Life Cycle Plan (LCP)

MedFRS Device Diagnostic Software

Team 16

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Version History

Date	Author	Version	Changes made	Rationale
09/27/13	DG,AAJ	1.0	• Original for CSCI577a; Tailored from ICSM OCD Template; Removed Section 6 : Iteration Plan; Removed Section 4: Approach; Removed Section 5: Resources; Changed Section 1: Introduction; Changed Section 2: Milestones and Products; Changed Section 3: Responsibilities	• To fit CS577a course content. And to remove empty sections for VCR. Add content for VCR.
10/09/13	DG	2.0	• Modified Section 2: Milestones and Products; Added Section 4: Approach; Section 5: Resources	• LCP for Draft FC Package
10/21/13	DG	3.0	• Modified Section 2: Milestones and Products, modified section 5:Resources, Added Section 6.1: Iteration Plan	• LCP for Draft DC Package
11/27/13	DG	4.0	• Modified Section 2: Milestones and Products, modified section 5:Resources, Added Section 6.1: Iteration Plan	• LCP for Draft TRR Package
12/9/13	AAJ,DG	4.1	• Corrections and formatting	• For final submission

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1. Introduction

1.1 Purpose of the Life Cycle Plan

This document describes the roles and responsibilities of the stakeholders, plans and projections for the development of the Medical First Response System (MedFRS) Device Diagnostic Software for the Center for Systems and Software Engineering (CSSE). It is to be viewed by the success-critical stakeholders Julie Sanchez (point of contact), Jo Ann Lane, Barry Boehm and the development team. The LCP helps all the stakeholders coordinate with respect to the deliverables and their deadlines.

1.2 Status of the Life Cycle Plan

The status of the LCP is currently at the Transition Package version number 4.1. This is the final version created by the team. This phase includes the transition readiness review milestone, the purpose, roles, responsibilities of each team member and the skills and required skills that each team member should have. It also has the cost estimation result from the COINCOMO model and the iteration plan for our project.

2. Milestones and Products

Exploration phase

Duration: 08/26/13- 09/27/13
Concept: They identify project operational concept, system and software requirement, system and software architecture, and life-cycle plan. These phases prioritize the capabilities, conduct investment and feasibility analysis, and implement the software prototype.
Deliverables: Valuation Commitment Package
Milestone: Valuation Commitment Review
Strategy: One Incremental Commitment Cycle

Valuation Phase

Duration: 09/28/13- 10/16/13
Concept: We start developing the first prototype of our system and analyze the amount of time and effort required in the overall process. This is done with the help of the program model and the benefit chain of the OCD package.
Deliverables: Draft Foundation Commitment Package
Milestone: Foundations Commitment Review
Strategy: One Incremental Commitment Cycle

Foundations phase

Duration: 10/16/13- 10/23/13
Concept: In this phase, the foundations for product development are laid down. This includes acquiring COTS, NDI etc., examining their interoperability and determining what can be used for development and what cannot. The feasibility of each requirement (Win condition) is
determined and development starts with, usually, the most feasible and required conditions.

Deliverables: Draft Development Commitment Package
Milestone: Development Commitment Review
Strategy: One Incremental Commitment Cycle

Development phase

DURATION: 10/23/13- 11/23/13

CONCEPT: The actual product development starts in this phase. All the acquired COTS, NDIs etc. are integrated, customized and the first working version of the product is developed. After thorough unit and integration testing, this version can be used for acceptance testing by the
client, and any changes required could be incorporated. Along with the product development, the team also prepares transition plans, test cases and training plans.

DELIVERABLES: TRR Package, Draft Training Plans, Draft Support Plans.

MILESTONE: Transition Readiness Review.

STRATEGY: One Incremental Commitment Cycle

3. Responsibilities

3.1 Responsibilities by Phase

Table 1: Stakeholder's responsibilities

Name:	Julie Sanchez
Role:	Client
Exploration	Provide the details of the project and artifacts related to it.
Valuation	Review the prototype prepared
Foundations	Review the product
Name:	Misha Dowd
Primary role: Secondary role:	Project Manager Feasibility Analyst
Exploration	Assign tasks to other team members, make progress report and project plan.
Valuation	Review the project progress and prototype, plan and manage the project, assess the risks and mitigate risks.
Foundations	Review the project progress and project plan.
Name:	Delnaz Gundevia
Primary role: Secondary role:	Life Cycle Planner System Architect
Exploration	Make a life cycle plan, identify the responsibilities and skills, identify milestones, prepare project plan, and make development strategy.
Valuation	Update the life cycle plan, identify the milestones and the features to be implemented, estimate the cost and effort using COCOMO-II model.
Foundations	Update life cycle plan; identify tools and methods to be used.

