Design and Development of an Intranet-Based IT Asset Management System with Mobile Application

Leonnel D. de Mesa, Ahnalene M. Fleras, Kier P. Pagdato, and Melvin Robert B. Yu

Abstract—Managing and tracking the state of the IT assets of a company involves a number of tedious activities that incur costs and consume time to accomplish. To be able to meet organizational goals along with being at par with the current global trends, companies require a solution to manage hardware, software, and information throughout the life cycle of an IT asset. This paper generally centered on the development of an information system, intranet-based web application with a mobile application on android-enabled devices, that maintains and keeps track of the information and current state of the IT assets of a company. Extreme Programming (XP) approach was used to frequently reassess the direction of the development process which should be in line with the needs of the client. Appropriate tests were conducted and based on the results, the developed solution was found to be useful to support tasks related to IT assets management.

Index Terms—Intranet-based applications, IT assets management, mobile application, workflow.

I. INTRODUCTION

While there are a seemingly endless number of software applications, there are three fundamental reasons for all business applications of information technology. They are found in the three vital roles that information systems can perform for a business enterprise: 1) support of business processes and operations, 2) support of decision making by employees and managers, and 3) support of strategies for competitive advantage [1].

Asset management refers to any system that monitors and maintains valuable things for an entity or group. It is a systematic process of operating, maintaining, upgrading, and disposing of assets cost-effectively. IT asset management (ITAM) is the set of business practices that join financial, contractual and inventory functions to support life cycle management and strategic decision-making for the IT environment. Assets include all elements of software and hardware that are found in the business environment. IT asset management, also called IT inventory management, is an important part of an organization's scheme since it involves gathering detailed hardware and software inventory information which is then used to make decisions about hardware and software purchases and redistribution. IT inventory management helps organizations manage their systems more effectively and saves time and money by avoiding unnecessary asset purchases and promoting the harvesting of existing resources. Organizations that develop and maintain an effective IT asset management program further minimize the incremental risks and related costs of advancing IT portfolio infrastructure projects based on old, incomplete and/or less accurate information [2].

Primarily, some of the problems that are seen on the current asset management systems of companies are (a) having no centralized repository of IT asset information and (b) the costly and time-consuming managing and tracking of IT asset information across a company manually.

The main objective of this study, therefore, was to design and develop an intranet-based IT asset management system with an implementation of a mobile application on android-enabled devices that aims to maintain and keep track of the information and current state of the IT assets of a company. More specifically the implementation of the system was used to (1) provide a means of maintaining IT assets information through an intranet-based platform which allowed establishing a master record for new IT assets, generated the IT assets’ Quick Response codes or QR codes, and a means to update old IT assets’ information; (2) provide a means of recording preventive maintenance and service information of IT assets through the use of mobile devices; (3) provide a readily available IT assets information through an intranet-based platform by means of generated summary reports about the inventory of the IT assets of the company, its preventive maintenance and service information which helped for better accountability of the IT assets, improved IT service levels, and supported the decision making process of the employees and managers.

II. METHODOLOGY

A. eXtreme Programming

The developers chose the extreme programming methodology under the agile development process. Agile programming gives developers continual opportunities to reassess the direction of a project throughout the entire development process. Extreme Programming is one of the agile processes and is a discipline of software development based on values of simplicity, communication, feedback, and courage. It is defined to work by bringing the whole team together in the presence of simple practices, with enough feedback to enable the team to see where they are and to tune
the practices to their unique situation [3].

After the analysis of the current system, the developers, then, studied the expected functionalities of the client and analyzed the planned interactions and components of the desired software. Its sub-modules were then identified and listed. The developers, then, came up with the program specifications of the desired software, and proceeded with the actual development phase. The whole team, developers and ISS employees, worked together with simple design and tested code, improving the design continually to keep it right for the current needs of the department. The developers kept the system integrated and running all the time. Codes were written in a consistent style so it can easily be understood and improved as needed. Each unit under every module were revisited or tested throughout the life cycle. Hence, the developers were able to accomplish every module one by one, as this methodology is considered an iterative and incremental process.

Using extreme programming, there were small releases of functional units to come up with the desired software. After a sub-module became functional, the developers proceeded with a small release. The developers presented it to the customers, who are the manager and software development head of the Information System Section of Pricon Microelectronics, Inc. for a review, hence, the acceptance testing stage. After all concerns for revisions were settled, the developers proceeded to the next sub-module undergoing the same process. The extreme practices are shown in Fig. 1 as well as the circle of life.

