CMSC 447

Software Development Plan (SDP)

1 Scope

1.1 Identification

This Software Development Plan (SDP) is applicable to CasaDomus 1.0, a home finding program that runs on both Chrome version number 60.0+ and Firefox version number 58.0+, that searches for potential areas of housing based off a user's response entry to a questionnaire.

1.2 System overview

The purpose of this piece of software, which should run on any system that is capable of any of the two following web browsers, Chrome version 60.0+, and Firefox version 58.0+, is to enable users to easily find housing locations based off their preferences. The web-based software should perform these tasks by using user preferences obtained from a questionnaire to search through information obtained through various APIs, .csv files, and a database, which display to the user a map that is gradiented based off the comparability of the housing options in various areas to the user preferences.

1.3 Document overview

This is the Software Development Plan document that describes the plan that intended to be followed throughout the entirety of the development of the product.

2 Overview of required work

a. Requirements and constraints on the system and software to be developed
    - Since the software is to be developed to be entirely functional on certain web browsers, including Chrome 58.0+ and Firefox 60.0+, the software should be functional on any device that supports such browsers. As consequence, the software has no known constraints on the system.

b. Requirements and constraints on project documentation
    - All project documentation should be done by 5/15/2018, signed off by out client, Prof. Charles Nicholas, and turned into Prof. Russ Cain in a binder.

c. Position of the project in the system life cycle
    - The position of the project in the system life cycle depends on what has been completed for the project. On the completion of all the requirements for one position in the system life cycle, the project then moves onto the next step in the life cycle.

Position in Lifecycle	**Items to be Completed**
Requirements	Obtaining and documenting the requirements specified by the customer
Design	Designing the project around its requirements

	along with designing the GUI.
Implementation	Implementing the project, which is done simultaneously with the front end and the back end
Test	Test the functionality and performance of the code and determine whether requirements have been met
Maintenance	After the code has been tested, it should be updated, and the functionality shall be maintained based off needs.

d. Requirements and constraints on project schedules and resources
    - It shall be completed by May 15th, 2018.

e. Other requirements and constraints, such as on project security, privacy, methods, standards, interdependencies in hardware and software development, etc.

    Since the project does not store any sensitive information, nor does it associate any potentially stored information with users in any direct manner, there are minimal concerns for project security and privacy.

3 Plans for performing general software development activities

3.1 Software development process

This paragraph shall describe the software development process to be used. The planning shall cover all contractual clauses concerning this topic, identifying planned builds, if applicable, their objectives, and the software development activities to be performed in each build.

The Software Development Process used shall be a mix of Waterfall and Agile.

3.2 General plans for software development

3.2.1 Software development methods

This paragraph shall describe or reference the software development methods to be used. Included shall be descriptions of the manual and automated tools and procedures to be used in support of these methods. The methods shall cover all contractual clauses concerning this topic. Reference may be made to other paragraphs in this plan if the methods are better described in context with the activities to which they will be applied.

Github shall be used for a public repository and Version Control

3.2.2 Standards for software products

This paragraph shall describe or reference the standards to be followed for representing

requirements, design, code, test cases, test procedures, and test results. The standards shall cover all contractual clauses concerning this topic. Reference may be made to other paragraphs in this plan if the standards are better described in context with the activities to which they will be applied. Standards for code shall be provided for each programming language to be used. They shall include at a minimum:

a. Standards for format (such as indentation, spacing, capitalization, and order of information)
    - Please refer to the SDD, Section 6.1
b. Standards for header comments (requiring, for example, name/identifier of the code; version identification; modification history; purpose; requirements and design decisions implemented; notes on the processing (such as algorithms used, assumptions, constraints, limitations, and side effects); and notes on the data (inputs, outputs, variables, data structures, etc.)
    - Please refer to the SDD, Section 6.1
c. Standards for other comments (such as required number and content expectations)
    - Please refer to the SDD, Section 6.1
d. Naming conventions for variables, parameters, packages, procedures, files, etc.
    - Please refer to the SDD, Section 6.1
e. Restrictions, if any, on the use of programming language constructs or features
    - Please refer to the SDD, Section 3.1
f. Restrictions, if any, on the complexity of code aggregates
    - N/A

3.2.3 Reusable software products

This paragraph shall be divided into the following subparagraphs.

3.2.3.1 Incorporating reusable software products

This paragraph shall describe the approach to be followed for identifying, evaluating, and incorporating reusable software products, including the scope of the search for such products and the criteria to be used for their evaluation. It shall cover all contractual clauses concerning this topic. Candidate or selected reusable software products known at the time this plan is prepared or updated shall be identified and described, together with benefits, drawbacks, and restrictions, as applicable, associated with their use.

