ANALYSIS AND IMPROVEMENT OF AN INFORMATION TECHNOLOGY WORK ORDER SYSTEM

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ABSTRACT

The purpose of this project was to analyze and improve the work order process at Capital One Financial Corp. A typical work order system replaces or changes hardware, software, and telecom items. It is also used for moving employees among buildings.

The group determined which direction the project should take from three choices: development of a prototype of a new system by the Capstone team, modification of the existing system, or implementation of a commercial software solution. Using a systems analysis approach, we determined that implementing a commercial software package was the most cost effective and viable solution for our client.

Initial research produced a number of possible software solutions. Preliminary analysis narrowed these choices to a group of 6. We then developed criteria and evaluated the candidates against the metrics. From this analysis, two software alternatives proved superior. To validate these results, the team performed use case analysis and on-site presentations. IFS Maintenance succeeded in passing all eleven use cases. The performance of IFS Maintenance was superior on both the evaluation criteria and use case analysis.

BACKGROUND ON THE WORK ORDER PROCESS

A work order process deals with replacing or changing hardware, software and telecom items. Moving associates inside buildings or between buildings are also work orders. Capital One has such a system in place. A typical work order begins when an end user has a problem with hardware, software or telecom items. The user then contacts a specific individual in their department, called the Business Unit Liaison (BUL), in order to make the request. The BUL files the request with a Work Flow Coordinator (WFC) in the IT department, by phone, email, or “shoulder tapping.” Approximately 800 different people acted as BUL’s last year for Capital One. Most of these people were responsible for generating only a few work orders per year: only 187 entered over 20 requests.

The WFC is then responsible for assigning the work orders to site analysts. Site analysts are Capital One employees that perform work order requests. There are four groups of Site Analysts at Capital One: Local Area Network, Wide Area Network, Phone, and Accounts. Each of these groups is responsible for a specific type of work order. In addition, the WFC must also take into account the work load of the given site analyst before making an assignment.

The current system at Capital One is inefficient, specifically because of a lack of communication and automation. The system does not automatically notify a manager if a request needs approval so the work order cannot even begin until that manager has been contacted and approval is given. A more specific example of inefficiency is when a work order requires equipment that is unavailable and must be ordered. The WFC must regularly check the system to see if the equipment has arrived and only then can the WFC proceed to assign a work order to a Site Analyst.
DETERMINING THE DIRECTION OF THE PROJECT

In order to achieve an efficient solution, all possible solutions to this problem were explored to determine which alternative would best achieve Capital One’s requirements. Evaluation of the alternatives determined there were three choices comprising of (1) implementation of a new system by the Capstone team (2) modification to the existing system or (3) implementation of a commercial software solution.

Evaluation of Capital One’s requirements and a better understanding of the complexity of the problem revealed that implementation of a customized software solution that could support an organization as large as Capital One by the Capstone group was out of the scope of this project. Even if the team were able to produce a viable solution, training and technical support could not be given.

From interviews with the client and research, the team also determined that the current system was so antiquated that modification to certain aspects of the system would improve only those specific areas. It was determined that modification to the current system would not provide a long term solution.

Implementation of an available commercial software solution turned out to be the most viable of the three options for several reasons. A software solution is a ready-made software system that has been created and developed by an IT company specializing in IT maintenance management.

The companies that were researched such as IFS Maintenance and TrackWeb all had a track record of success and experience together with an impressive list of customers such as J.P Morgan, General Motors, Boeing, and other Fortune 500 companies.

These companies could provide Capital One with technical support and training for years and they provide ‘upgrades’ so the system would not become out of date any time soon. Another advantage was that some of these companies had ‘add-on’ modules for inventory, purchasing, auditing, accounting, payroll and asset management that could easily be integrated with the work order system.

An ‘add-on’ module was a separate software package that can be added to the system to increase functionality even after it had been implemented. Capital One had expressed an interest that they would prefer a system that had this option because ultimately in the future the corporation wanted to integrate all the business areas mentioned above.

