

## Operational Concept Description

for the

### KNEAD Example System

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**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 Project artifact repository.

**Change Record**

Date	Version	Author(s)	Change Reference
03 Jan 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. A list of all changed items may be found in the Index section under the heading “All Changes This Version”.

**Draft P1** Preliminary version of this document.

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## 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 Operational Concept Description (OCD) for the Smart Silvia. The system will be referred to as the Smart-Silvia-Sys.

#### 1.1 Identification

ALL-1.1 :: 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 Smart Silvia described in this document shall be known as Smart-Silvia-Sys version 1. However, the Operational Concept Description OCD 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

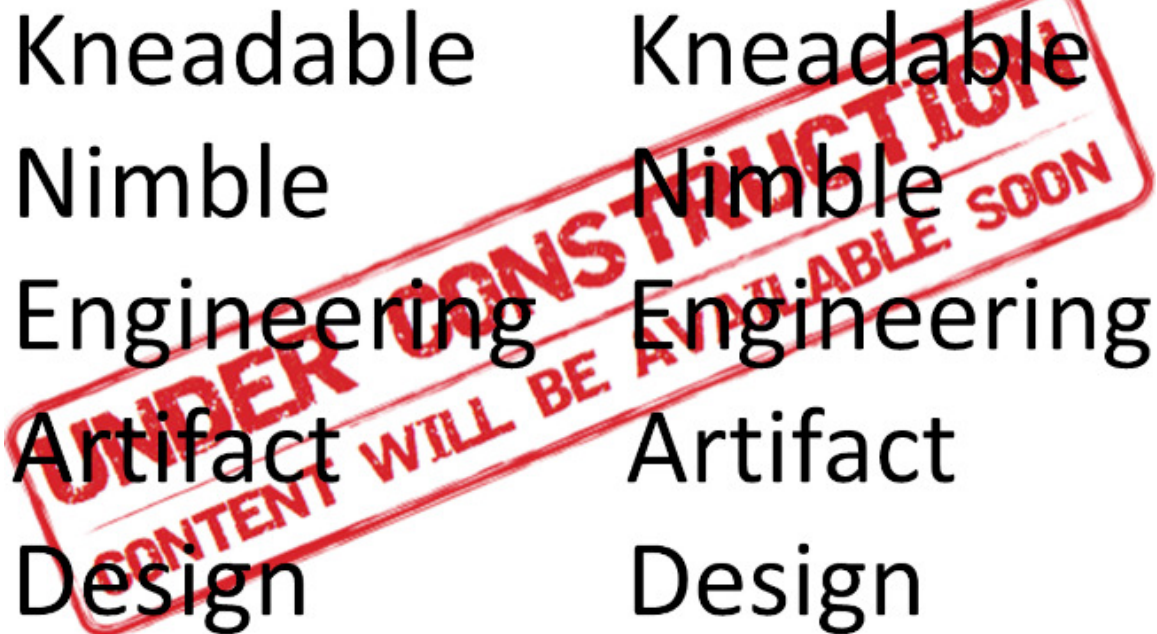
ALL-1.2 :: THIS PARAGRAPH SHALL BRIEFLY STATE THE PURPOSE OF THE SYSTEM TO WHICH THIS DOCUMENT APPLIES. IT SHALL DESCRIBE THE GENERAL NATURE OF THE SYSTEM; SUMMARIZE THE HISTORY OF SYSTEM DEVELOPMENT, OPERATION, AND MAINTENANCE; IDENTIFY THE PROJECT SPONSOR, ACQUIRER, USER, DEVELOPER, AND SUPPORT AGENCIES; IDENTIFY CURRENT AND PLANNED OPERATING SITES; AND LIST OTHER RELEVANT DOCUMENTS.

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 Smart Silvia system is ...TBD....

Figure 1 shows the high-level architecture for the Smart-Silvia-Sys system. This diagram shows the major external interfaces that provide the capabilities of Smart-Silvia-Sys. As are shown, the Smart-Silvia-Sys can provide. This system's main goal is to automate functionality in order to make great Espresso.

The general concept of operations (CONOP) for this system is User Selects an input weight through an OLED screen using a rotary encoder. Espresso is prepared. User begins a shot, solid state relays are enabled and the shot begins to pull and a timer is started. As water falls into the cup and onto the load cells, the espresso cup is weighed. Once the desired



Kneadable	Kneadable
Nimble	Nimble
Engineering	Engineering
Artifact	Artifact
Design	Design

Figure 1: System Overview

weight is met the pump is turned off. The user is displayed their time and weight on the OLED screen and data is pushed ...TBD...