Product	License
Papa Parse 4	MIT
Angular JS	MIT
Google Maps Javascript API	Google Maps Platform License

3.2.4 Handling of critical requirements

This paragraph shall be divided into the following subparagraphs to describe the approach to be followed for handling requirements designated critical. The planning in each subparagraph shall cover all contractual clauses concerning the identified topic.

3.2.4.1 Safety assurance

3.2.4.2 Security assurance

3.2.4.3 Privacy assurance

3.2.4.4 Assurance of other critical requirements

3.2.5 Computer hardware resource utilization

This paragraph shall describe the approach to be followed for allocating computer hardware resources and monitoring their utilization. It shall cover all contractual clauses concerning this topic.

3.2.6 Recording rationale

This paragraph shall describe the approach to be followed for recording rationale that will be useful to the support agency for key decisions made on the project. It shall interpret the term "key decisions" for the project and state where the rationale are to be recorded. It shall cover all contractual clauses concerning this topic.

3.2.7 Access for acquirer review

This paragraph shall describe the approach to be followed for providing the acquirer or its authorized representative access to developer and subcontractor facilities for review of software products and activities. It shall cover all contractual clauses concerning this topic.

4 Plans for performing detailed software development activities

This section shall be divided into the following paragraphs. Provisions corresponding to non-required activities may be satisfied by the words "Not applicable." If different builds or different software on the project require different planning, these differences shall be noted in the paragraphs. The discussion of each activity shall include the approach (methods/procedures/tools) to be applied to: 1) the analysis or other technical tasks involved, 2) the recording of results, and 3) the preparation of associated deliverables, if applicable. The discussion shall also identify applicable risks/uncertainties and plans for dealing with them. Reference may be made to 4.2.1 if applicable methods are described there.

4.1 Project planning and oversight

This paragraph shall be divided into the following subparagraphs to describe the approach to

be followed for project planning and oversight. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.1.1 Software development planning (covering updates to this plan)

4.1.2 CSCI test planning

4.1.3 System test planning

4.1.4 Software installation planning

4.1.5 Software transition planning

4.1.6 Following and updating plans, including the intervals for management review

4.2 Establishing a software development environment

This paragraph shall be divided into the following subparagraphs to describe the approach to be followed for establishing, controlling, and maintaining a software development environment. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.2.1 Software engineering environment

The following text editing softwares and interactive development environments were used to develop the source code, Vim, NotePad++,//TODO JAMES STUFF. These various text editors will be used by preference of the developer for writing code and various tests.

4.2.2 Software test environment

The following tools will be used for the purpose of testing the CSUs, CSCIs, and the system. Chrome's built-in developer console, Firefox's built-in developer console.

4.2.3 Software development library

4.2.4 Software development files

4.2.5 Non-deliverable software

4.3 System requirements analysis

This paragraph shall be divided into the following subparagraphs to describe the approach to be followed for participating in system requirements analysis. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.3.1 Analysis of user input

4.3.2 Operational concept

4.3.3 System requirements

4.4 System design

This paragraph shall be divided into the following subparagraphs to describe the approach to be followed for participating in system design. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.4.1 System-wide design decisions

4.4.2 System architectural design

4.5 Software requirements analysis

This paragraph shall describe the approach to be followed for software requirements analysis. The approach shall cover all contractual clauses concerning this topic.

4.6 Software design

This paragraph shall be divided into the following subparagraphs to describe the approach to be followed for software design. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.6.1 CSCI-wide design decisions

4.6.2 CSCI architectural design

4.6.3 CSCI detailed design

4.7 Software implementation and unit testing

This paragraph shall be divided into the following subparagraphs to describe the approach to be followed for software implementation and unit testing. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.7.1 Software implementation

4.7.2 Preparing for unit testing

4.7.3 Performing unit testing

4.7.4 Revision and retesting

4.7.5 Analyzing and recording unit test results

4.8 Unit integration and testing

This paragraph shall be divided into the following sub- paragraphs to describe the approach to be followed for unit integration and testing. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.8.1 Preparing for unit integration and testing

4.8.2 Performing unit integration and testing

4.8.3 Revision and retesting

4.8.4 Analyzing and recording unit integration and test results

4.9 CSCI qualification testing

This paragraph shall be divided into the following sub- paragraphs to describe the approach to be followed for CSCI qualification testing. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.9.1 Independence in CSCI qualification testing

4.9.2 Testing on the target computer system

4.9.3 Preparing for CSCI qualification testing

4.9.4 Dry run of CSCI qualification testing

4.9.5 Performing CSCI qualification testing

4.9.6 Revision and retesting

4.9.7 Analyzing and recording CSCI qualification test results

4.10 CSCI/HWCI integration and testing

This paragraph shall be divided into the following subparagraphs to describe the approach to be followed for participating in CSCI/HWCI integration and testing. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.10.1 Preparing for CSCI/HWCI integration and testing

