

National Electronic Patient Record System

NEPRS

Project 2

Book: Deborah J. Mayhew Usability Engineering Lifecycle

UPPSALA UNIVERSITY

User-Centered System Design, 5 hp

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Group 6

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1. Summary of the Book

The usability engineering life cycle written by Deborah J. Mayhew is a process oriented book and follows the general processes of the software engineering. This book explains the steps within the processes to make a user centered system. There are three processes described in the book.

The first process is the **requirement analysis** in which the goals about usability are established. Within this process there are several steps which involve creating the user profiles, performing the contextual task analysis which is kind of ethnographical approach, accounting the platform capabilities constraints and making general design principles. The result of these steps emerge as the usability goals to be achieved, it must be noted that all the projects need not to follow all the steps but only the required ones. When this process is completed it is documented known as style guide in the book to act a input for the next process.

The second process described in the book involves **Design/Testing/Development**. This process is a kind of big process and is subdivided into three levels with iterations within these levels. The first level involves the high level design aspects and considers the possibilities how to re engineer the current work situations according to new system to be developed , which can provide improved and efficient work processes to users. In first level no interface design is done but only the high level view of the interface is documented. After each level there is an evaluation which is done to eliminate the flaws and validated document of the high level view is provided to the next step. The second level involves setting up of the design standards. The first step in this level is to setup the main screen design standards like what scheme of colours should be used throughout the design. Once these standards are formed, prototype based on these design standards are made and at the end evaluation is conducted to ensure the compliance of the usability goals. The last level deals with the making of the detailed user interface design based on the previous two levels. These detailed designs are then tested to met the usability goals and if the required satisfaction is not achieved then the iteration follow back to first phase and all the steps are iterated in order to achieve the usability goals.

The last process is the **installation**. Where the interface is ready to be deployed and used by users. In order to make it more enhanced a feedback is taken in one of the steps within this process which is iterated until all the issues in the feedback are resolved.

The complete process diagram and steps involved within it is shown below:

Requirements Analysis

Function/Data Modeling
OOSE: Requirements Model



The Usability Engineering Lifecycle

Level 1

Work Re-engineering

Conceptual Model (CM) Design

CM Mockups

Iterative CM Evaluation

Eliminated Major Flaws?

Start Application Architecture
OOSE: Analysis Model

Style Guide

Met Usability Goals?

Style Guide

Style Guide

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Level 2

Screen Design Standards (SDS)

SDS Prototyping

Iterative SDS Evaluation

Met Usability Goals?

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Level 3

Detailed User Interface Design (DUID)

Unit/System Testing
OOSE: Test Model

Iterative DUID Evaluation

Met Usability Goals?

Style Guide

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Installation

Installation

User Feedback

All Issues Resolved?

Enhancements

DONE

- UE Task
- Development Task
- Decision Point
- Documentation
- Complex Applications
- Simple Applications (e.g. Web sites)

2. Project Plan

2.1-Introduction

Nowadays web applications are mostly used and almost all of the information is carried through online servers. On the other hand we can say that much of the IT life is dependent on these servers. Similarly is the case of the project of national patient record system. This system is a kind of collaborations of different systems at first but after some years will merge into the single system to be used. It will be good if preferred to see that at first this system will develop as a open source system to involve more innovative ideas. This system will be a large system which will involve many development cycles. For this report of the project plan we will only describe the user interface software development of the project. The main purpose of the system as a whole includes the patient records accessible anywhere online through web. This will reduce the access time to patient record increasing the probability of proper and timely medical attention to patients.

As discussed before, this report will show only the user interface development cycle which will be electronic web based application. The whole system is a kind of critical system and as user interface software is a part of development can also be considered as critical. That is why lot of iterations could be required and because of this time estimation is difficult. Our interface should be flawless and should show what the user really want to see, thus making it more challenging. Some serious planning is needed and specifically for user interface software development we will follow the method of usability engineering provided by Mayhew. As the software aim is to be efficient and easy to use daily by set of users so some kind of training will also be provided.

2.2-Project Roles

There are some roles mentioned in the book which play important part in the project. As mentioned above in the summary we have different processes and similarly we have different roles involved in these processes. For example we have user interface designer, usability engineer and developers. The responsibility concerning to the role depends upon the senior person who is in charge like for example the lead usability engineer. One role is not exclusively restricted to his own domain of work but can assist other also. There are also many other roles which depends upon the nature of the project. Roles involve in our project is described below.