While the system is not actively pulling a shot, it will be monitoring the water level. If low water is detected the user will be notified.



### 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 document format is based upon the guidance in the OCD DID [ref\*OCD\*DID]. The operational concept is documented following the guidelines of ISO-12207 [ref\*ISO\*12207] and MIL-STD-498 [ref\*MIL\*STD\*498] (from which ISO-12207 originated). This document follows the listed OCD 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** summarizes the current status into which this system is to be situated.

**Section 4** justifies why change is needed.

**Section 5** describes the concept for a new or modified system.

**Section 6** illustrates operational scenarios for the new or modified system.

**Section 7** discusses a summary of impacts for the new system.

**Section 8** details analysis of the proposed system.

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

IF THIS TEXT IS VISIBLE, THE FIRST INSTANCE OF EACH SECTION MAY DISPLAY 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.

#### 1.3.1 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 [ $\LaTeX \Rightarrow$  PS  $\Rightarrow$  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:

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Repository	<a href="https://svn.riouxsvn.com/kneadlatxinputs/ExampleArtifactFolders/0%20-%20OCD/KNEAD_OCD.tex">https://svn.riouxsvn.com/kneadlatxinputs/ExampleArtifactFolders/0%20-%20OCD/KNEAD_OCD.tex</a>
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## CHAPTER 2

### References

ALL-2.0.0 :: THIS SECTION SHALL LIST THE NUMBER, TITLE, REVISION, AND DATE OF ALL DOCUMENTS REFERENCED IN THIS SPECIFICATION. THIS SECTION SHALL ALSO IDENTIFY THE SOURCE FOR ALL DOCUMENTS NOT AVAILABLE THROUGH NORMAL GOVERNMENT STOCKING ACTIVITIES. IT ALSO SHALL INCLUDE A LIST OF ACRONYMS AND GLOSSARY TERMS SO THAT THEY ARE DEFINED BEFORE USE.

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

#### 2.1 Acronyms and Abbreviations

ALL-2.1.0 :: THIS SECTION SHALL CONTAIN A FULL LIST OF DEFINITIONS FOR ALL ACRONYMS AND ABBREVIATIONS USED IN THIS DOCUMENT. THESE ARE OFTEN INCLUDED IN AN APPENDIX BUT ARE INCLUDED IN CHAPTER 2 ALONG WITH GLOSSARY TERMS AND CITED REFERENCES TO PRESENT THE READER WITH THE INFORMATION BEFORE IT IS NEEDED.

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

Table 1: Acronym Definitions

Acronym	Definition
ADC	Analog to Digital Converter
A/V	Audio / Visual
End of acronym definition table	

#### 2.2 Glossary and Definitions

ALL-2.2.0 :: THIS SECTION SHALL CONTAIN A FULL LIST OF GLOSSARY DEFINITIONS FOR ALL SPECIALTY TERMS USED IN THIS DOCUMENT. THESE ARE OFTEN INCLUDED IN AN APPENDIX BUT ARE INCLUDED IN CHAPTER 2 ALONG WITH ACRONYMS / ABBREVIATIONS AND CITED REFERENCES AND GLOSSARY TERMS TO PRESENT THE READER WITH THE INFORMATION BEFORE IT IS NEEDED.

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.
Glossary terms continue on next page	

**Glossary terms – continued from previous page**

Glossary Term	Definition
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**

ALL-2.3.0 :: THIS SECTION SHALL CONTAIN A FULL LIST OF ALL ARTIFACTS REFERENCED FROM WITHIN THIS DOCUMENT. THESE ARE OFTEN INCLUDED IN A FINAL CHAPTER/SECTION OR APPENDIX BUT ARE INCLUDED IN CHAPTER 2 ALONG WITH ACRONYMS / ABBREVIATIONS AND GLOSSARY TERMS TO PRESENT THE READER WITH THE INFORMATION BEFORE IT IS NEEDED.

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

### Current system or situation

OCD-3.0 :: THIS SECTION SHALL BE DIVIDED INTO THE FOLLOWING PARAGRAPHS TO DESCRIBE THE SYSTEM OR SITUATION AS IT CURRENTLY EXISTS. FOR EXISTING SYSTEMS, THIS CHAPTER PROVIDES A SUMMARY OF THE PERFORMANCE (SPS) AND/OR SEGMENT CAPABILITIES (SSS) ATTRIBUTES; SECTION NUMBERS ARE SHOWN IN PARENTHESIS IN FOLLOWING DIDINFO BLOCKS. FOR NEW SYSTEMS, THIS CHAPTER PROVIDES A SUMMARY OF THE PROBLEM THAT NEEDS TO BE ADDRESSED BY THE NEW SYSTEM.