Name:	Anfal Abdul Jaleel
Primary role: Secondary role:	Software Architect Systems Requirement Engineer
Exploration	Analyze the proposed system; analyze the interoperability of NDI components.
Valuation	Assess and evaluate the NDI components, assess the system architecture, make a prototype and UML diagrams.
Foundations	Design the system architecture; provide feasibility evidence for architecture agile.
Name:	Nanda Kishore Kollaje Rao
Primary Role: Secondary Role:	Systems Requirements Engineer Prototyper
Exploration	Exploring existing infrastructure, Analyze the primary requirements.
Valuation	Initial prototype architecture and design, finalized requirement engineering artifacts.
Foundations	Develop the initial prototype.
Name:	Anupam Kumar
Primary Role: Secondary role:	Feasibility Analyst Operational Concept Engineer
Exploration	Assess and plan to mitigate risks, analyze the current system.
Valuation	Explore alternative solutions to the risks, provide feasibility evidence and analyze the business case, establish new operational concept.
Foundations	Assess and plan to mitigate risks, operational concept description.
Name:	Jackie Cheng

Primary Role: Secondary Role:	IIV&V Quality Focal Point
Exploration	Verify and validate work products, assess the quality management strategy.
Valuation	Verify and validate work products, identify the quality management strategy, identify configuration management.
Foundations	Verify and validate work products, identify the quality management strategy.

3.2 Skills

Table 2: Skills Table

Team members	Role	Skills
Misha Dowd	**Primary:** Project Manager **Secondary:** Feasibility Analyst	**Current skills:** C, C++, Java, JavaScript, Python, JSON, VBA, HTML **Required skills:** MS Project, COCOMO-II, PHP/ Ruby on Rails
Delnaz Gundevia	**Primary:** Life Cycle Planner **Secondary:** System Architect	**Current skills:** C/C++, Web Services, Databases **Required skills:** COCOMO-II, UML coding, PHP/ Ruby on Rails
Anfal Abdul Jaleel	**Primary:** System Architect **Secondary:** Systems Requirement Engineer	**Current skills:** ER modelling, C, C++, Java, HTML, Ruby on Rails, Databases **Required skills:** UML coding
Nanda Kishore Kollaje Rao	**Primary:** Systems Requirement Engineer **Secondary:** Prototyper	**Current skills:** iOS Development, Java, PHP, HTML, JavaScript, jQuery Framework, MySQL. **Required skills:** JSP, Prototyping tools, Ruby on Rails
Anupam Kumar	**Primary:** Feasibility Analyst **Secondary:** Operational Concept Engineer	**Current skills:** Databases, Web Services, Network Protocols, Data Analytics, Android Development **Required skills:** COCOMO-II, Ruby on Rails

Jackie Cheng	**Primary:** IIV & V **Secondary:** Quality Focal Point	**Current skills:** Systems engineering, project management, C++, C, Network engineering, Visual Basic **Required skills:** Bugzilla, Software and Hardware verification, report generations, follow quality process, , PHP/Ruby on Rails

4. Approach

4.1 Monitoring and Control

4.1.1 Closed Loop Feedback Control

The team gets together twice every week to discuss about the project status. The team also communicates about every task on hand and the tasks to be performed the coming week on Asana, a web application to connect with all team members. The main purpose of these meetings is to handle any backlogs and identify the high risks involved in our project.

4.1.2 Reviews

Weekly team meetings to discuss the current status and the tasks to be performed in the coming weeks.

4.2 Methods, Tools and Facilities

Tools	Usage	Provider
Interface Builder	UI Designer for iOS Apps	Apple
Instruments	Debugger and Memory optimizer for iOS application	Apple
XCode	IDE for iOS development	Apple
MySQL	Database Management System	Oracle
Asana	Used to communicate information between team members	Asana

5. Resources

- Estimated CSCI577a Effort : 6 team members at 12 hrs/week for 12 weeks
- Total estimated effort : 864 Hours
- Budget information : Estimated Budget of $4350
- Project duration : 12 Weeks
- Component modules in your development project: Volunteer Management System, Mobile Victim Data Entry and retrieval System, Victim state monitoring System, Victim transport coordinator system, Supervisor Management System, Transport Coordinator Management System, Communication System and Security System.
- Programming language used : Objective C, SQL,PHP/Ruby On Rails

Table 3: COCOMOII Scale Driver

Scale Driver	Value	Rationale
PREC	LOW	The development team is unfamiliar with this type of application as this has never been done before.
FLEX	HIGH	There is no present system and our client does not have any technical specifications only objectives. We are not interfacing with any other system.
RESL	NOMINAL	All critical risk items, schedule, budget and internal milestones are identified.
TEAM	HIGH	Each stakeholder has considerable consistency of objectives and cultures, and considerable ability and willingness to accommodate others' objectives.
PMAT	NOMINAL	The development team follows ICSM guidelines, which the processes are defined and repeatable but the result may not be consistent, CMM Level 2.