User Interface Designer:

This role is involved in the Design/Testing/Development process of the whole project. His/Her main concern is to deal with activities design, prototyping etc. he/she is also involved in making the style guide with cooperation with Usability engineer.

Usability Engineer:

He/She is involved in the first phase of the project and made the style guide with cooperation with User Interface Designer.

Developer:

He/She is mostly involved in the implementation of the project and plays important role in the installation at the end of the project.

Domain Experts:

These are set of the people working or potential users, where the system is going to be deployed. They are very valuable for the project because they have the insight knowledge about the work processes. Here for our group we have medical staff as our domain experts and from the patients point of view we have set of willing patients to help in developing the project.

End Users:

They are important people because they help system to be measured in real environment by giving the valuable feedbacks. Potential end users in our project are the medical staff with different categories, but to make it simple we have assumed all of them into one. Similarly the others are patients.

2.3-Initial Requirements Analysis

2.3.1-User Profile

Purpose:

Before the start of the system-development, we really need to understand the user population of the system we are going to develop. Thus, the purpose of this part is to establish the general requirements of a category of users in terms of overall interface style and approach.

Description:

For the user profile, first we should determine who will use the system. In the next place, we need to investigate the whole user population in terms of their psychological characteristics, knowledge and experience, Job and task characteristics, physical characteristics relevant to user interface design. And different usability goal will be extracted from the profiles of different user population. This would have a direct impact of the all design tasks.

Procedure:

Since we are developing the system for medical organization, we would initially divide the users into two big categories – Patients and Medical workers which also can be divided into different subcategories in terms of their role in the organization, such as doctors, nurses and administrative staff. Afterwards, we will interview representatives from different potential users groups as mentioned in our initial assumption, to achieve more accurate user categories and their regular task descriptions; usability engineer and user interface designer will prepare the initial questions for the interview.

In the next stage, usability engineer and user interface designer will lead the team to draft a questionnaire for each specific user categories about the web-based user interface in terms of the task information we got from the previous interviews and detailed information of the current system. After the revision of the questionnaire with project team members, we will invite user representatives for each specific user categories to give feedback on the questionnaire. Then we revise and finalize the questionnaire in terms of the feedback we got from user representatives. And then, we distribute the questionnaire to same amount of users from each significant user categories. We may distribute the questionnaire second and or more times depending on the responses we get to guarantee the sufficiency of data.

After we get expected amount of response from users, we will analyze the data and make an intuitive statistics on each question in the questionnaire, then we distribute this to user representatives of each significant user category. After we get their feed back, we analyze and summarize the data in terms of the feedback we get from previous step. After summarization, usability engineer will take the lead to interpret the data. In the last stage, we will distribute the data summary and conclusion to the project members. And we also would fold the result in the system style guide. Then we will move on to the next task – Contextual Task Analysis.

Artifacts:

Questionnaires, Interviews, user profile data entry and analysis, data summary and conclusion.

2.3.2-Contextual Task Analysis**Purpose:**

The purpose of this work is to obtain a user-centered model of work as it is currently performed. That means we need to understand how the end users do their work in the current work environment and how they think about it. This analysis is performed in the context of the work environment.

The Contextual Task Analysis (CTA) focuses on the behavioral aspects of a task, resulting in an understanding of the general structure and flow of task activities. The analysis enumerates the tasks that users may want to accomplish to achieve stated goals through the preparation of a task list or task inventory. The CTA also identifies the primary objects or artifacts that support tasks, information needs (both inputs and outputs), workarounds that have been adopted, and exceptions to normal work activities. The results provide insights into the optimal structuring of task activities and key attributes of the work environment that will directly affect interactive system design.

Goal of the CTA is to gain insights into the context a system will be used in by end users. This includes the following:

1. people that will actually be using the system (job categories using system);
2. type of work being accomplished (tasks and subtasks) during interaction with the system;
3. artifacts used to support this work;
4. The way workers-think about and talk amongst themselves about their work (terminology).