4.10.2 Performing CSCI/HWCI integration and testing

4.10.3 Revision and retesting

4.10.4 Analyzing and recording CSCI/HWCI integration and test results

4.11 System qualification testing

This paragraph shall be divided into the following sub- paragraphs to describe the approach to be followed for participating in system qualification testing. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.11.1 Independence in system qualification testing

4.11.2 Testing on the target computer system

4.11.3 Preparing for system qualification testing

4.11.4 Dry run of system qualification testing

4.11.5 Performing system qualification testing

4.11.6 Revision and retesting

4.11.7 Analyzing and recording system qualification test results

4.12 Preparing for software use

This paragraph shall be divided into the following sub- paragraphs to describe the approach to be followed for preparing for software use. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.12.1 Preparing the executable softwareInstead, the product should require a user to obtain at least one of its supported web browsers, including Google Chrome version 60.0+ or Firefox 58.0+, which will be used to load, display, and execute the product. Instead, direct access to the product will be given via a .zip file containing all the files, making up the product. The entirety of the product can be obtained by opening the landing page of the site, which will give access to all of the product's functunality.

4.12.2 Preparing version descriptions for user sites

4.12.3 Preparing user manuals

4.12.4 Installation at user sites

4.13 Preparing for software transition

This paragraph shall be divided into the following subparagraphs to describe the approach to be followed for preparing for software transition. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.13.1 Preparing the executable software

4.13.2 Preparing source files

4.13.3 Preparing version descriptions for the support site

4.13.4 Preparing the "as built" CSCI design and other software support information

4.13.5 Updating the system design description

4.13.6 Preparing support manuals

4.13.7 Transition to the designated support site

4.14 Software configuration management

This paragraph shall be divided into the following subparagraphs to describe the approach to be followed for software configuration management. The planning in each subparagraph shall

cover all contractual clauses regarding the identified topic.

4.14.1 Configuration identification

4.14.2 Configuration control

4.14.3 Configuration status accounting

4.14.4 Configuration audits

4.14.5 Packaging, storage, handling, and delivery

4.15 Software product evaluation

This paragraph shall be divided into the following sub- paragraphs to describe the approach to be followed for software product evaluation. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.15.1 In-process and final software product evaluations

4.15.2 Software product evaluation records, including items to be recorded

4.15.3 Independence in software product evaluation

4.16 Software quality assurance

This paragraph shall be divided into the following sub- paragraphs to describe the approach to be followed for software quality assurance. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.16.1 Software quality assurance evaluations

4.16.2 Software quality assurance records, including items to be recorded

4.16.3 Independence in software quality assurance

4.17 Corrective action

This paragraph shall be divided into the following subparagraphs to describe the approach to be followed for corrective action. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.17.1 Problem/change reports, including items to be recorded (candidate items include project name, originator, problem number, problem name, software element or document affected, origination date, category and priority, description, analyst assigned to the problem, date assigned, date completed, analysis time, recommended solution, impacts, problem status, approval of solution, follow-up actions, corrector, correction date, version where corrected, correction time, description of solution implemented)

4.17.2 Corrective action system

4.18 Joint technical and management reviews

This paragraph shall be divided into the following subparagraphs to describe the approach to be followed for joint technical and management reviews. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.18.1 Joint technical reviews, including a proposed set of reviews

4.18.2 Joint management reviews, including a proposed set of reviews

4.19 Other software development activities

This paragraph shall be divided into the following subparagraphs to describe the approach to be followed for other software development activities. The planning in each subparagraph shall cover all contractual clauses regarding the identified topic.

4.19.1 Risk management, including known risks and corresponding strategies

4.19.2 Software management indicators, including indicators to be used

4.19.3 Security and privacy

4.19.4 Subcontractor management

4.19.5 Interface with software independent verification and validation (IV&V) agents

4.19.6 Coordination with associate developers

4.19.7 Improvement of project processes

4.19.8 Other activities not covered elsewhere in the plan

5 Schedules and activity network

This section shall present:

a. Schedule(s) identifying the activities in each build and showing initiation of each activity, availability of draft and final deliverables and other milestones, and completion of each activity
b. An activity network, depicting sequential relationships and dependencies among activities and identifying those activities that impose the greatest time restrictions on the project

6 Project organization and resources

This section shall be divided into the following paragraphs to describe the project organization and resources to be applied in each build.

6.1 Project organization

This project is done incorporation with the customer, Professor Charles Nicholas, of

UMBC. Besides his involvement in specifying the requirements of the project, and indicating his satisfaction level, we also have to work within the expectations of Professor Russell Cain, of UMBC, who will likely play the role of another reviewer for our project. All other aspects of the project are managed by the team developing the code.