Table 4: COCOMOII Cost Driver

Cost Driver	Value	Rationale
RELY	HIGH	All modules should perform optimally for the entire system to be reliable.
DATA	NOMINAL	The ratio of bytes in the testing database to SLOC in the program is approximately less than 10 because the database will store only information of victim, which are his vitals, RPM, treated or not, and short comments.
DOCU	NOMINAL	Because the development process follows ICSM, the document for life-cycle needs is normal.
CPLX	NOMINAL	It contains simple message passing control, standard math and statistical routines for generating reports, and simple I/O process includes device selection from bar code scanner or user interface, status checking of bar code scanner, and error processing. Additionally, it has simple structural changes and uses simple widget set.
RUSE	LOW	It is not intended to be reused for the future project.
TIME	NOMINAL	The system is to be used only in high catastrophic situations
STOR	NOMINAL	The percentage of available storage expected to be used by the system and subsystem is less than 50%.
PVOL	NOMINAL	Major changes of the platform, i.e. Apache Tomcat, JDK, MySQL, and web browsers, are approximately every year.
ACAP	NOMINAL	The analysts have the ability to analyze, design, communicate, and cooperate very well.
PCAP	NOMINAL	Programmers are capable, efficient and thorough. They are able to communicate and cooperate very well.
PCON	NOMINAL	We have 6 team members in CSCI577A that is suitable for our project sizing.
APEX	VERY LOW	The average experience of the team members for this application is very less since it is the first time anyone of us is working on such a project.
LTEX	NOMINAL	The development team plans to develop this application with Objective C, HTML, PHP/Ruby on Rails and Java

		script, and uses SQL language to query information from the database. The tools for programming are Xcode, Interface Builder, Instruments and MySQL. Therefore, the language and tool experience is nominal because team members have at least one year experience with these languages and tools.
PLEX	LOW	The server platform is web server Apache, and database is MySQL. Although, all developers have this platform experience, this module need implementation an user interface on handheld device which our developers have less experience.
TOOL	NOMINAL	The software tools development team plan to use is just ios, frontend, backend CASE, and supporting little integration. There is no support for life-cycle.
SITE	VERY HIGH	In CSCI577a, five of six team members are on-campus students. Additionally, we use wideband electronic communication and occasional video conference.
SCED	NOMINAL	The schedule is fixed for 12 weeks in Fall semester.

The following is module listed in the system and its estimated size with Source Lines of Code (SLOC)