And also we should find an optimal compromise between these important goals:

1. Realizing the power and efficiency that automation makes possible
2. Reengineering work processes to more effectively support identified business goals
3. Minimizing retraining by having the new product tap as much as possible into users' existing task knowledge, and maximizing efficiency and effectiveness by accommodation human constraints and capabilities within the context of their actual task.

General Approach

- Obtain background information about work and work practices.
- Collect and analyze data from observations and interviews with end users as they do real work in the real work environment.
- Construct and validate a model of users' current task organization.

Procedure:

1. Obtain background information about work and work practices:

In the first step, if a product development team has conducted a traditional systems analysis or an object-oriented analysis has been completed and a *requirement specification* has been carried out, then we will gather the project

team members to review the requirement specifications. The goal behind this is to understand the boundaries around work to be automated and to understand how a project team is planning to approach automation of the work. And also we will identify the work boundaries and project approach. At the same time, we will train all team members on the CTA techniques. Then we will interview user representative of medical workers and patients including the representatives of each subcategory of medical workers to overview their daily work. For medical workers, we inquire them about their job contexts, work environment, work artifacts. For patients, we will interview them to obtain information about how they reach the current recording system for which kind of purpose; what kind of service or items they want to use and which services and information they most frequently use and inquire. And also we will appropriately train all user representatives on the CTA techniques to make the work efficient and reliable; in the meanwhile it could let users interact with us in a better way. After all these we will be able to indentify major user categories (key actors) of the recording system and major types of user tasks (user cases). In our cases, the key actors are Medical workers which could be divided into doctors, nurses, administrative staff and patients.

2. Collect and analyze data from observations and interviews with end users as they do real work in the real work environment.

In this step, we will assign team members to go to the medical organizations to observe and talk with actual intended end users in their real work environment while they are doing their work focus on use cases relevant to system being developed and context of overall job.

Here are the main things to discover about tasks and work environment:

1. Main work artifacts or objects.(medical staff's and patients)
2. Task scenarios or instances of use cases.
3. Actual user goals and business goals driving use cases.
4. Actual users' work models.
5. Users' language (terminology and jargon).
6. Statistics about use cases (relative frequency, range, average time to complete, number of typing errors, etc.).
7. Problems such as bottlenecks, errors and other opportunities for improvement in current process; discover the big overall picture.
8. Data about work environment, noise levels, heat, cold, sit or stand workstations.

After all these, we will document and analyze the data we get from medical workers and patients and start constructing task scenarios for both categories. Then we document all of the task analysis data and further discuss if the data is

complete, if not we will iterate the tasks in this part till we get complete CTA data. And when it is completed, we will meet with user representatives again to further validate the CTA data and get feedback from them, and then we will finalize the CTA documentation.

3. Construct and validate a model of users' current task organization.

First, we will identify all tasks and subtasks from results of tasks analysis. Then we will gather user representatives and project team members to discuss and construct the current user task organization model.

Roles and Resources:

Task leader: Usability Engineer

Other resources: The User Interface Designer and all project team members should participate in all aspects of this task. Users should participate in this task being the subjects of contextual observations/interviews and the Task Sorting exercise.

Artifacts:

Interview and data collection, data analysis, work environment analysis, task analysis, current user task organization model.

2.3.3-Usability Goal Setting

Establishing usability goals on a development project can serve two purposes. First, specific usability goals help to focus user interface efforts during the design process by giving designers something concrete to aim for and focus on. For example, all designer should understand and agree that ease of learning is much important in a certain case.

The second purpose of usability goals is to serve as acceptance criteria during usability evaluation, especially towards the end of the design process.

Usability goals fall into several categories, the broadest of which are qualitative usability goals and quantitative usability goals. And quantitative usability goals can be divided into ease-of-use and ease-of-learning goals.

✚ Qualitative usability goals: The general goals that guide design, which are not quantified.

In our project, qualitative usability goals are as following:

- 1, Distraction-resistant: When users are distracted by environmental interruption, the system should provide enough context information which enables them to go back to their task easily.


2, Consistency: The system should make all of its components consistent.

3, Accessibility: Users should be able to access to the different component of the system with the same account and they should be able to access all the corresponding services.

4, Simplicity: The new system should not require users any knowledge of underlying technology.