This chapter describes the capabilities and needs for the Smart Silvia. This Smart Silvia aims to solve the complicated world of specialty coffee. New users may find themselves overwhelmed by the complexity of Espresso. The Smart Silvia focuses on usability to allow the user to input factors like coffee weight and a desired brew ratio and allow the machine to automate the process. This system also monitors the Rancillio Silvia's current state, measuring water level to protect the system from running out of water and potentially damaging the boiler. At this time the system is designed as a prototype to prove out capabilities. The focus of this design is time to market with the most user features.

#### 3.1 Background, objectives, and scope

OCD-3.1 :: THIS PARAGRAPH SHALL DESCRIBE THE BACKGROUND, MISSION OR OBJECTIVES, AND SCOPE OF THE CURRENT SYSTEM OR SITUATION. NOTE THAT THIS SECTION BASICALLY SUMMARIZES THE NORMAL CHAPTER 1 BOILERPLATE MATERIAL AND SYSTEM OVERVIEW FROM EXISTING DOCUMENTATION.

This system is designed to meet the criteria of ENPM818I. This course focuses on embedded software design and servers to document the process of developing an embedded system.

The Smart Silvia aims to simplify the complicated process of brewing espresso for optimal user enjoyment. This system integrates with the existing Rancillio Silvia espresso machine and must be safe and easy for users.

#### 3.2 Operational policies and constraints

OCD-3.2 :: THIS PARAGRAPH SHALL DESCRIBE ANY OPERATIONAL POLICIES AND CONSTRAINTS THAT APPLY TO THE CURRENT SYSTEM OR SITUATION.

This section is ...TBD....

#### 3.3 Description of current system or situation

OCD-3.3 :: THIS PARAGRAPH SHALL PROVIDE A DESCRIPTION OF THE CURRENT SYSTEM OR SITUATION. NOTE THAT THIS IS BASICALLY A SUMMARY OF THE DETAILED OF SPS AND/OR SSS ITEMS. THE DESCRIPTION STARTS BY IDENTIFYING DIFFERENCES ASSOCIATED WITH DIFFERENT STATES OR MODES OF OPERATION (FOR EXAMPLE, REGULAR, MAINTENANCE, TRAINING, DEGRADED, EMERGENCY, ALTERNATIVE-SITE, 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 THE SYSTEM OPERATES WITHOUT STATES OR MODES, THIS PARAGRAPH SHALL SO STATE, WITHOUT THE NEED TO CREATE ARTIFICIAL DISTINCTIONS. THE DESCRIPTION SHALL INCLUDE, AS APPLICABLE:

- THE OPERATIONAL ENVIRONMENT AND ITS CHARACTERISTICS (3.2),
- INTERFACES TO EXTERNAL SYSTEMS OR PROCEDURES (3.2)
- CHARTS AND ACCOMPANYING DESCRIPTIONS DEPICTING INPUTS, OUTPUTS, DATA FLOW, AND MANUAL AND AUTOMATED PROCESSES SUFFICIENT TO UNDERSTAND THE CURRENT SYSTEM OR SITUATION FROM THE USER'S POINT OF VIEW (3.2),
- CAPABILITIES/FUNCTIONS OF THE CURRENT SYSTEM (3.3),
- PERFORMANCE CHARACTERISTICS, SUCH AS SPEED, THROUGHPUT, VOLUME, AND FREQUENCY (3.3),
- MAJOR SYSTEM COMPONENTS AND THE INTERCONNECTIONS AMONG THESE COMPONENTS (3.4 AND 3.5),
- QUALITY ATTRIBUTES, SUCH AS RELIABILITY, MAINTAINABILITY, AVAILABILITY, FLEXIBILITY, PORTABILITY, USABILITY, OR EFFICIENCY, (3.11) AND
- PROVISIONS FOR SAFETY, SECURITY, PRIVACY, (3.7, 3.8) AND CONTINUITY OF OPERATIONS IN EMERGENCIES (3.11).

This system is to operate in one mode. It is assumed that the system is operating at room temperature. The system will be interacted with using a rotary encoder and a LCD display to provide user feedback. This system is expected to work with user guidance and it is expected that the user will supervise the system.

