Selecting Appropriate System Development Methodology to Develop Human Resource Management System for Ethiopian Center for Disability and Development

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Abstract

Selection of an appropriate System Development Methodology to develop an information system is one of among the most essential steps in any System Development. Finding and choosing of this methodology to do the work that follows for a Human Resource Management System (HRMS) falls also in that category. The Human Resource Management System by itself has much functionality and can be considered as fairly a large system. Therefore the choosing of a method among many should consider many factors and a wrong choosing on this stage might sicken the development process and may lead to failure.

Rational Unified Process (RUP) was the selected method which the researcher found to be helpful and constructive. It is well documented and is a complete methodology. It has a higher level of reuse and has reduced integration time and effort. Most importantly the ability of the methodology managing the change of requirements of the customer has added more value for selection.

The selected method's implementation has its own steps and dynamism which can be benefited from and its constraints also help to minimize the risks. The Human Resource Management System developed for Ethiopian Center for Disability and Development here has firm grasp on the business requirement and was developed entirely by using Rational Unified Process. The object oriented approach here for the definite realization on the functionalities recognized earlier made the execution of the project much more attainable and change insensitive. The interleaved nature of the method, the development environment chosen and the developed system being able to be realized in modular manner made a remarkable coherence to develop and deploy this Human Resource Management System.

Keywords: Selecting Appropriate System Development Methodology; Human Resource Management System; Small Enterprise

1. Introduction

It is common nowadays to see companies going for a partial or whole automation of their systems. The driving force behind this move may partly be attributed to a strong aspiration for higher efficiency and performance. Ethiopian Center for Disability and Development (ECDD), for which this paper come to life, is no exception.

Due to the fact that the organization's operations are project-based, there are regular recruitment, deployment and termination processes that are undertaken by the organization's Human Resource Department along with other in-process human resource activities that the department normally does. The motivation behind this paper is, therefore, the inefficiency of the manual record keeping and a time consuming handling of these routine activities.

A System Development Methodology refers to the framework that is used to structure, plan, and control the process of developing an Information System. Software methodologies are also purely a means to reduce project risk. "No methodology" is

still a methodology, just not a very good (repeatable, predictable, improvable) one.

Many methodologies and techniques may be used in the development of information systems. Choosing the right methodology and the technique that goes with it need a deeper understating of what the enterprise is involved in and a correct interpretation of the business procedure. When it comes to selection of methods, many facts should be involved for the success of any project. Keeping this in mind method choosing is the most important and complex part of any development.

Though there are many automated HR systems on the market, from the researchers' point of view, almost all of them have too much functionality and require a lot of customization to fit ECDD's requirements. All the available applications whether it is an open source or not, needs further analysis to fit it in the current HR department's activities. Analyzing it in this case may likely include customizing it as per the requirement developed earlier and that by itself will need an additional resource like skilled manpower on the perspective technology chosen, additional time is also required since we are studying other people's developed application and extra cost will more likely be incurred. Not to mention all the available HR systems are developed outside of this country, they greatly have a shortcoming on organization's business rules interpretation. Though some of them possess a great technological advantage and standardize the HR department functionalities, the cost of purchasing and deployment and maintenance of these applications are very high.

2. Related Work

There are no one-fit-all development methodologies. Some companies have their own unique customized methodology for developing products or services; others simply use standard commercial off-the-shelf methodologies. With the incorrect methodology, discovering, designing, building, testing and deploying a project is chaotic. The project methodology that is chosen represents merely the framework for the real work to be done and indicates where creativity is needed. There is no guarantee that the team will deliver if it just follows a chosen methodology. Clients seldom complete requirement specifications because their requirements are constantly changing. The most logical solution is to simply evolve the products as the client's needs change along the project development process. This shows the need for a methodology more flexible than a formal waterfall approach. In fact, the trend is shifting to the more iterative or incremental style of methodologies [1].

We all know that more than forty methodologies are there to use for development of a new application call it a standalone application or a web enabled one. All these methodologies have their own way of deployment techniques for them to become successes and produce an acceptable product for the user.