5, Efficiency: Patients should get all the services and information they want in a quick way; Medical worker should be able to do the all of their tasks quickly.

6, Maintainability: System should be maintainable so that medical workers can update and maintain the database in any time they want.

 Quantitative usability goals: Goals which are objective and measurable.

In our project, qualitative usability goals are as following:

1. Easy-to-use: Experienced medical workers (Defined as users who have performed the transaction five times in a training session) should take no longer than one minutes on average to deal with a patient's medical record.

2. Easy-to-learn: Novice users (defined as first-time users) should take no longer than three minutes to fill in a patient's medical record form; Patients should take no longer than 2 minutes to find out the information they want; For both medical worker and patients, when they doing a very infrequent operation (which will take place once in year or once in several months), it should take no longer than three minutes.

Procedure:

First, we will refer to the User Profile: We will review and analyze the user profile data to indentify the relative importance of ease-of-learning versus ease-of-use goals and relative importance of performance versus preference/satisfaction goals for medical workers and patients.

Then we will refer to Contextual task analysis data to figure out the contextual relation between each tasks so that we could find out the context information which could let users reorient quickly after they are distracted and also based on that, we are able to decide what kind of information should be on-screen for a specific task.

In the next place, we will indentify and draft usability goals based the outcome of pervious steps. Then we prioritize these usability goals to find most and less important goals. Then we will formulate quantitative usability goals.

And then we will document all prioritized quantitative and qualitative usability goals so that we can distribute it to all project team members to let them aware of project progress.

After the document is perfectly done, we will conduct user/management review to get feedback on our outcome data. In the last step, all team members together with user representatives establish benchmark data for relative quantitative goals so that we all know the level of performance that the system should reach.

Roles and resources:

Task leader: Usability Engineer

Other Resources: The User Interface Designer should participate heavily in indentifying, quantifying, and prioritizing usability goals. Involvement by other team members, as well as other project stakeholders (e.g., managers, tech support staff), is highly desirable. Input and final endorsement by project and user management is crucial.

2.4-Level 1 in Design/Testing/Development stage

Design/Testing/Development stage consists of three levels. The first level contains four tasks which will possibly be repeated, depending on the result of the last task of this level, the Iterative Conceptual Design Evaluation.

All the tasks are strongly interlinked and dependable on the previous ones. However, some of the tasks can be ignored or skipped if necessary.

Role involvement

While in Work-reengineering, Conceptual Model Design and Conceptual Model Mock-ups the Usability Interface Designer leads the team in the implementation of each of the tasks. However, the Usability Engineer is also participating in every task providing directions and feedback. Bear in mind the importance of user participation in each of these activities. In our case, the user is further divided in different categories, such as doctors, medical assistants and patients. Each of which having different needs for the User Interface.

The team that is involved in the Requirements Analysis is also involved, and work closely with the Usability Interface Designer and Usability Engineer.

The last task of this level, the iterative evaluation of Conceptual Models, is done by a team led by the Usability Engineer while the UI Designer is providing assistance and other team members can be requested if needed, especially members that have participated in the Requirement Analysis.

Level outcome

The result of this level consists in mock-ups used for high-level design, which are build from reengineering the current systems, then tested and evaluated by user representatives in the last task of the level.

All the tasks in this level depend on the previous task and their output is served for the next one. Thus, they cannot be executed in parallel or simultaneously, but one after the other, which would also be impossible since roles used in some tasks are also used in others.

2.4.1-Work Reengineering

Purpose

This particular task is of high importance given the fact that the current systems are paper based, while the new system will be build as a web application. However, it important to keep in mind that web application's new interface should try to be similar to the existing design, Task scenario, since we don't really want everyone to learn yet a new way of working with the system.

Procedure

The usability interface designer should take the lead role in this task as well as any other project members that have participated in some of the previous steps: User Profile and Contextual Task Analysis.

The second and most important step which, although advised by Deborah Mayhew's book, cannot be skipped is the validation and refinement of Reengineered Task Organisation Model. The reason for which this step is particularly important is because of the wide range of systems already implemented across different regions in the country. The validation will be deployed on users who need different access levels across each of the 5 regional systems.

The integration of this within the whole project plan is dependable on the input it receives from the Contextual Task Analysis and User Profile(which in our case can be doctor, nurse, patient, system administrator). Furthermore, the results of Reengineering Task Organization Model.

