3.12.0 :: This section shall specify the requirements, if any, that constrain the design and construction of the system. For hardware-software systems, this paragraph shall include the physical requirements imposed on the system. These requirements may be specified by reference to appropriate commercial or military standards and specifications.

This section provides the GCS design and construction requirements.

3.12.1 Regulatory Restrictions

This section is included for future expansion.

Specification 3.12.1.2 Proprietary Components	
Text	All Garden Control System variants shall include only software components that are open source or to which the developer has unlimited rights.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by inspection.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. The inspection is of the software design documents and build scripts to ensure that all code meets this requirement.

3.12.2 Design Defences

This section provides the construction constraints.

This section is provided for future expansion.

3.12.3 Construction Constraints

This section provides the construction constraints.

This section is provided for future expansion.

3.13 Personnel Requirements

SPS/SSS-3.13.0 :: This section shall specify the system requirements, if any, included to accommodate the number, skill levels, duty cycles, training needs, or other information about the personnel who will use or support the system. Examples include requirements for the number of work stations to be provided and for built-in help and training features. Also included shall be the human factors engineering requirements, if any, imposed on the system. These requirements shall include, as applicable, considerations for the capabilities and limitations of humans, foreseeable human errors under both normal and extreme conditions, and specific areas where the effects of human error would be particularly serious. Examples include requirements for adjustable-height work stations, color and duration of error messages, physical placement of critical indicators or buttons, and use of auditory signals.

This section is provided for future expansion.

3.14 Training Requirements

SPS/SSS-3.14.0 :: This section shall specify the system requirements, if any, pertaining to training. Examples include training devices and training materials to be included in the system.

3.14.1 Manuals

Specification 3.14.1.1 Operator's Guide	
Text	The GCS training shall provide an operator's manual.
Status	**Phase 1** T=O
Acceptance	This requirement shall be verified by inspection.
Traceability	**N/A** This is a base requirement.
Notes	1. N/A

3.14.2 Materials

Specification 3.14.2.1 Training Materials	
Text	The GCS training shall provide all training course materials.
Status	**Phase 1** T=O
Acceptance	This requirement shall be verified by inspection.
Traceability	**N/A** This is a base requriement.
Notes	1. N/A

3.14.3 Courses

Specification 3.14.3.1 Training Courses	
Text	The vendor will provide specific training and course materials and programs of instruction.
Status	**Phase 1** T=O
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This is a base requirement.
Notes	1. N/A

3.15 Logistics Requirements

SPS/SSS-3.15.0 :: This section shall specify the system requirements, if any, concerned with logistics considerations. These considerations may include: system maintenance, software support, system transportation modes, supply-system requirements, impact on existing facilities, and impact on existing equipment.

3.15.1 Support Constraints

Specification 3.15.1.1 Lithium Battery Shipping Constraints	
Text	The system contains batteries based on Lithium technologies so all shipping shall be done in accordance with regulations related to the shipment of Lithium-chemistry batteries.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by inspection.
Traceability	**...TBD...** 4.1.2
Notes	1. This specification was added in version Av5 of this document to capture the need to plan for shipping of Lithium-chemistry batteries. 2. Lar's group has shipped these batteries before so their experience should be called upon to minimize risks, such as shipment delays.

3.15.2 Transportability

Specification 3.15.2.1 Transportability	
Text	All Garden Control System variants shall be transportable by air, ground, and maritime resources.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This is a base requirement.
Notes	1. N/A

3.16 Packaging Requirements

SPS/SSS-3.16.0 :: This section shall specify the requirements, if any, for packaging, labeling, and handling the system and its components for delivery. Applicable military specifications and standards may be referenced if appropriate.

3.16.1 Shipping Constraints

This section is provided for future expansion.

3.17 Other Requirements

SPS/SSS-3.17.0 :: This paragraph shall specify additional system requirements, if any, not covered in the previous paragraphs. Examples include requirements for system documentation, such as specifications, drawings, technical manuals, test plans and procedures, and installation instruction data, if not covered in other contractual documents.

