



Agile Software Development: A Case Study of Web Application

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Abstract - Agile methodology is an approach used for the development of a project which helps to respond to the unpredictability of building software through incremental, iterative work cadences. These methodologies are used to deal with the situations where the waterfall model fails. The biggest drawback of waterfall model is that it assumes that every requirement of the project can be identified before any design or coding occurs [1]. In this paper we are specifying the differences in the development of a project by using the Agile Methods: Extreme Programming (XP) and Scrum through a case study on Women's Era (WE- A State Level Women Development and Support).

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GJCST-C Classification : *H.3.5*



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Agile Software Development: A Case Study of Web Application

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I. INTRODUCTION

Agile methods software development (also called *Agile Modeling* denoted AG for short) reduces the software lifecycle time by developing a prototype version, then integrating functionality on an iterative basis responding to customer requirements and testing throughout the development cycle. Agile methods originate from the instability of the technical environment and the fact that the client is often unable to define every single requirement at the start of the project. The term "agile" is a reference to the ability to adapt to contextual changes and changes to specifications which occur during the development process.

II. AGILE METHODOLOGY

Agile software development refers to a group of software development methodologies that promote the development of iterations, open collaborations, and process adaptability throughout the life-cycle of the project. It chooses to do things in small increments, with minimal planning, rather than plan at length. This helps to minimize the overall risk, and allows the project to adapt changes more quickly. There is also an emphasis on stakeholder involvement [2].

Any agile software process is characterized in a manner that addresses three key assumptions about the majority of software projects:

1. It is difficult to predict in advance which software requirements will persist and which will change. It is equally difficult to predict how customer priorities will change as a project proceeds.

2. For many types of software, design and construction are interleaved.
3. Analysis, design, construction, and testing are not as predictable as we might like.

An agile process, therefore, must be adaptable. [3]

In this case study we are involving women from different categories of society from different areas of Andhra Pradesh. They specified a bulk of requirements which they are in need regularly like Legal issues, Medical issues, Educational issues, Recipes and Government schemes. For identifying the sources to get the information they need to spend a lot of time away from home. So, we searched a number of web Applications which will be providing the information related to these requirements but no application is there to serve for all the needs. For this purpose we are going to develop the proposed application to satisfy all these requirements.

After the collaborative communication with the customer we have collected the following things.

They need

- To know the Legal Matters related to Women.
- Different University Notification in a single point access.
- Expert lectures and study material
- To have the information related to the precautions and preventions of various diseases and likes to have suggestions from the Medical practitioners.
- To know the information related to local, national and international recipes.
- Government Schemes related to women.

a) Legal issues

We had collected the information related to legal matters from Lawyers, Police department and different social organizations.

b) Educational issues

Gathering the notifications and proceedings information from different university websites regularly and updating the related data in our application. Collecting the study materials and expert lectures related to different domains.

c) Medical issues

By having communication with Medical Practitioners we are going to collect the area wise information related to various diseases, their precautions and prevention measures.

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d) *Recipes*

Collecting the information related to different recipes from websites and expert chefs.

e) *Government Schemes*

Here the source of information is from www.aponline.gov and related government sites.

III. ANALYSIS

At first we are going to consider the development of this case study by using XP.

In this phase we are concentrating on the requirements of users called stories, consists of the features and functionalities and these will be placed on index cards. Customers specify the values for these requirements called Priorities. Depending on the priorities specified by the customers releases will be done. For this case study the priorities specified by the customer are represented by the figure-1.

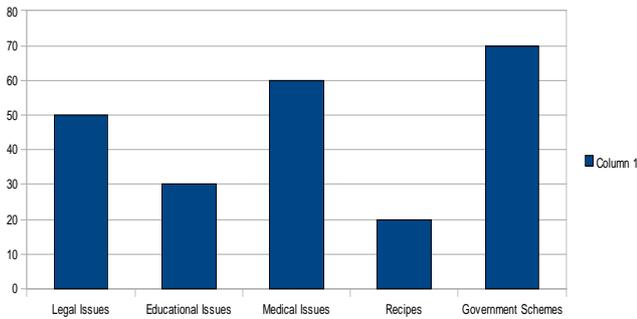


Figure 1 : Customer interest chart

No story should take more than three weeks for the development. If it takes it should be splitted into

small stories. The cost and time scheduling must be done again for these. New story can be written at any time. Grouping of the stories will be done for the releases. The releases for this case study are represented by the figure-2, which is totally depending on the priorities specified by the customer.