2.4.2-Conceptual Model Design

Purpose

The output of the previous step, Work Reengineering, Reengineered Task Organization Model becomes the basis of building the user interface design, providing the structure for the overall architecture of the system, later being used in detailing the user interface design.

The RTOM(Reengineered Task Organization Model) alongside with Conceptual Model Design play a vital importance in spotting issues of organization and presentation.

The output of Conceptual Model Design will serve in providing in the further steps when a more detail user interface is defined. Thus, without any confusion, this step is focused on the high-level design decisions, such as whether to design a product or process oriented CM, on the definition of products and processes, etc and not on the low-level decisions, like the GUI.

Procedure

Although the book recommends designing in small teams of two to six people, given the size of the project -National Electronic Patient Records, the count of employees per team will vary possible exceeding the upper limit indicated in the book.

The first and most important step is deciding whether the design should be process or product. In our case the Conceptual model will be process oriented, given the fact that the users are not creating (majority of them, except when a new person is introduced into the system) records, but working on the existing information.

Since the Conceptual Model is process oriented, the second step advised by Mayhew can be skipped since the RTOM defines the processes and the subprocesses.

Another step in this activity is setting the design presentation rules, which has to follow the RTOM and maintain the similarity between processes at a given level. Furthermore, since the system will be web-based, there should be consistent rules set for the web pages/frames that are part of the major displays, that is the interface most commonly used. Which leads to defining and designing the major navigational pathways.

Keeping in mind that Conceptual Model Design is iterative, the need for documenting alternative designs is obvious. This is a rather informal than formal documentation, and as the author recommends, formal documentation is not recommended as it is time consuming and change is inevitable.

2.4.3-Conceptual Design Mock-ups

Purpose

The main reason for building mock-ups is for supporting the Conceptual Models designs rules established in the previous task.

Another reason for building mock-ups for the previously created Conceptual Model designs is to better evaluate and compare them in the upcoming task - Iterative CM(Conceptual Model) evaluation in order to choose the best model.

During this task, user involvement should peak. The reason for that is the continuous process of understanding the requirements analysis, avoiding thus getting off track.

Procedure

The mock-ups can be made either on paper or prototypes. Nonetheless, both the author and research shows that the paper-based mock-ups are far more productive since it's cheaper to throw away a piece of paper than built web site (in our case).

The steps are straightforward, starting with selecting a functionality that's going to be the centre of the mock-up, continuing with sketching the UI design and ending with building the muck-ups. However, in selecting the correct functionality the book indicates a criteria that can be used:

- parts generally used by users
- new features with high visibility
- mission critical and safety features.As in setting a disease by clicking on the wrong button.

When sketching the interface, after choosing one of the related functionalities, the level of details need not be very high, but rather suggestive so the user can easily understand what the mock-up's about.

In the case of building the mock-ups, both paper and web-based prototypes can be used. Web pages containing only the functionality selected are easily built nowadays with software such as Microsoft Expression Web, Adobe InDesign, etc.

2.4.4-Iterative Conceptual Model Evaluation

Purpose

In this task an evaluation is done over the previous two tasks,which generated the Conceptual model mock-ups. It's a very important step, and the resources

should be allocated accordingly considering that regardless of the amount of resources spent now, in the long run more resources are saved. Furthermore, at this task the focus should be made on either ease of use or ease of learning, which in our case the latter one would be more appropriate.

On each iteration representative users, such as doctors, system administrators, medical nurse, patient, must take part in tests.

Procedure

The first half of these steps is focused on the preparation and planning of tests. Bear in mind that these tests are related only to the User Interface - the main focus of this entire project plan.

Among the first steps several choices should be made regarding the user and task focus for the test. Furthermore, designing the test requires a significant amount of resources taking in consideration that the task will repeat itself at least twice in order to come-up with a consistent design for the whole 5 regional medical centres.

Users need to be recruited in order to run the tests. Since this system will be deployed nation-wide, it's important to recruit users from all the 5 regions represented in order to avoid complying with the needs of one region and later on discovering that another region has different needs/expectations.