6.2 Project resources

This paragraph shall describe the resources to be applied to the project. It shall include, as applicable:

a. Personnel resources, including:

1) The estimated staff-loading for the project (number of personnel over time)

- 6 Software Developers; no expected increase in personnel

2) The breakdown of the staff-loading numbers by responsibility (for example, management, software engineering, software testing, software configuration management, software product evaluation, software quality assurance)

Area of Responsibility	Staff Responsible
Software Engineering and Testing	All Staff
Front end	William Gao, Elia Deppe
Map API	Ryan Coleman, Haoran Ren
Data Aggregation	Elia Deppe, James Williams, Haoran Ren
Back end	James Williams
Documentation	All Staff

3) A breakdown of the skill levels of personnel performing each responsibility

Cynthia Chou	
Ryan Coleman	Proficiency in C, C++, Python, Javascript. Basic in HTML, CSS
Elia Deppe	Proficiency in C, C++, Java, Android Development, and Python Basic in HTML, CSS, and Javascript
William Gao	

Haoran Ren	
James Williams	

b. Overview of developer facilities to be used, including geographic locations in which the work will be performed, facilities to be used, and secure areas and other features of the facilities as applicable to the contracted effort.
    1) All development will be done in the engineer's respective homes and on campus at UMBC. There is no need for secure areas.
c. Acquirer-furnished equipment, software, services, documentation, data, and facilities required for the contracted effort. A schedule detailing when these items will be needed shall also be included.
d. Other required resources, including a plan for obtaining the resources, dates needed, and availability of each resource item.

7 Notes

This section shall contain any general information that aids in understanding this document (e.g., background information, glossary, rationale). This section shall include an alphabetical listing of all acronyms, abbreviations, and their meanings as used in this document and a list of any terms and definitions needed to understand this document.

A.

Appendixes

Appendixes may be used to provide information published separately for convenience in document maintenance (e.g., charts, classified data). As applicable, each appendix shall be referenced in the main body of the document where the data would normally have been provided. Appendixes may be bound as separate documents for ease in handling. Appendixes shall be lettered alphabetically (A, B, etc.).

DESCRIPTION/PURPOSE

The Software Development Plan (SDP) describes a developer's plans for conducting a software development effort. The term "software development" is meant to include new development, modification, reuse, reengineering, maintenance, and all other activities resulting in software products.

The SDP provides the acquirer insight into, and a tool for monitoring, the processes to be followed for software development, the methods to be used, the approach to be followed for each activity, and project schedules, organization, and resources.

APPLICATION/INTERRELATIONSHIP

Portions of this plan may be bound separately if this approach enhances their usability. Examples include plans for software configuration management and software quality assurance.

The Contract Data Requirements List (CDRL) should specify whether deliverable data are to be delivered on paper or electronic media; are to be in a given electronic form (such as ASCII, CALS, or compatible with a specified word processor or other support software); may be delivered in developer format rather than in the format specified herein; and may reside in a computer-aided software engineering (CASE) or other automated tool rather than in the form of a traditional document.

PREPARATION INSTRUCTIONS

General instructions.

a. Automated techniques. Use of automated techniques is encouraged. The term "document" in this means a collection of data regardless of its medium.

b. Alternate presentation styles. Diagrams, tables, matrices, and other presentation styles are acceptable substitutes for text when data required can be made more readable using these styles.

c. Title page or identifier. The document shall include a title page containing, as applicable: document number; volume number; version/revision indicator; security markings or other restrictions on the handling of the document; date; document title; name, abbreviation, and any other identifier for the system, subsystem, or item to which the document applies; contract number; CDRL item number; organization for which the document has been prepared; name and address of the preparing organization; and distribution statement. For data in a database or other alternative form, this information shall be included on external and internal labels or by equivalent identification methods.

d. Table of contents. The document shall contain a table of contents providing the number, title, and page number of each titled paragraph, figure, table, and appendix. For data in a database or other alternative form, this information shall consist of an internal or external table of contents containing pointers to, or instructions for accessing, each paragraph, figure, table, and appendix or their equivalents.

e. Page numbering/labeling. Each page shall contain a unique page number and display the document number, including version, volume, and date, as applicable. For data in a

database or other alternative form, files, screens, or other entities shall be assigned names or numbers in such a way that desired data can be indexed and accessed.

f. Response to tailoring instructions. If a paragraph is tailored out of this document, the resulting document shall contain the corresponding paragraph number and title, followed by "This paragraph has been tailored out." For data in a database or other alternative form, this representation need occur only in the table of contents or equivalent.

g. Multiple paragraphs and subparagraphs. Any section, paragraph, or subparagraph in this DID may be written as multiple paragraphs or subparagraphs to enhance readability.

h. Standard data descriptions. If a data description required by this document has been published in a standard data element dictionary specified in the contract, reference to an entry in that dictionary is preferred over including the description itself.

i. Substitution of existing documents. Commercial or other existing documents, including other project plans, may be substituted for all or part of the document if they contain the required data.