Attempt to actually *evaluate the available methodologies* has always given questionable results. As mentioned in [2], there are two general trends as to how various criteria for evaluation are organized. There are relatively ad hoc lists of criteria for evaluation, and systematically organized frameworks, which generally provide more authoritative assessment results. However, the frameworks investigated are too generic and disproportionate in their emphasis on certain parts of a method [2].On their conclusion also random lists of assessments criteria to evaluate methods do not tend to provide conclusive answers. Frameworks, which are based upon more rigorous logical foundations, deploy a more systematic questioning approach. The existing approaches investigated were theoretically sound, but there were deficiencies in pragmatics.

Selection of a suitable software model to use within an organization is critical for overall success of a project. The selection of one model over the others is driven by project size, budget, team size, criticality of the project and a lot of other factors. The different aspects which need to be kept in mind while selecting a suitable process model can be summarized as follows.

Reuse of existing Components? Component Based approach may be ideal choice.

Is it a very large project with High risks or high cost of failure? A Spiral process Model may be the best choice.

Although the customer has defined business goals but the requirements are not freeze yet Agile (light Weight) Model will have the advantage over others as it has the flexibility to change the requirement at any stage.

All the developers are experts? And if the project is small enough, an agile approach may work.

Want to keep stakeholders involved? An Incremental process Model may be what is needed.

Don't have an on-site stakeholder to sit with the developers? Agile development model is not suitable.

Developers are not highly skilled? A Waterfall or Spiral process Model can help keep them on track and out of trouble.

3. The Proposed Solution

The objective of this project was to Select the appropriate System Development Methodology and develop an automated Human Resource Management System (HRMS) (beta version) with the view to experiment on the selected Methodology. To achieve the above stated objective, the researcher will be performing the following activities: Selecting Appropriate Methodology, Conducting System Development using the selected Method, Experiment the selected Methodology, Deploy the system with in the intranet of the company. The scope of this project is limited to the Human Resource Management of ECDD that will be deployed in the intranet, which is handling the following modules only: - System Administration, Employee information management, Employee self-service management, Document Management, Notification and Alert management, Security Management and Report Management.

The activities carried out under the method were: Data gathering, System development Methods, Development Environment and Programming tools and training and testing procedures.

For easing the evaluation for the methodologies the majority of scholars agree that they fall under two categories that are Heavyweight and Lightweight. Heavyweight one is also known as traditional methodologies and their focus are detailed documentation, inclusive planning and demonstrative planning. Lightweight methodologies focused mainly on short iterative cycles and rely on the knowledge within a team.

There is also another assessment to evaluate a methodology from the project manager point of view. Decision must be made by the project manager on selecting a methodology. The table below which is taken from [1] show how the project manager can select a methodology.

Table 1: Requirements for selecting a Methodology

Requirement	*Rationale*
Budget	Methodologies require money and effects schedule
Team Size	Number of staff to be managed is required.
Project Criticality	The urgency of the project decides the methodology.
Technology Used	Hardware such as computer servers, composite materials, or electronics may be needed.
Documentation	The methodology needs documentation.
Training	Effective training to key support staff and project managers is required.
Best Practices/ Lessons Learned	Past lessons learned and good practice should be available.
Tools and techniques	Tools and techniques must be available.
Examination of existing processes	The maturity of existing processes will influence the pace at which a project will progress.
Software	Methodologies require software as part of their design.

When we come to actually choosing from the methodologies we have, we reviewed documents for the selection criteria.

There are criteria for selecting a Software Engineering Tools (SETs). Though the paper's objective were to select SETs for Small and Medium Enterprises (SMEs), the criteria used here for selecting SETs were much more sounding and can be used for this project too. Accordingly there are four (4) conditions used for the selection purpose.