The other half of this task -executing the tests, begins with running the tests on the user representatives and collect the data. When conducting the tests with different Concept Model Mock-ups it is recommended to randomize them as much as possible for the output to be unbiased. No guidance should be provided across the test. However, the users should be trained before taking the tests, but no questions are to be asked during the test.

2.5-Level 2 in Design/Testing/Development stage

The second level contains four tasks which will possibly be repeated, depending on the result of the last task of this level, the Iterative SDS Evaluation. All the tasks are strongly interlinked and dependable on the previous ones. However, some of the tasks can be ignored or skipped if necessary.

Role Involvement

The user interface designer has the leading role during the first parts of the level and will be assisted by all the staff involved in the previous stages. During the evaluation part of the level the usability engineer will have the lead role where the user interface designer should only assist in planning and executing the evaluation.

Level Outcome

This is simply a document that should be put together in order for the detailed user interface design to be possible or to be easier. We have the User Interface Designer to take the leader role here with help from the usability engineer and the staff involved in the requirements analysis of the system. The document should contain User Profiles, Contextual Task Analysis, Platform Capabilities, Usability Goals, Reengineered Work Models, the Conceptual Model and the Screen Design Standards.

2.5.1-Screen Design Standards**Purpose:**

This task is done to ensure consistency and simplicity in detailed design across all displays within the product and across other products used by the same users. The consistency is important for learning and product usability. Quality will also be ensured since the SDS is based on earlier requirement analysis.

The task at hand consists of defining and documenting a set of SDS to be followed by all displays and all interactions between them.

Examples of issues to be standardized:

- Use of controls
- Location and format of standard display components
- Terminology
- Use of color
- Use of type fonts and styles
- Pointing device interactions and keyboard shortcuts
- Type, location, format, and wording of messages and on-line instructions

Validated SDS are documented in the product Style Guide and applied during Detailed User Interface Design.

Procedure:

We need the SDS to meet the criteria from the requirements analysis. We are going to make sure that consistency is withheld in comparison to the work that the hospital staff are doing at the moment, so that they won't have a hard time learning the new system. For the patients this will not be an issue to consider since for them the interface will be a completely new one. There are some standards to be decided and put into a document which will display all the SDS. These standards will be decided after the proper work and research has been done. The different categories that we are to set the standards for are: Control, Product/process window, Dialog box contents, Message box contents, Input device interactions and Feedback. The whole staff that was involved in the earlier stages of our system development should take part in this task as well and the user interface designer will take the leader role.

2.5.2-Screen Design Standards Prototyping

Purpose:

We are to let in users in as early as possible to evaluate the product. The first step in this task is to select a subset of the total product functionality for prototyping. Complete functional and user interface detail is specified for the selected subset of functionality. This is all paper based so adding and changing details is simple.

Procedure:

All participating developers of the earlier stages should be involved in this task. The user interface designer should take the leader role and the usability engineer should build a high-fidelity prototype and also participate in giving feedback. Here a prototype for the hospital staff should be put together since consistency is important for them and also since it is very critical that hospital staff is involved as early as possible. If something goes wrong when doctors are working, it might be fatal for someone.

2.5.3-Iterative SDS Evaluation

Purpose:

This task is performed to get some early feedback on the usability of the SDS. Having evaluation done at an early stage keeps us efficient and changes can be performed more simply and cost effective.

We are to evaluate the SDS and the detailed design of subsets of product functionality. The prototypes should be complete, detailed, and fully interactive running prototypes. The test task is formally structured, detailed, and specific. The point of the task is to collect rough timing data.

General steps of each iteration of testing:

- plan the test and develop supporting materials
- run the test users and collect data specified in the test plan
- analyze and interpret data and formulate redesign recommendations

at the end of each steps are:

- modify the detailed user interface design
- modify application code
- modify test plan and materials

Procedure:

This task is needed to ensure that we really do keep the consistency of the way the hospital staff work. We will invite professionals from hospitals to participate in evaluating and giving pointers to whatever seems odd. Think aloud sessions should be involved in the evaluation. Here we have the same outline for the patients that they need not to be involved since they will have a new web based interface. We are to have several iterations to be able to fulfill all requirements and also be able to find errors and work based difficulties at an early stage. During the evaluation the usability engineer should take the lead role where he should be assisted by the user interface designer.