The rest is ...TBD...

### 3.4 Users or involved personnel

OCD-3.4 :: THIS PARAGRAPH SHALL DESCRIBE THE TYPES OF USERS OF THE SYSTEM, OR PERSONNEL INVOLVED IN THE CURRENT SITUATION, INCLUDING, AS APPLICABLE, ORGANIZATIONAL STRUCTURES, TRAINING/SKILLS, RESPONSIBILITIES, ACTIVITIES, AND INTERACTIONS WITH ONE ANOTHER. NOTE THAT THIS SECTION IS A SUMMARY OF ITEMS FOUND IN THE SECURITY AND PRIVACY (3.8), PERSONNEL (3.13), AND TRAINING (3.14) SECTIONS OF AN SPS OR SSS.

The Smart Silvia is designed for two main users. Experienced coffee enthusiasts and new coffee users. The core feature of the Smart Silvia is the ability to set a brew ratio and guarantee the correct amount of output liquid. In addition the system provides water level monitoring and tracking data for each shot of espresso, a key feature regardless of your skill level.

An experienced coffee enthusiasts gains the convince of automation in their process and the accuracy an automated system provides allowing for more consistent espresso shots. In addition the monitoring of shot data allows additional Information for the user to tweak in order to perfect their espresso.

A new user may not have the know how to pull their own shots. The automation provides a simple and effective interface to get the user pulling the right ratio of coffee to water. In addition the Smart Silvia provides basic feedback to let the user know if they may

have an under or over extracted espresso. This system aims to reduce variables to allow for repeatable and consistent espresso without months or years of training.

### **3.5 Support concept**

OCD-3.5 :: THIS PARAGRAPH SHALL PROVIDE AN OVERVIEW OF THE SUPPORT CONCEPT FOR THE CURRENT SYSTEM, INCLUDING, AS APPLICABLE TO THIS DOCUMENT, SUPPORT AGENCY(IES); FACILITIES; EQUIPMENT; SUPPORT SOFTWARE; REPAIR/REPLACEMENT CRITERIA; MAINTENANCE LEVELS AND CYCLES; AND STORAGE, DISTRIBUTION, AND SUPPLY METHODS. NOTE THAT THIS IS A SUMMARY OF ITEMS FOUND IN THE SPS OR SSS LOGISTICS (3.15), OTHER (3.16), AND PACKAGING (3.17) SECTIONS.

This section is ...TBD....

## CHAPTER 4

### Justification for and nature of changes

OCD-4.0 :: THIS SECTION SHALL BE DIVIDED INTO THE FOLLOWING PARAGRAPHS TO DESCRIBE THE JUSTIFICATION FOR AND NATURE OF CHANGES. AN UNDERLYING GOAL HERE, FOR MODIFIED SYSTEMS, IS TO DESCRIBE WHAT IS WRONG WITH THE EXISTING SYSTEM, AS DESCRIBED IN CHAPTER 3, WITHOUT ACTUALLY LISTING WHAT THE NEW SYSTEM NEEDS TO DO, WHICH IS PROVIDED IN CHAPTER 5.

This is the first formal release for the Smart Silvia, the justification for these changes are to release an initial product. This product meets a user's need and therefor should be created.

#### 4.1 Justification for change

OCD-4.1 :: THIS SECTION SHALL: A. DESCRIBE NEW OR MODIFIED ASPECTS OF USER NEEDS, THREATS, MISSIONS, OBJECTIVES, ENVIRONMENTS, INTERFACES, PERSONNEL OR OTHER FACTORS THAT REQUIRE A NEW OR MODIFIED SYSTEM, AND B. SUMMARIZE DEFICIENCIES OR LIMITATIONS IN THE CURRENT SYSTEM OR SITUATION THAT MAKE IT UNABLE TO RESPOND TO THESE FACTORS.

The Smart Silvia provides a service to all levels of users that are interested in espresso. It gives them the ability to refine and record their process.

#### 4.2 Description of needed changes

OCD-4.2 :: THIS SECTION SHALL SUMMARIZE NEW OR MODIFIED CAPABILITIES/FUNCTIONS, PROCESSES, INTERFACES, OR OTHER CHANGES NEEDED TO RESPOND TO THE FACTORS IDENTIFIED IN 4.1. AGAIN, JUST SUMMARIZE NEW ITEMS HERE SINCE CHAPTER 5 WILL "DEFINE" THE NEW SYSTEM.