Given these advantages, a software solution was found to meet Capital One’s requirements better than any of the other alternatives.

The software solution option meant that the IT company would implement the solution, not the Capstone group.

GOALS AND OBJECTIVES

The goal of the work order system is to improve the overall productivity and efficiency at Capital One by enhancing the manner in which work requests are undertaken. The work flow will be streamlined by improving the following attributes of the current system: communication, information accessibility and availability, support for decision making and user interface.

Communication

Communication plays an important role in any business situation. In a work order system, lapses in communication wastes time. As stated previously, the current work order system at Capital One does not have a standardized way of communicating. It can take the form of “shoulder tapping,” phone calls, or electronic mail. Shoulder tapping is the situation where the requestor simply goes by the desk of the BUL, taps them on the shoulder, and asks for a work order to be submitted. This method of making a request prevents the creation of a paper trail. Phone calls create the same problem.

Communication is also used to notify the correct service group when a work order is created. Different service groups are responsible for performing different types of work orders. In the current system at Capital One, the WFC assigns work orders to the correct group. In order to expedite this process, the optimal solution should provide automatic notification to the appropriate group, preferably through email.

Information Accessibility and Availability

The current work order system at Capital One is contained on a Lotus Notes database. This type of database is flat file, meaning that there are no intrinsic relationships between any of the fields. This makes it difficult to create queries and to generate reports based on multiple variables. For these
reasons, the optimal solution should provide a relational database that contains all the work order information.

Given the complexity of many requests, it is necessary that the database have sufficient storage to hold all related information. The current system consists of two servers. This prevents queries from being complete because one can only log onto a single server at a time. It also makes it difficult to know where the work order that you are looking for is located. The optimal solution should provide a single server that is capable of supporting enough data to hold all work orders.

Support for Decision Making

Intelligent decision making is one of the most difficult parts of any business process. With increasing software complexity, it is now possible to automatically make some of these decisions through intelligent “business rules.” A business rule enables the system to automatically perform a function when one or more logical conditions are met. For example, at Capital One a work order to install a new monitor cannot be completed until the monitor is received in inventory. The optimal software package should recognize when a piece of equipment arrives, either through scanning a bar code or having someone manually enter the information. Once the equipment is received, the software should then schedule the request for the work order. The current work order system provides no functionality of this kind.

User Interface

Users can access the current work order system by two methods: the Lotus Notes interface, which allows the user to add, delete or modify records, and the Domino interface, which allows the user to add records. Users can access the Domino system through any Web browser. This is an advantage over the Lotus Notes system because additional software installation is not required. The disadvantage of Domino is that users cannot modify existing records. The optimal system should provide full functionality and a single interface for all users. A browser based software package, accessed through an in house server, is the typical implementation. This provides one standard interface for all work order needs.

Customization

It is very difficulty to find a system, no matter how good it is, to match the specific requirements of a client so some customization is inevitably required to achieve these goals. The system must strike a balance whereby it can be easily customizable to meet Capital One’s requirements but also be generic enough so additional coding is not needed. Otherwise, implementation and maintenance costs will be very high and more technical problems will be incurred with increased customization. Customization requires that fields on a form can easily be changed to drop-down menus and field names and terms can be easily changed to represent the language of Capital One.

ANALYSIS OF ALTERNATIVE SOLUTIONS

There were several levels of analysis that were conducted on the software solutions and each level of analysis further narrowed down which solution would best meet Capital One’s requirements. After researching 74 available software solutions, twelve software alternatives provided the necessary functionality as described in the Goals and Objectives.

Preliminary Analysis

In order to narrow down the choices, feedback was obtained from the clients who identified three essential requirements.

The first requirement was that the software must be Web based. The ability for end users to interact with the work order system from the Web prevents the need for installing software on individual personal computers. It also allows the interface to be accessed from any computer on the company’s internal network. This enables the performer of the work order to view and edit tasks regardless of his/her location in the building.