2.6-Level 3 in Design/Testing/Development stage

The third level contains two tasks which will possibly be repeated, depending on the result of the last task of this level, the Iterative DUID Evaluation. All the tasks are strongly interlinked and dependable on the previous ones.

Role Involvement

The user interface designer has the leading role during the first part of the level and will be given guidance from the usability engineer. The developers will be handed a document from where they will write their code. During the evaluation part of the level the usability engineer will have the lead role where the user interface designer should only assist in planning and executing the evaluation.

Level Outcome

The purpose of this level is to have a complete working system. The process is depending on the output from the preceding levels. The style guide is used to produce a complete detailed user interface design. This will be tested and evaluated iteratively until the satisfaction criteria is met. The complete user interface design should be documented from where the developers can write their code. The document should be written by the user interface designer.

2.6.1-Detailed user Interface Design**Purpose:**

This is the end product the earlier steps were intended to help establish. We need this task in order for the interface to optimize user performance.

The tasks to be completed are:

- Complete the identification of all pathways between windows, dialog boxes and message boxes.
- Complete the detailed design of menu bar and/or all other action controls.
- Complete the detailed design of the content of all windows, dialog boxes and message boxes.
- Complete the detailed design of all interactions with input

People involved: User Interface Designer and system developers.

The User Interface Designer is to create a complete, documented, formal specification of the detailed user interface design from the style guide which was put together from the earlier phases. This is needed since we are dealing with a complex system. From the document the developers can write their code.

Procedure:

Here we are in detail going to describe the User Interface Design. So after this step we should hopefully have a fully working system. Since this system is very complex the user interface designer is to take the lead role and produce a written Detailed User Interface Design specification from which developers will write their code.

So now the complete interface design will be documented by the user interface designer which will show the new hospital system.

2.6.2-Iterative Detailed User Interface Design Evaluation

Purpose:

This stage is performed to evaluate the Detailed User Interface Design, evaluating the final interface, against the quantitative usability goals and as performance goals usually have a higher priority than satisfaction goals, timing data is the key data being collected. The evaluation is going to be formal and very structured, detailed and specific because the detailed design of subsets, of product functionality are being evaluated. We are to evaluate general screen design standards, small subsets of detailed design and further evaluate aspects of DUID not already directly subjected to usability evaluation. This will be conducted on actual application code.

The usability testing we are going to perform will focus on, either ease of learning or ease of use. Whether one or the other or both will be studied depends on the usability goals established during the usability goal setting task.

The technique for evaluating is usability testing with main purpose of collecting timing data in order to test the final interface against performance goals. During this time error data should be collected. The data is summarized to isolate major problem areas and to reveal unmet usability goals. Ideally, flaws at the DUID level only will be identified and these are easy and inexpensive to fix. After which design must be redesigned, recoded and retested to make sure problems are fixed Design and testing should be carried out iteratively until usability goals are met (minimum goals) and major identified problems eliminated.

General steps of each iteration of testing:

- plan the test and develop supporting materials
- run the test users and collect data specified in the test plan
- analyze and interpret data and formulate redesign recommendations

at the end of each steps are:

- modify the detailed user interface design

- modify application code
- modify test plan and materials

Procedure:

This step is very important to make. Now the whole system will be tested and evaluated. Here we have the usability engineer taking the lead role during this whole process where he will be assisted by the user interface designer in planning and executing the evaluation. This task should have several iterations until all the performance goals are met. Now we are to invite both hospital staff and different potential patients who fit into the user profiles to be involved in the evaluation. In this part it is mostly important that the hospital staff is able to work as efficient as possible and for the patients to get the information needed with as much ease as possible, so the timing data will be critical. For the hospital staff, evaluation should be done both towards ease of use and ease of learning whereas patients should be directed to ease of use. Also any error data will be collected to be able to improve the system so that a new iteration of DUID can be made.

2.7-Installation and User Feedback

User Interface is completed at this stage and developer prepare the package to be installed at the target location. It is always advisable to approach the installation at steps bases. Because there might be lot of problems involved in the massive deployment of the system. As mentioned above that in our project we have to be extra careful because people lives are dependant on this type of system and any mistake can lead to big problem involving human lives.