Espresso is a complicated coffee. It has many factors that impact taste. Smart Silvia serves to simplify these variables through automation. Specifically monitoring Time to Brew Ratio.

#### 4.3 Priorities among the changes

OCD-4.3 :: THIS PARAGRAPH SHALL IDENTIFY PRIORITIES AMONG THE NEEDED CHANGES. IT SHALL, FOR EXAMPLE, IDENTIFY EACH CHANGE AS ESSENTIAL, DESIRABLE, OR OPTIONAL, AND PRIORITIZE THE DESIRABLE AND OPTIONAL CHANGES.

The Smart Silvia prioritizes the following

- Easy of use
- Information should be easily displayed to the user
- Information should be easily changed by the user
- System will turn on and off pumps
- System will monitor water tank to prevent boiler running with no water



#### 4.4 Changes considered but not included

OCD-4.4 :: THIS SECTION SHALL IDENTIFY NEW FEATURES OR CHANGES TO EXISTING CAPABILITIES THAT WERE CONSIDERED BUT NOT INCLUDED IN 4.2, AND THE RATIONALE FOR NOT INCLUDING THEM.

The Smart Silvia will be considering ways to easily present information from previous shots. This may include a web interface or additional system to record and present historical data. This may also allow the user to rate their shots in order to remember and catalog their espresso.

#### 4.5 Assumptions and constraints

OCD-4.5 :: THIS SECTION SHALL IDENTIFY ANY ASSUMPTIONS AND CONSTRAINTS APPLICABLE TO THE CHANGES IDENTIFIED IN THIS CHAPTER.

It is assumed that a user has some experience with espresso, or the desire to learn. This system will not teach a user and will not fix user errors.

## CHAPTER 5

### Concept for a new or modified system

OCD-5.0 :: THIS CHAPTER SHALL BE DIVIDED INTO THE FOLLOWING SECTIONS TO DESCRIBE THE A NEW SYSTEM OR THE EXPECTED MODIFIED SYSTEM. FOR ALL SYSTEMS, THIS CHAPTER PROVIDES A SUMMARY OF THE PERFORMANCE (SPS) AND/OR SEGMENT CAPABILITIES (SSS) ATTRIBUTES; SECTION NUMBERS ARE SHOWN IN PARENTHESIS IN FOLLOWING DIDINFO BLOCKS. FOR NEW SYSTEMS, THIS CHAPTER PROVIDES A SUMMARY OF THE PROBLEM THAT NEEDS TO BE ADDRESSED BY THE NEW SYSTEM.

This chapter summaries the problem that is to be addressed by the Smart Silvia. This is the initial release and it is here to address as many problems as possible with a quick time to market.

#### 5.1 Background, objectives, and scope

OCD-5.1 :: THIS PARAGRAPH SHALL DESCRIBE THE BACKGROUND, MISSION OR OBJECTIVES, AND SCOPE OF THE NEW OR MODIFIED SYSTEM. NOTE THAT THIS SECTION BASICALLY SUMMARIZES THE NORMAL CHAPTER 1 BOILERPLATE MATERIAL AND SYSTEM OVERVIEW THAT WILL BE USED IN NEW DOCUMENTATION.

This system primary goal is to automate espresso extraction to improve ease of use for new users. As well as improving consistency and giving users additional data to improve espresso extraction.

#### 5.2 Operational policies and constraints

OCD-5.2 :: THIS SECTION SHALL DESCRIBE ANY OPERATIONAL POLICIES AND CONSTRAINTS THAT APPLY TO THE NEW SYSTEM.

This section is ...TBD....

#### 5.3 Description of the new or modified system

OCD-5.3 :: THIS SECTION SHALL PROVIDE A DESCRIPTION OF THE NEW SYSTEM. NOTE THAT THIS IS BASICALLY A SUMMARY OF THE DETAILED OF SPS AND/OR SSS ITEMS. THE DESCRIPTION STARTS BY IDENTIFYING DIFFERENCES ASSOCIATED WITH DIFFERENT STATES OR MODES OF OPERATION (FOR EXAMPLE, REGULAR, MAINTENANCE, TRAINING, DEGRADED, EMERGENCY, ALTERNATIVE-SITE, 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 THE SYSTEM OPERATES WITHOUT STATES OR MODES, THIS PARAGRAPH SHALL SO STATE, WITHOUT THE NEED TO CREATE ARTIFICIAL DISTINCTIONS. THE DESCRIPTION SHALL INCLUDE, AS APPLICABLE:

- THE OPERATIONAL ENVIRONMENT AND ITS CHARACTERISTICS (3.2),
- INTERFACES TO EXTERNAL SYSTEMS OR PROCEDURES (3.2)
- CHARTS AND ACCOMPANYING DESCRIPTIONS DEPICTING INPUTS, OUTPUTS, DATA FLOW, AND MANUAL AND AUTOMATED PROCESSES SUFFICIENT TO UNDERSTAND THE CURRENT SYSTEM OR SITUATION FROM THE USER'S POINT OF VIEW (3.2),
- CAPABILITIES/FUNCTIONS OF THE CURRENT SYSTEM (3.3),
- PERFORMANCE CHARACTERISTICS, SUCH AS SPEED, THROUGHPUT, VOLUME, AND FREQUENCY (3.3),
- MAJOR SYSTEM COMPONENTS AND THE INTERCONNECTIONS AMONG THESE COMPONENTS (3.4 AND 3.5),

- QUALITY ATTRIBUTES, SUCH AS RELIABILITY, MAINTAINABILITY, AVAILABILITY, FLEXIBILITY, PORTABILITY, USABILITY, OR EFFICIENCY, (3.11) AND
- PROVISIONS FOR SAFETY, SECURITY, PRIVACY, (3.7, 3.8) AND CONTINUITY OF OPERATIONS IN EMERGENCIES (3.11).

The Smart Silvia is designed to be installed inside a Rancillio Silvia V2 espresso machine.

The rest is ...TBD....

#### 5.4 Users/affected personnel

OCD-5.4 :: THIS SECTION SHALL DESCRIBE THE TYPES OF USERS OF THE SYSTEM, OR PERSONNEL INVOLVED IN THE NEW SYSTEM, INCLUDING, AS APPLICABLE, ORGANIZATIONAL STRUCTURES, TRAINING/SKILLS, RESPONSIBILITIES, ACTIVITIES, AND INTERACTIONS WITH ONE ANOTHER. NOTE THAT THIS SECTION IS A SUMMARY OF ITEMS FOUND IN THE SECURITY AND PRIVACY (3.8), PERSONNEL (3.13), AND TRAINING (3.14) SECTIONS OF AN SPS OR SSS.

An experienced coffee enthusiasts gains the convince of automation in their process and the accuracy an automated system provides allowing for more consistent espresso shots. In addition the monitoring of shot data allows additional Information for the user to tweak in order to perfect their espresso.

A new user may not have the know how to pull their own shots. The automation provides a simple and effective interface to get the user pulling the right ratio of coffee to water. In addition the Smart Silvia provides basic feedback to let the user know if they may have an under or over extracted espresso. This system aims to reduce variables to allow for repeatable and consistent espresso without months or years of training.

#### 5.5 Support concept

OCD-5.5 :: THIS SECTION SHALL PROVIDE AN OVERVIEW OF THE SUPPORT CONCEPT FOR THE NEW SYSTEM, INCLUDING, AS APPLICABLE TO THIS DOCUMENT, SUPPORT AGENCY(IES); FACILITIES; EQUIPMENT; SUPPORT SOFTWARE; REPAIR/REPLACEMENT CRITERIA; MAINTENANCE LEVELS AND CYCLES; AND STORAGE, DISTRIBUTION, AND SUPPLY METHODS. NOTE THAT THIS IS A SUMMARY OF ITEMS FOUND IN THE SPS OR SSS LOGISTICS (3.15), OTHER (3.16), AND PACKAGING (3.17) SECTIONS.

This section is ...TBD....

## CHAPTER 6

### Operational scenarios

OCD-6.0 :: THIS CHAPTER SHALL DESCRIBE ONE OR MORE OPERATIONAL SCENARIOS THAT ILLUSTRATE THE ROLE OF THE NEW OR MODIFIED SYSTEM, ITS INTERACTION WITH USERS, ITS INTERFACE TO OTHER SYSTEMS, AND ALL STATES OR MODES IDENTIFIED FOR THE SYSTEM. THE SCENARIOS SHALL INCLUDE EVENTS, ACTIONS, STIMULI, INFORMATION, INTERACTIONS, ETC., AS APPLICABLE. REFERENCE MAY BE MADE TO OTHER MEDIA, SUCH AS VIDEOS, TO PROVIDE PART OR ALL OF THIS INFORMATION.

This chapter describes different scenarios in which the Smart Silvia is to be used.