B. Locale of the Study

The study was conducted for the employees of the Information System Section (ISS) of Pricon Microelectronics, Inc. located at Light Industry & Science Park I, Cabuyao City, Laguna. The ISS department is responsible for the hardware, software, architecture, and networking of the computers in the company. The IS section also maintains and keeps track of the inventory, information, and current state of all the IT assets of the company. Having a traditional or manual way of carrying out this process, the Information System Section looked into the implementation of an IT assets management system that would maintain and keep track of the information and current state of the company’s IT assets, thereby supporting the processes and operations of the IS section and the decision-making process of its employees.

C. Population of the Study

Pricon Microelectronics, Inc. has a total of 313 employees as of February 2014 which includes five (5) employees of the Information System Section. The company has four (4) divisions, with sections under each. From each division, the number of possible requestors and approvers vary.

D. Data Flow Diagram

A data flow diagram (DFD) is a tool that depicts the flow of data through a system and the work or processing performed by the system [4]. Following the series of interviews, the developers were acquainted with the major processes and operations facilitated by the IS section shown in Fig. 2.

![Fig. 2. Context-level data flow diagram of the current IT asset management.](image-url)
A. Use Case Diagram

A use case diagram was used to illustrate the core functions of the system, and the different kinds of users that can interact with the IT Asset Management system [5]. There are five actors involved in the system that determine the roles and access levels within the system, namely, the PMI employee, ISS Section Manager, ISS Software Head, ISS employee, and the ISS Manager. There are four main modules in the system that these users can use: the Service Request Module, the Inventory Module, the Preventive Maintenance Module, and the Summary Report Module.

In the Service Request Module (Fig. 3), PMI employees can send service requests. These requests can be viewed later by the requestor and the ISS section manager for status. The ISS section manager then approves the request. Once approved, the ISS SW head assigns an ISS employee who will conduct the servicing. The assigned ISS employee will then be able to view the assigned service request and record the findings after the conduct of the servicing.

In the Inventory Module (Fig. 4), functions that can be carried out by the ISS employee include the recording of IT asset information and disposal information, as well as view, search, and update IT asset information.

In the Preventive Maintenance Module (Fig. 5), the ISS employee can view and search for an IT asset information and PM information. After the conduct of a scheduled preventive maintenance, findings are recorded and/or updated using the Record PM information feature. PMI employees can also request for PM reschedule.

In the Summary Report Module (Fig. 6), the ISS manager is provided with features to view and print a number of reports, namely the inventory summary, the service summary, and the preventive maintenance summary reports.

III. RESULTS AND ANALYSIS

After all major modules were done and fully functional, the whole team met again for the last phase of the development lifecycle to perform last usability testing on an office environment for their acceptance.

The developers devised a survey form, based on Zhang’s usability guidelines containing questions about the usability of developed system, the IT assets management system, to gather feedback from people who will be using the system while in conducting the descriptive survey, the developers followed a testing strategy and approach written on the approved test plan. To be able to evaluate and interpret the feedback from the users regarding the usability of the system, the developers based the results on the Likert scale shown in Table I.
User Acceptance Testing (UAT) is a phase of software development in which the software is tested in the “real world” by the intended audience or a business representative. The goal of UAT is to assess if the system can support the day-to-day business and user scenarios and ensure the system is sufficient and correct for business usage [6]. After all major modules were done and fully functional, the developers and the employees from the locale of the study met again to perform last usability testing on an office environment for acceptance.

The developers devised and used a descriptive survey based on Zhang’s usability guidelines. Question numbers 1, 2, 3, 5, 6, 8, and 9 under the Usefulness Concerns category aims to answer the requisites of the first and second objectives of the study which are to develop a module that would maintain IT assets information through an intranet-based platform and a module that would allow recording of PM and service information through the use of mobile devices. Question numbers 4, 7, and 10 of the same category aims to answer the requisites of the third objective which is to develop a module that would provide readily available information about the IT assets of the company.

Table II shows the summary of the results of the user acceptance testing with the employees from the IT department of the locale of the study. They are the primary users of the developed system as it aims to support their processes and operations with regards to the IT assets of the company. The developers were able to gather feedback from all five (5) employees of the said company.

Table III shows the summary of the results of the user acceptance testing with the other employees of the locale of the study. They are only allowed to use selected features of the developed system such as sending service requests, approving service request for section managers, and viewing information with regards to their service requests through the intranet-based platform. The developers were able to gather feedback from 26 employees of the company.

For the other users of the software, the category with the lowest evaluation was the “physical or safety concerns” which dealt mainly on their personal preference with regards to the use of the system. This may have had resulted to such because these employees were not used to the newly implemented information system yet. In contrast, the category that got the highest was the “usefulness concerns” which denotes that they found the developed software useful such that it supports their day to day tasks.