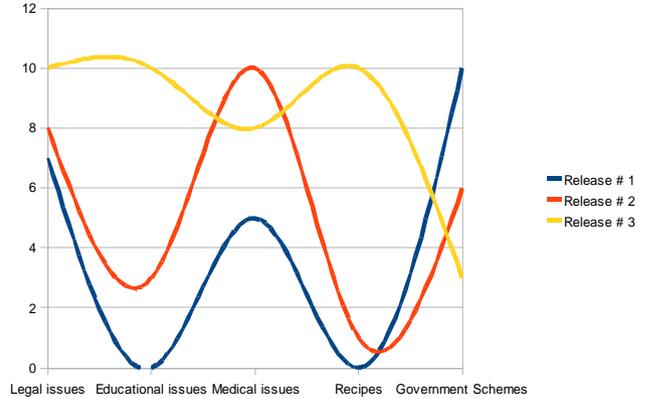


Figure 2 : Priority Chart

IV. DESIGN

XP follows KIS (Keep It Simple) principle. CRC (Class-Responsibility- Collaborator) cards identify and organize the object oriented classes that are relevant to the current software increment. Design occurs both before and after coding commences. Refactoring means that design occurs continuously as the system is constructed.

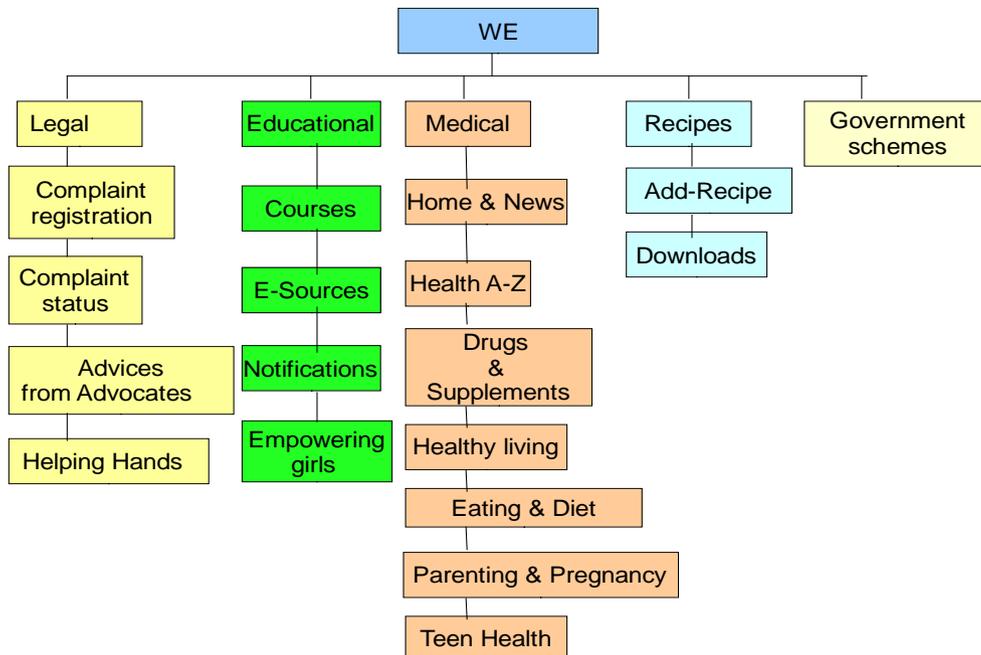


Figure 3 : System Architecture

a) *CRC cards*

As per the system Architecture the following are the classes

- In Legal issues Complaint registration, Complaint status, Advices from Advocates and Helping Hands. The classes Complaint registration, Complaint status have the internal relationships.
- In Educational Issues courses, E-Sources, Notifications and Empowering girls are the individual functionalities no interdependency between the classes.
- In Medical issues Home & Health, Health A-Z, Drugs & Supplements ,Healthy living, Eating & Diet, Parenting & Pregnancy and Teen Health no interoperability between the functionality.
- In Recipes there are two functionalities Add Recipes and Download.
- In Government schemes we are going to post the information related to government schemes.

As this is the web application this can be viewed by number of user, according to their feedback the developers has to modify. If we follow the traditional processes it may disturb the flow of the system.

b) *MVC Design pattern*

The model view controller (MVC) design pattern which can weaken the coupling among the different application tiers and make the development and maintenance simpler. The MVC is a fundamental design pattern for the separation between user interface logic and business logic. Since applications are very large in size these days and the MVC design pattern can weak the coupling among the different application tiers of application [2].

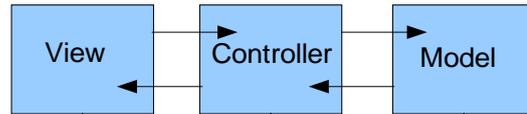


Figure 4 : MVC Model

One way to separate concerns in a software application is to use Model-View-Controller (MVC) architecture.

- The *Model* represents the business or database code
- The *View* represents the page design code
- The *Controller* represents the navigational code [2].