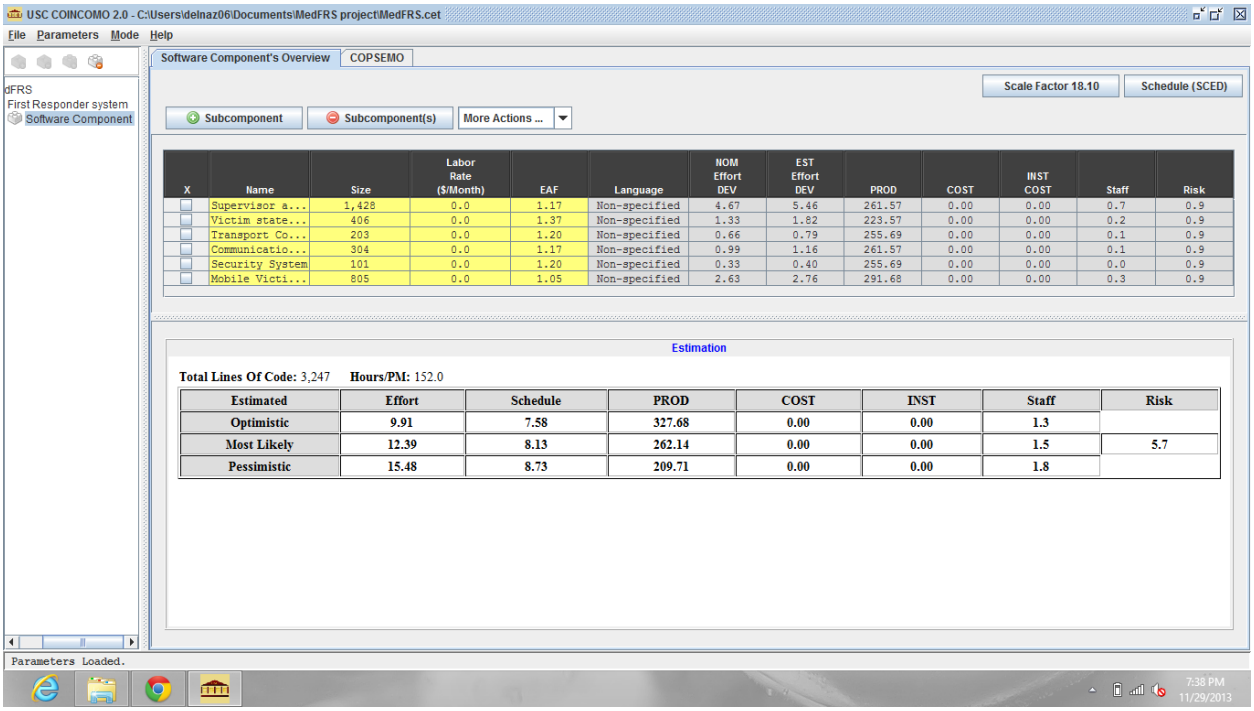
Table 5: Module lists and SLOC of each module

No.	Module Name	Brief Description	SLOC	REVL
1	Supervisor and Volunteer Management System	Provide volunteer management system for Supervisor to Add/Delete/Update data of Volunteers	1400	2%

2	Mobile Victim Data Entry and retrieval System	Allows Volunteer to enter and retrieve data of victim.	700	15%
3	Victim state monitoring System	Allows supervisor to monitor location, condition and treatment state.	400	1.5%
4	Transport Coordinator Management System	Provide Transport Coordinator management system for supervisors to add/manage/ delete Transport Coordinator.	200	1.5%
5	Communication System	To allow data sync from mobile client to hub and web client to hub vice versa.	300	1.5%
6	Security System	To allow only authenticated users to use the system.	100	1.5%

The following is the result from COCOMOII estimation based on Scale Drivers and Cost Drivers discussed above.

Figure 2: COCOMO Estimation Result



Conclusion

The form of schedule our project uses is the Independent Variable (SAIV) strategy: 12–week schedule drives development of a set of top priority core capabilities. Therefore, the estimates show the effort required for the project.

According to COCOMO II Estimates for CSCI577, one team member effort = 1.67 COCOMO II person months. The total effort put forward by a team of 6 members is 6*1.67=10.02 person months, which is less than the most likely effort. The pessimistic effort from the COCOMO estimation above is 15.48, so the total team members need for this project = 15.48/1.67 = 9.26. Since, we have 6 people, from this effort and staff estimation; we would not be able to finish the project completely in one semester.

As of now, we should focus on the some of the core features for a basic prototype and get back to the other features, if time permits.

6. Iteration Plan

6.1 Plan

The first iteration of the development phase concentrates on getting the basic structure of the mobile application and website in the form of a prototype.

6.1.1 Capabilities to be implemented

Table 5: Construction iteration capabilities to be implemented

ID	Capability	Description	Priority	Iteration
UC -02	OC-14	The system must transmit data securely ,WC_2741	Must Have	1
UC -08	OC-6	Ability for the Hub Supervisor to sort victim's list based on victim condition and building name alphabetically WC_2796	Must Have	1
UC -20	OC-1	Ability to record victims condition (breathing, perfusion, mental state), WC_2635, WC_2636, WC_2637	Must Have	1
UC -20	OC-2	Ability to record victims vital stats WC_2634	Must Have	1
UC -12	OC-3	Ability to record victims identification information,WC_2757	Should Have	1
UC -20	OC-4	Ability to record victims other medical details (broken bones, torn muscles, contamination etc),WC_2755	Should Have	1
UC -20	OC-5	Ability for system to classify victims condition automatically**,**WC_2756	Should Have	1
UC -12	OC-9	Ability for Volunteer to scan barcode **,** WC_2639, WC_2641	Want to Have	1
UC -20	OC-11	Ability for volunteer to enter room number/floor number/other relevant location information**,** WC_2638	Must Have	1