1. Flexible Project Management
2. Development Process Support
3. Tool Usability
4. Communication and Collaboration

Table 2: Methodologies valuation based on the criteria

Method	*Flexible Project Management*						*Development Process Support*			*Tool Usability*			*Comm. & Colla.*	
	PRTE	*Planning*	*PT*	*Risk*	*Effort*	*AC*	*ATP*	*Modeling*	*VC*	*DF*	*IVF*	*TU*	*DC*	*TC*
XP	H	M	H	M	M	H	H	H	M	L	M	M	L	H
Scrum	H	H	H	H	H	M	H	H	H	H	H	H	M	H
Crystal	M	H	M	M	H	M	H	H	H	M	H	H	M	H
DSDM	H	M	H	L	M	L	L	M	L	L	M	M	M	H
RAD	M	H	H	L	H	L	L	M	L	L	M	M	H	M
Adaptive	H	L	M	L	H	M	M	M	L	L	M	M	L	H
RUP	H	M	M	M	H	M	H	H	M	H	H	M	H	M
FDD	H	M	H	L	M	H	H	H	M	L	H	H	M	H

Legend: H= High, M= Medium and L= Low

Criteria Description

PRTE: Project Resource and Time Estimation

PT: Project Tracking

AC: Attaching custom metrics

ATP: Adjustment to Processes

VC: Version Control

DF: Documentation Flexibility

IVF: Information Visualization Flexibility

TU: Tools Usability

DC: Documentation Collaboration

TC: Team Communication

The unquestionable actions of an organization are to become much more efficient in its responsibilities and accommodate numerous features in its existence. ECDD is no different. Non-governmental Organizations (NGO) activities are specific and target oriented. For the accomplishment of these tasks skillful personnel are required and that is what the organization has. What it lacks is a standardized and customized Human resource management system to make the allocation and job success within the company to its highest expected level. As we all know a Human Resource Management System (HRMS) has many functionalities and features. One fit for this company's Human Resource Department is very much hard and want more asking price in every aspects of its appliance. By dividing the HRMS's functionalities and processes and dealing with these tasks one at a time makes system development process for the Human Resource Department much more easy and attainable. Among all the methodologies available and seen before the viable choice for this task is using the Rational Unified Process (RUP). RUP's reputation and acceptance level by the Development community is very much recommendable for fairly large scope projects. Also for a chunk of that very large scope project development we found it to be comfortable and suitable. The following points are some of the points why this methodology was preferred:

- The interleaved nature of its steps works well with our way to develop a customized application

and greatly helps to integrate any change from the client.

- The fact that its documentation level is detailed makes for the later upgrading or changing of its functionalities by any Individual/team much more preferable.
- The fact that it is open, public and training materials are readily available also makes it more acceptable to implement.
- The style used by this methodology in development helps the developer to see what might happen in the future and makes some remarks for the anticipated attitudes.

Rational Unified Process (RUP) is an object-oriented and Web-enabled program development methodology. According to Rational (developers of Rational Rose and Unified Modeling Languages), RUP is an online mentor that provides guidelines, templates, and examples for all aspects and stages of program development. RUP and similar products - such as Object-Oriented Software Process (OOSP), and the OPEN Process - are comprehensive software engineering tools that combine the procedural aspects of development (such as defined stages, techniques, and practices) with other components of development (such as documents, models, manuals, code, and so on) within a unifying framework.

RUP establishes four phases of development, each of which is organized into a number of separate iterations that must satisfy defined criteria before the next phase is undertaken. The phases are Inception, Elaboration, Construction, and Transition.

4. Discussion

Here we will explain what was done and how it was done. The scope on the methodology is depicted in Figure 1.