V. TESTING

Test case	Testing of Registration form		Date: 10/09/2012	
Tester Name	Joy			
Test Designer	Mr. Test			
Functionality	Legal Issues		Project : WE	
Module	Complaint Registration			
Test case ID	Test case Description	Expected Value	Actual Value	Result
LEG/001	The "complainant Name" is filled in the registration form.	M. Vani	M. Vani	Pass
LEG/002	In address field "pin code" ,string length 6 characters	517102	517102	Pass
LEG/003	Name of the victim	Ravi	Sunil	Fail

Table 1 : Test cases

VI. ACCEPTANCE TESTING

Acceptance Testing is performed after System Testing and before making the system available for actual use

- **Internal Acceptance Testing** (Also known as Alpha Testing) is performed by members of the organization that developed the software but who are not directly involved in the project (Development or Testing). Here we are involving the analyst and designer.
- **External Acceptance Testing** is performed by people who are not employees of the organization that developed the software.

- **Customer Acceptance Testing** is performed by the customers of the organization that developed the software. They are the ones who asked the organization to develop the software for them. This is the project for social benefit so no specific customer is there here we are involving the Doctors, Lawyers and members of social organizations who shared their knowledge to start the process. [This is in the case of the software not being owned by the organization that developed it.]
- **User Acceptance Testing** (Also known as Beta Testing) is performed by the end users of the software. They can be the customers themselves or the customers' customers. To perform this task we

selected 50 members of women from different categories of the society.

Depending on the priority chart [Figure 2] releases will be done. After **Release #1** the team computes project velocity in turn used to estimate delivery dates and schedule for subsequent releases and determine whether an over-commitment exists or not.

VII. SCRUM

[6] SCRUM incorporates the following framework activities.

- Requirements
- Analysis
- Design
- Evolution and Delivery

Each framework activity will have work task occur within a process pattern called a sprint, is defined and often modify in real time by the scrum team. Scrum emphasizes the use of set of software process pattern that were proven effective for project with tight timely ness changing requirements and business criticality.

In Scrum, the entire framework activities categorized into three phases:

- ❖ Preamble
- ❖ Game
- ❖ Postgame

Preamble consist of two important activities

1. Planning: Definition of a new release based on currently known backlog, along with an estimate of its schedule and cost. If a new system is being developed, this phase consists of both conceptualization and analysis. If an existing system is being enhanced, this phase consists of limited analysis.

Backlog -A prioritized list of project requirements or features that provide business values for the customer. The product manager assesses the backlogs and updates priorities as required.

In this case study the prioritized list is common for XP and Scrum. The requirements already specified above for XP.

2. Architecture: The architecture of scrum deals with the development of design which specifies the process patterns of work units called sprints.

Sprints – consist of work unit that are required to achieve a requirement defined in the backlog that must be fit in to a predefined time-box (Typically 30 days).During the sprint, the work units addresses are frozen and allotted to team members to work in stable environment.

Requirement	Work units
Legal Issues	Complaint registration, Complaint status, Advises from Advocates and helping hands
Educational issues	Courses, E-Sources, Notifications and Empowering girls
Medical issues	Home & Health, Health A-Z, Drugs & Supplements ,Healthy living, Eating & Diet, Parenting & Pregnancy and Teen Health
Recipes	Add Recipes and Download
Government Schemes	General schemes, women welfare schemes

Table 2 : Work units specification

a) Game

Game phase includes in the development activities.

Development Sprints: Development of new release functionality, with constant respect to the variables of time, requirements, quality, cost, and competition. Interaction with these variables defines the end of this phase. There are multiple, iterative development sprints, or cycles, that are used to evolve the system.

b) Postgame

Closure: Preparation for release, including final documentation, pre-release staged testing, and release. *Scrum meetings* - are short (typically 15 minutes). Meetings held daily by the scrum teams. Three questions are asked and answer by the all team members.

- What did you do since the last team meeting?
- What obstacles are you encountering?
- What do you plan to accomplish by the next team meeting?

These daily meetings help the team to uncover potential problems as early as possible and lead to knowledge socialization and there by promote a self-organizing team structure.

Depending on the work unit size the designing of the sprint is done and what are the test case studies to be invoked is going to be identified.

Demos – deliver the software increment to the customer so that functionality that has been implemented can be demonstrated and evaluated by the customer. It is not compulsory that all functionalities must be covered but they must be delivered within the time box.

Scrum process patterns enable a software development team to work successfully in a world where the elimination of uncertainty is impossible.

VIII. CONCLUSION

In agile development process by using XP methodology, the stories can be divided in two number of small depending on the time factor (if a story exceeds

3 weeks for the development that can be divided in to small stories). So in XP the changes can be allowed in the middle of the development. For example, in this case study if we consider the legal issues, adding of another new requirement related to complaint like cybercrime will cause some change in the development which is going to have effect on the size of the story which already have been specified. These types of changes can be acceptable in XP.

In Scrum once the sprints are identified and allotted to the team members they must be stable because they are frozen. No modifications are allowed until the completion of the development of that sprint. Adding of new sprints in the middle of the development is not possible. In XP team size should not exceed 10 members, and it is limited to 7 in scrum. XP will not support the distributed development, scrum will support.

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