3.17.1 Broadcast Playlist Manager

Specification 3.17.1.1 Playlist Manager	
Text	All Garden Control System variants shall interface with an approved external broadcast playlist manager that will provide the operator the ability to manage programming in real-time.
Status	**Phase 1** T=O
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This is a base requirement.
Notes	1. N/A

3.17.2 Information Exchange

Specification 3.17.2.1 IP Data	
Text	All Garden Control System variants shall be capable of disseminating data on an approved network with a reasonable response time of less than four (4) hours.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by demonstration.
Traceability	**N/A** This is a base requirement.
Notes	1. N/A

3.18 Precedence of Requirements

SPS/SSS-3.18.0 :: This section shall specify, if applicable, the order of precedence, criticality, or assigned weights indicating the relative importance of the requirements in this specification. Examples include identifying those requirements deemed critical to safety, to security, or to privacy for purposes of singling them out for special treatment. If all requirements have equal weight, this paragraph shall so state.

3.18.1 Safety

Specification 3.18.1.1 Safety Requirements Precedence	
Text	All Garden Control System variants shall meet safety requirements listed in Section **??** before all other requirements.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by inspection.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. Obviously safety is of utmost importance. 2. The inspection is of design notes and rationale whereby design decisions relating to precedence are recorded.

3.18.2 Security and Privacy

Specification 3.18.2.1 Security Requirements Precedence	
Text	All Garden Control System variants shall meet security requirements listed in Section **??** before all other requirements with the exception of safety.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by inspection.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. Security trumps privacy since good security should help ensure privacy. 2. The inspection is of design notes and rationale whereby design decisions relating to precedence are recorded.

Specification 3.18.2.2 Privacy Requirements Precedence	
Text	All Garden Control System variants shall meet privacy requirements listed in Section **??** before all other requirements with the exception of safety and security.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by inspection.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. Privacy is trumped by security since good security should help ensure privacy. 2. The inspection is of design notes and rationale whereby design decisions relating to precedence are recorded.

3.18.3 Other

Specification 3.18.3.1 Other Requirements Precedence	
Text	All Garden Control System variants shall meet with equal precedence all other requirements not pertaining to safety, security, and privacy.
Status	**Phase 1** Threshold
Acceptance	This requirement shall be verified by inspection.
Traceability	**N/A** This requirement is a base requirement.
Notes	1. The inspection is of design notes and rationale whereby design decisions relating to precedence are recorded.

CHAPTER 4

Qualification Provisions

The qualification provisions are listed in the acceptance row of the specifications in Section 3.

CHAPTER 5

Traceability

This section provides a list of the sources, if applicable, for each requirement. This traceability connects the specifications in this document to those presented in higher level sources such as a Joint Urgent Operational Need (JUON) document, Joint Emergent Operational Need (JEON), or a STATEMENT OF WORK (SOW)

The traceability of all specifications from each requirement to its source, if applicable, is listed in the specifications presented in section 3. Traceability from each document to requirements is provided below.

Table 7: Source to Requirement Traceability.

Source Requirement	**Traced Requirement**
N/A :: This requirement is a base requirement.	**??**
N/A :: This requirement is a base requirement.	**??**
N/A :: This requirement is a base requirement.	**??**
N/A :: This requirement is a base requirement.	**??**
N/A :: This requirement is a base requirement.	**??**
N/A :: This requirement is a base requirement.	**??**

APPENDIX

Notes

This section provides notes, as necessary, to document the system segmentation specification.

APPENDIX

Key Performance Parameters and System Attributes

This Appendix provides the key performance parameters and key system attributes, summarized in a short list for easy review.

B.1 Key Performance Parameters

Table B.8: Key Performance Parameter Specifications

Specification	Key Performance Parameter
REF_UNDEFINED	The system shall provide the TBD Mode in the states and sub-states as shown in Table **??**.

B.2 Key System Attributes

Table B.9: Key System Attribute Specifications

Specification	Key System Attribute
RQT_TBD	The system shall be capable of ...TBD... capability.