The deployment of the whole system will require a large amount of time, here for example we can take 10 years for a system to be operated optimally. In which 2 years will involve the merging and making the patients records centralized and then some time to fulfil other needs which is out of scope for our discussed project. Now reverting back to our project, we have discussed that there are five main system in electronic patient record systems. Although there geographical distribution is not equal but to deploy these type of system we will make the geographical distribution and will not focus the existing systems in this. Once these distributions will be established, we will study the statistics of the patients load on these geographical distributions. Our main concern here is to install the system to that distribution first where the load is minimum. This geographical is subdivided further into parts and we will pick only one to install the system. Once we are done with the installation which is headed by the developers we will focus on the feedback about the system in the real environment in order to enhance the system more according to users. But it is important to mention that before starting the feedback we will give some training to the concerned users to operate the system. Here one problem arises regarding patients for example we can give training and get feedback to medical staff but cannot give the training to users like patients which are somehow dynamic. So what we have suggested here for our project is to get the continuous feed back and set the time or some

specific period to resolve these feedback issues until the whole system is absorbed in the society which can be 10 years or might be less or more.

As there will be many phases for the installation also but for our project we only concentrate on the first phase. During this phase of the project we will get the feed back through different ways like for example we conduct interviews with the set of user that how they felt about the system. We will make the focus group within the set of users and get the feed back from them. Usage study will be performed about the system by randomly selecting the users and then analyzing their usage. For example if users are not using some function then interviews etc about that functions will be conducted to resolve that issue if there is. Questionnaire system will be embedded to our system in order to have all possible feed back from every user using the system first time.

The roles involved during this process will be usability engineer and interface designer. But the lead role in this task will be performed by the usability engineer, where as other will assist him and users will act as the source of information.

Planning the project is actually done to encapsulate all the activities within time and budget and similar is the case with the usability project planning which ensure the execution of the project/system.

3. Timeline

The time assumed for different activities is basically taken from the book.

Requirements Analysis

User Profiles: 224 hours

Contextual task Analysis: 338 hours

Usability Goal settings: 216 hours

First level

Work Re engineering: 106 hours

Conceptual Model Design: 204 hours

Conceptual Model Mock-ups: 80 hours

Iterative Conceptual Model Evaluation: 144 hours

Second level

Screen Design Standards: 180 hours

Screen design Standards Prototyping: 152 hours

Iterative Screen design Standards Evaluation: 144 hours

Third level

Detailed User interface Design: 240 hours

Iterative Detailed UI Design Evaluation: 144 hours

Installation and Feedback

Installation time for this project is very large and depends upon the smooth operations of the other back end steps involved in the installation. But considering our project scope we assume that if every thing goes right then it will take round about 2 to 3 months to install the system and start getting the feedback which is hard to measure because a lot of iteration can be expected to do so. Here it must be noted that we are talking about one medical facility, obviously the first phase of installations will take more time as compared to later ones because of the experience gained during previous installations.

4. Project Cost

Making assumptions about the cost of the project is one of the difficult task and good assumptions can lead a failure project to success. Here we have to assume about the project only concerning about the user interface development of the national patient record system, not the whole project in which many parallel projects of different types are involved. In order to be simple we have computed the hours needed to fulfill the activities and thus can say that if each hour can cost 800 kr, then simply multiplying the total hours with this figure can generate the total amount of the project with some surplus funds. It is true that some activities will require less amount than 800 kr per hour but that difference can be adjusted with some professionals getting more so we set this as an average to be simple. So the assumptions about costs about under discussion project are as follows:

Total Hours * 800 Kr = 2172 * 800 = 1,737,600 Kr + Additional costs (200,000)

The cost for the Installation and feedback is not included because we are not sure about the assumed cost also.

CONCLUSION

This methodology covered all the aspects of the project development life cycle. Mainly the advantage of this approach is the frequent interaction with users and a lot of iterations which reduces the probability of errors at latter stages. Another advantage of this methodology is that it can easily be integrated in the development process but on the other hand there are unnecessary steps which can be avoided to reduce costs. For our project this methodology is very useful because of several types of user involvement and for the integration with the other parts of development. One more advantage is the proper responsibility assigned to every specific role which distributes the responsibility in a correct direction. The style guide used in this method is very useful since it documents the different aspects of the different levels in the process. This acts as a reference for the improvements.