UC -12	OC-10	Ability for volunteer to retrieve all information about victim from system**,** WC_2641	Must Have	1
UC -10	OC-8	Ability for Supervisor/Transport Coordinator release EMTs from buildings**,** WC_2762	Must Have	1
UC -14	OC-12	Ability for Transport Coordinator to note victim's transport details and destination ,WC_2742	Must Have	1
UC -16	OC-7	Ability for supervisor to assign EMTs to buildings, WC_2760	Must Have	1

6.1.2 Capabilities to be tested

Table 6: Construction iteration capabilities to be tested

ID	Capability	Description	Priority	Iteration
UC -02	OC-14	The system must transmit data securely ,WC_2741	Must Have	1
UC -08	OC-6	Ability for the Hub Supervisor to sort victim's list based on victim condition and building name alphabetically WC_2796	Must Have	1
UC -20	OC-1	Ability to record victims condition (breathing, perfusion, mental state), WC_2635, WC_2636, WC_2637	Must Have	1
UC -20	OC-2	Ability to record victims vital stats WC_2634	Must Have	1
UC -12	OC-3	Ability to record victims identification information,WC_2757	Should Have	1

UC -20	OC-4	Ability to record victims other medical details (broken bones, torn muscles, contamination etc),WC_2755	Should Have	1
UC -20	OC-5	Ability for system to classify victims condition automatically**,**WC_2756	Should Have	1
UC -12	OC-9	Ability for Volunteer to scan barcode **,** WC_2639, WC_2641	Want to Have	1
UC -20	OC-11	Ability for volunteer to enter room number/floor number/other relevant location information**,** WC_2638	Must Have	1
UC -12	OC-10	Ability for volunteer to retrieve all information about victim from system**,** WC_2641	Must Have	1
UC -10	OC-8	Ability for Supervisor/Transport Coordinator release EMTs from buildings**,** WC_2762	Must Have	1
UC -14	OC-12	Ability for Transport Coordinator to note victim's transport details and destination ,WC_2742	Must Have	1
UC -16	OC-7	Ability for supervisor to assign EMTs to buildings, WC_2760	Must Have	1

6.1.3 Capabilities not to be tested

- Data Security

6.1.4 CCD Preparation Plans

The development team along with the client will be involved in the core capability drive-through. During the CCD, the team will provide a written or if possible a working prototype to the client. Our main focus would be to get all the high priority requirements fulfilled. We will collect the response from our client through regular feedbacks and gradually progress in the development.

6.2 Iteration Assessment

6.2.1 Capabilities Implemented, Tested and Results

The capabilities implemented and tested are collecting the data of the victim that is done by the volunteer, syncing the data, and storing it.

ID	Capability	Test Case	Test Results	If Fail, Why?
1	Ease of Navigation in website	All web related TCs	Fail	Its linear flow with no links added yet
2	Ease of Navigation in mobile app	All mobile related TCs	Pass	
3	Design and Look of website	All web related TCs	Pass	
4	Design and Look of mobile app	All mobile related TCs	Pass	
5	Login as Supervisor	TC -15	Pass	
6	Login as Transport coordinator	TC -15	Pass	
7	Add/Remove building information	TC -14	Pass	

6.2.2 Core Capabilities Drive-Through Results

1) The client was able to navigate through the website without much problems but navigation could be improved.
2) A few glitches that came in the CCD were the phrasing of words that confused the client a bit but have now been resolved.
3) The client needed guidance on how to add and remove a volunteer in the MedFRS system.

4) The client needed a little help while using the mobile application.
5) The comment section in the mobile application does not incorporate special characters which has to be resolved.
6) The client was very happy with the functionalities implemented despite the few glitches.

Summary

The mobile application and the website are mostly self-descriptive and can be easily used by Volunteers and Coordinators, but a few functions need to have an explanation of how to use them. And in times of emergency, for the volunteer or the coordinator to work at a fast pace, some prior training on using the system is to be given. Additionally, navigation links need to be added to the site.

6.3 Adherence to Plan

The iterations were on budget, but we were not able to adhere to the pre-decided timelines due to the following reasons:

1) Change in prioritization of requirements: It took time for the team to decide with the client what were the major requirements to be fulfilled. Earlier the scope of the project was too large and we had to narrow it down which took quite some time at the beginning.

2) Change in deployment plan: The team had to talk with the client and finalize if the client wanted to spend money to deploy the application on the app store or a working model on the emulator would do the work.

3) Mid-terms: Some team members had mid-terms during the first week of November, because of which they were not able to fully concentrate on the development process.