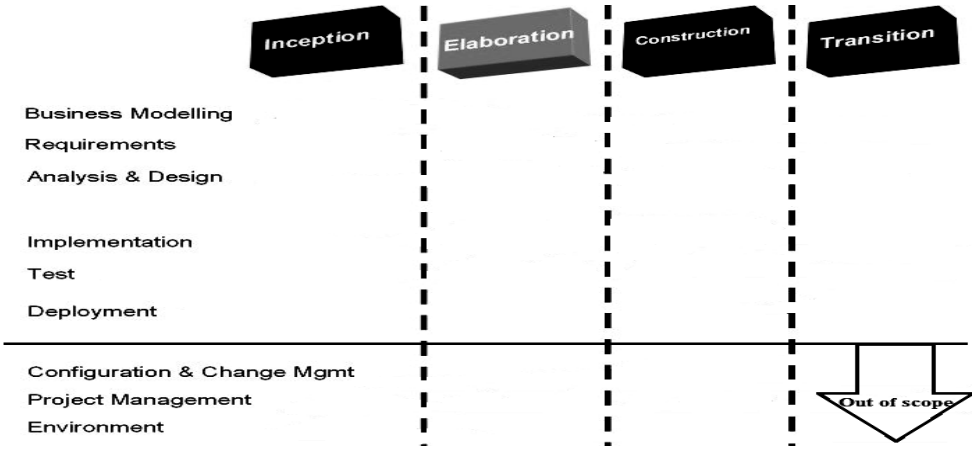

Figure 1: RUP's Methodology Understanding

The methodology as it was stated before has a nature of interleaving steps in order to attain the dynamic requirement needs of the customer. The Table 3 specifies what was done on what stage and what the outcomes were.

Table 3: Summary of Methodology used

	Inception	*Elaboration*	*Construction*	*Transition*
Business Modeling	By using the Business use case and the Business Object model we tried to communicate the business engineering process with the software engineering one.	The final stage for this step was here. The output this step is a document which is called Business use cases which are analyzed to understand how the business should support the business process.	Non for Business modeling	Non for Business modeling
Requirements	A complete listing of the main features and functionalities for this version of the product.	Identifying and listing of all the driving requirement that will helped me in choosing the architecture to be used and the quality of the product that am developing. Mostly the above points were forced by the system's non-functional requirements.	Non for Requirements	Non for Requirements
Analysis& Design	Actor Identification for the system.	Selecting the appropriate architecture for the system and identifying the system features was done here.	A full business process model that will describe the use case of the system and the activity diagram which will help for the document preparation of the *Problem* and *Solution* domain of the system was done here.	Distribution of classes of the system in to large scale by using the component view.
Implementation	Not applicable at this stage	The Subsystem overview and the persistence model which helps us to identify the data model of the system	Actual coding and User Interface preparation was done.	An Entity Data Model that is used for linking the business and Data model.
Test	Not applicable at this stage	Unit Testing on the data model and normalization of the tables existing.	Unit Testing, Regression Testing.	Unit testing, Regression testing, System Testing.
Deployment	Not applicable at this stage		Primary stage of distinguishing the deployment area was done.	Setup Server & configure, Configure Client work stations, if needed Configure internet

5. Conclusion

As a conclusion any software development process must follow a methodology for a complete success and accomplishment of a project. The right methodology for a project has a high degree of acceptance with both the developer and the customer which are involved. Method usage by itself will give well-studied steps and tasks to get to where one wants to go by making the communication and collaboration interactions between the customer and developer a lot easier and will also be goal oriented. Not to mention choosing the right method will greatly help on planning, risk reduction, effort exerted to complete a task and effective time usage, it will also make it more flexible to changes made and team communication will be easy.

The Human Resource Management task as it was stated many time in this paper is one of the most important and projecting part of any organization. By bringing this part of an organization to a very well acceptable standard stage, the organization itself could make the best out of it personnel set. ECDD is no different. HR has many functionalities, and I strongly believe that it should be split to a more manageable and separate modules where later on all could be put together to make one complete customized system that serves well within the company.

Coming to our method usage on the HR, we found the choice of method which is RUP to be best suited for this small enterprise. During the selection phase, we tried to make a brief and short amalgamation between the RUP methodology, HRMS and the ECDD and why it was worthwhile going this way.

In our opinion Rational Unified Process (RUP) usage for development was suitable. Though the level of expertise needed by this method is high, we found it to be more interesting and sensible to actually go though it to produce a web based application for ECDD. Its high business value deliverance and its object realization in each step made the work much more easy and thrilling. The greater advantage that we have noticed on this method is the high and demanding need of the client involvement though it is a heavyweight made it more suitable for this application development.

References

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[2] Peter Bielkowicz, Preeti Patel, and Thein Than Tun, “Evaluating Information Systems Development Methods: A New Framework”, London Guildhall University, UK, 2002.