### TABLE I: INTERPRETATION OF WEIGHTED MEAN ACCORDING TO THE LIKERT SCALE

<table>
<thead>
<tr>
<th>RANGE</th>
<th>INTERPRETATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.20 – 5.00</td>
<td>Very Good</td>
</tr>
<tr>
<td>3.40 – 4.19</td>
<td>Good</td>
</tr>
<tr>
<td>2.60 – 3.39</td>
<td>Average</td>
</tr>
<tr>
<td>1.80 – 2.59</td>
<td>Fair</td>
</tr>
<tr>
<td>1.00 – 1.79</td>
<td>Very Poor</td>
</tr>
</tbody>
</table>

### TABLE II: USER ACCEPTANCE TESTING RESULTS (ISS EMPLOYEES)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Weighted Mean</th>
<th>Verbal Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usefulness</td>
<td>1</td>
<td>2</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>4.6</td>
<td>very good</td>
</tr>
<tr>
<td>PM</td>
<td>6</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4.4</td>
<td>very good</td>
</tr>
<tr>
<td>Service</td>
<td>3</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4.3</td>
<td>very good</td>
</tr>
<tr>
<td>TOTAL</td>
<td>21</td>
<td>24</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4.43</td>
<td>very good</td>
</tr>
<tr>
<td>Physical / Safety</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4.4</td>
<td>very good</td>
</tr>
<tr>
<td>Usability</td>
<td>2</td>
<td>23</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4.08</td>
<td>good</td>
</tr>
<tr>
<td>Pleasing / Enjoyable Attributes</td>
<td>8</td>
<td>12</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4.4</td>
<td>very good</td>
</tr>
<tr>
<td>TOTAL</td>
<td>9</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4.45</td>
<td>very good</td>
</tr>
</tbody>
</table>

For the main users of the developed software, the category

### TABLE III: USER ACCEPTANCE TESTING RESULTS (OTHER EMPLOYEES)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Weighted Mean</th>
<th>Verbal Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usefulness</td>
<td>3</td>
<td>20</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>4.0</td>
<td>good</td>
</tr>
<tr>
<td>Physical / Safety</td>
<td>9</td>
<td>27</td>
<td>16</td>
<td>0</td>
<td>0</td>
<td>3.87</td>
<td>good</td>
</tr>
<tr>
<td>Usability</td>
<td>17</td>
<td>92</td>
<td>21</td>
<td>0</td>
<td>0</td>
<td>3.97</td>
<td>good</td>
</tr>
<tr>
<td>Pleasing / Enjoyable Attributes</td>
<td>38</td>
<td>48</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>4.19</td>
<td>good</td>
</tr>
</tbody>
</table>

Table III shows the summary of the results of the user acceptance testing with the other employees of the locale of the study. They are only allowed to use selected features of the developed system such as sending service requests, approving service request for section managers, and viewing information with regards to their service requests through the intranet-based platform. The developers were able to gather feedback from 26 employees of the company.

For the other users of the software, the category with the lowest evaluation was the “physical or safety concerns” which dealt mainly on their personal preference with regards to the use of the system. This may have had resulted to such because these employees were not used to the newly implemented information system yet. Oppositely, the category that got the highest was the “pleasing and enjoyable attributes” which denotes that they found the graphical user interfaces satisfying.

### IV. CONCLUSIONS AND RECOMMENDATIONS

According to Zwass, business firms and other organizations depend on information systems to carry out and manage their operations, work together with their customers and suppliers, and stand the pace in the marketplace [7]. Based on the results of the study, the implementation of the developed information system will be able to support the business processes and operations of the employees of a company, in the decision making process of its employees and manager, and in support of strategies for competitive advantage. The development of the IT Asset Management System will help for better accountability of IT assets, support the decision making process of the employees and managers of the company, and improve the IT service levels of the company’s IT department.

After conducting several testing and revisions on the developed software and based on the results of the user acceptance testing, the developers were able to meet the objectives of the study. The developers used Likert scale to
find the final evaluation of the developed system based on the results of the user acceptance testing. These results, based on the technology acceptance model, mean that the developed software will be able to support the day to day business activities and processes facilitated by a company.

As technology and people’s demand increase through time, there will always be room for improvement and extensions of systems or applications. The following are the recommendations of the developers for future studies:

1) First, the developed application on the mobile-based platform does not include saving the signature of the user of an IT asset after a preventive maintenance or a service, which may serve as his conformance or acknowledgment that the preventive maintenance or the service is already done. This is a good opportunity for improvement of the application such that the signature of the user can also be done through the use of mobile devices.

2) Another potential improvement of the intranet-based platform is to extend the IT Assets Inventory Module into mobile devices such that it can also be used to record information of the company’s assets whenever employees go to the warehouse. This could be a great opportunity for the improvement of the application because stocks can also be immediately recorded and reflected on the inventory of the company’s IT assets.

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REFERENCES


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