#### 6.1 Use Case 1: Low Water Sensor

OCD-6.1 :: THIS SECTION SHALL DESCRIBE ONE OPERATIONAL SCENARIO THAT ILLUSTRATES THE ROLE OF THE NEW OR MODIFIED SYSTEM, ITS INTERACTION WITH USERS, ITS INTERFACE TO OTHER SYSTEMS, AND ALL STATES OR MODES IDENTIFIED FOR THE SYSTEM. THE SCENARIOS SHALL INCLUDE EVENTS, ACTIONS, STIMULI, INFORMATION, INTERACTIONS, ETC., AS APPLICABLE. REFERENCE MAY BE MADE TO OTHER MEDIA, SUCH AS VIDEOS, TO PROVIDE PART OR ALL OF THIS INFORMATION.

One of the most important uses of this system is to monitor water level. When the water level is low the Rancillio Silvia V2 could damage itself. Providing the user with two states Full and empty. When the system has water it is considered in the full state. The system should operate as normal. When the water level is low the system must report this to the user using the Built in screen. The system should also lock the user out of other functionality.

#### 6.2 Use Case 2: Pulling an Espresso Shot

When the user wants to pull a shot the user should prepare their espresso as they usually do. Measuring the weight of ground coffee in their portafilter. Once this measurement is received and the shot is ready to pull. The user should place their cup in the brew area. Then the user should input their coffee weight into the Smart Silvia using the user interface. The pumps will engage and the espresso will be brewed. The system will monitor the weight of liquid that falls into the cup, when the desired brew weight is reached the pumps will disengage and system will summarize the shot to the user and return to a ready state waiting for the next shot.

#### 6.3 Use Case 3: Reviewing a Shot

The system will allow the user to review previous reviewed shots. This information will include time and weight and well as some metrics around how the shot was pulled. This will be done by ...TBD...

#### 6.4 Use Case 4

This section is ...TBD....

## CHAPTER 7

### Summary of impacts

OCD-7.0 :: THIS CHAPTER SHALL BE DIVIDED INTO THE FOLLOWING SECTIONS TO DESCRIBE THE IMPACTS OF THE NEW SYSTEM OR THE EXPECTED MODIFIED SYSTEM.

This chapter summarizes the impact of Smart Silvia.

#### 7.1 Operational impacts

OCD-7.1 :: THIS PARAGRAPH SHALL DESCRIBE ANTICIPATED OPERATIONAL IMPACTS ON THE USER, ACQUIRER, DEVELOPER, AND SUPPORT AGENCY(IES). THESE IMPACTS MAY INCLUDE CHANGES IN INTERFACES WITH COMPUTER OPERATING CENTERS; CHANGE IN PROCEDURES; USE OF NEW DATA SOURCES; CHANGES IN QUANTITY, TYPE, AND TIMING OF DATA TO BE INPUT TO THE SYSTEM; CHANGES IN DATA RETENTION REQUIREMENTS; AND NEW MODES OF OPERATION BASED ON PEACETIME, ALERT, WARTIME, OR EMERGENCY CONDITIONS.

The Smart Silvia improves consistency, easy of use, and adds system monitoring to an existing system. The improved efficiency and ease of use should improve users satisfaction with the system.

#### 7.2 Organizational impacts

OCD-7.2 :: THIS PARAGRAPH SHALL DESCRIBE ANTICIPATED ORGANIZATIONAL IMPACTS ON THE USER, ACQUIRER, DEVELOPER, AND SUPPORT AGENCY(IES). THESE IMPACTS MAY INCLUDE MODIFICATION OF RESPONSIBILITIES; ADDITION OR ELIMINATION OF RESPONSIBILITIES OR POSITIONS; NEED FOR TRAINING OR RETRAINING; AND CHANGES IN NUMBER, SKILL LEVELS, POSITION IDENTIFIERS, OR LOCATION OF PERSONNEL IN VARIOUS MODES OF OPERATION.

This system is designed to be used in home environment and focuses on individual user satisfaction. This system should improve the users experience. Decreasing the chance of damaging the Rancillio Silvia system. In addition to repeatability and ease of use with pulling espresso shots.

#### 7.3 Impacts during development

OCD-7.3 :: THIS PARAGRAPH SHALL DESCRIBE ANTICIPATED IMPACTS ON THE USER, ACQUIRER, DEVELOPER, AND SUPPORT AGENCY(IES) DURING THE DEVELOPMENT EFFORT. THESE IMPACTS MAY INCLUDE MEETINGS/DISCUSSIONS REGARDING THE NEW SYSTEM; DEVELOPMENT OR MODIFICATION OF DATABASES; TRAINING; PARALLEL OPERATION OF THE NEW AND EXISTING SYSTEMS; IMPACTS DURING TESTING OF THE NEW SYSTEM; AND OTHER ACTIVITIES NEEDED TO AID OR MONITOR DEVELOPMENT.

The development of this system is impacted by accessibility to the Rancillio Silvia machine. Development will be done in the C language and run on the ESP32 microcontroller. This system will require access to coffee in order to accurately develop the system.

## CHAPTER 8

### Analysis of the proposed system

OCD-8.0 :: THIS CHAPTER SHALL BE DIVIDED INTO THE FOLLOWING SECTIONS TO DESCRIBE THE ANALYSIS OF THE NEW SYSTEM OR THE EXPECTED MODIFIED SYSTEM. THIS CHAPTER CAN BE CONSIDERED TO BE AN EXECUTIVE SUMMARY OF THE NEW/PROPOSED SYSTEMS. THE CONTENTS SOMEWHAT FOLLOW THE COMMON NABC (NEED, APPROACH, BENEFIT, COMPETITION) WAY OF PRESENTING A SHORT SUMMARY OF AN IDEA. THE NEED, APPROACH, AND BENEFIT ARE ROLLED UP INTO THE FIRST SECTION, WHILE THE COMPETITION IS DISTRIBUTED IN THE FINAL TWO SECTIONS.

This chapter is ...TBD....

#### 8.1 Summary of advantages

OCD-8.1 :: THIS PARAGRAPH SHALL PROVIDE A QUALITATIVE AND QUANTITATIVE SUMMARY OF THE ADVANTAGES TO BE OBTAINED FROM THE NEW OR MODIFIED SYSTEM. THIS SUMMARY SHALL INCLUDE NEW CAPABILITIES, ENHANCED CAPABILITIES, AND IMPROVED PERFORMANCE, AS APPLICABLE, AND THEIR RELATIONSHIP TO DEFICIENCIES IDENTIFIED IN 4.1.

This systems major advantages remove the human error when it comes to espresso. The monitoring of the water level potentially protects the system from a user who forgets to check the water levels. It is quicker and more accurate for the embedded system to manage the pumps and output products of the espresso machine. With the major advantage of more accurate espresso shots as well as a more accurate summary of the shot. This platform also provides user with avenues to monitor and review previous shots. A feature that does not currently exist on the market.

#### 8.2 Summary of disadvantages/limitations

OCD-8.2 :: THIS PARAGRAPH SHALL PROVIDE A QUALITATIVE AND QUANTITATIVE SUMMARY OF DISADVANTAGES OR LIMITATIONS OF THE NEW OR MODIFIED SYSTEM. THESE DISADVANTAGES AND LIMITATIONS SHALL INCLUDE, AS APPLICABLE, DEGRADED OR MISSING CAPABILITIES, DEGRADED OR LESS-THAN-DESIRED PERFORMANCE, GREATER-THAN-DESIRED USE OF COMPUTER HARDWARE RESOURCES, UNDESIRABLE OPERATIONAL IMPACTS, CONFLICTS WITH USER ASSUMPTIONS, AND OTHER CONSTRAINTS.

Some disadvantages of this system. There is still a user input. The user must weight and input the coffee they are going to use. The system is also dependant on user competence. Understanding how to manipulate and change variables to get the desired effect.

The system additionally creates added complexity and more areas for failures. This system integrates into the existing machine and the user must install and learn how to operate it.

#### 8.3 Alternatives and trade-offs considered

OCD-8.3 :: THIS PARAGRAPH SHALL IDENTIFY AND DESCRIBE MAJOR ALTERNATIVES CONSIDERED TO THE SYSTEM OR ITS CHARACTERISTICS, THE TRADE-OFFS AMONG THEM, AND RATIONALE FOR THE DECISIONS REACHED.

The biggest alternative to the Smart Silvia is a traditional espresso setup. A simple scale and timer with a user controlling the system. This is a cost effective solution. It leaves rooms for human error but is how many users brew espresso.

One additional trade off is the complexity of the system. The user must be comfortable installing the Smart Silvia. This requires opening up the machine working with hardware meant to carry 120V AC current.

## APPENDIX

### Notes

OCD-9.0 :: THIS SECTION SHALL CONTAIN ANY GENERAL INFORMATION THAT AIDS IN UNDERSTANDING THIS DOCUMENT.

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