The second requirement was that the software package support Oracle. Capital One has experienced over 20% growth in each of the past four years. This necessitates a software solution that can expand with the company. A database such as Microsoft Access has a limited amount of entries that it can contain. In addition, Capital One currently uses Oracle in other IT areas, thus the company has Oracle technicians on site.
The final requirement was that the software package must support all Microsoft Windows platforms. Capital One currently has Windows 95, 98, 2000 and ME running on computers in their network. A software solution that did not support all of these operating systems would require the purchase of additional operating system licenses. Table 1-1 shows where each solution stands with regards to the specified requirements. The O’s symbolize that the solution meets the requirement. An X represents the failure to meet the listed requirement.

Figure 1

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Web-based</th>
<th>Supports Oracle</th>
<th>Supports All Windows Platforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolve IT!</td>
<td>O</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>IFS Maintenance</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Tech+Center</td>
<td>O</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>WOFM</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Track-It!</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>ServiceWise</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>WOPM</td>
<td>O</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>MS2000</td>
<td>X</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>BigWebDesk</td>
<td>O</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>TrackWeb</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>HEAT</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Magic HD</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

After having performed a preliminary analysis of the solutions, the packages in bold were chosen to be examined further.

ALTERNATIVE ANALYSIS

For our secondary analysis we developed a list of criteria to evaluate the software packages. These criteria are broken down into five distinct sections, each with their own sub-categories. The weights for each section and sub-section were determined with input from the client. The total score for each software solution is based on a number from 0 to 1, 1 being the highest. The results from this ranking can be seen below.

Figure 2

Figure 2 shows IFS Maintenance and TrackWeb as the leading software solutions. The next step in identifying the optimal solution is to validate these findings.

Use Case Analysis

Use cases allow analysts to identify the required features of a software system. A set of 11 use cases was developed in cooperation with the client.

The package received a 0 if the software could not complete the use case. It received a score of 1 if it could complete the use case. As illustrated in Figure 3, IFS Maintenance TrackWeb had the best performance in the use case testing.

<table>
<thead>
<tr>
<th>Software Name</th>
<th># of Use Cases Passed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track-It</td>
<td>5</td>
</tr>
<tr>
<td>ServiceWise</td>
<td>5</td>
</tr>
<tr>
<td>HEAT</td>
<td>9</td>
</tr>
<tr>
<td>Magic Help Desk</td>
<td>8</td>
</tr>
<tr>
<td>IFS Maintenance</td>
<td>11</td>
</tr>
<tr>
<td>TrackWeb</td>
<td>10</td>
</tr>
</tbody>
</table>

Figure 3

Feedback Evaluation

After the use case analysis was complete, it was clear that IFS Maintenance and TrackWeb were the two highest rated software solutions. The next course of action was to have the two software vendors present their software solutions to the Capstone team and Capital One. The two solutions were presented to Capital One associates who are involved in the work order process.
Each associate received evaluation sheets to complete after each company presentation so the group could receive feedback from Capital One on their impression of each system. The evaluation sheets had a list of seven attributes that were to be graded by Capital One associates. These included: end-user interface, WFC interface, quality of reporting features, ease of customization, easily integrated into Capital One’s current process, ability to improve work order process and overall impression of the system. Each of these attributes had a scale from 1 to 5 and a comments box for each employee to fill out. The scores and comments for each attribute for both software solutions were recorded into a matrix and a total score was obtained. The total scores for each attribute are shown below in Figure 4, and it is clear that IFS Maintenance scored higher than TrackWeb. IFS scored higher than TrackWeb in every attribute except ease of customization. The difficulty of customizing IFS can be explained simply because IFS has more functionality than TrackWeb and with increased functionality comes increased customization.

Figure 4

CONCLUSION

In this project, the Capstone team recommends that Capital One Corporation can no longer use their current work order system because it is inefficient and cannot accommodate increasing demands. The Capstone team analyzed and identified inefficient areas of the work order system, gathered system requirements and determined there were three alternatives to solving the problem; (1) implementation of a new system by the Capstone team (2) modification to the existing system or (3) implementation of a software solution. The third option was found to be the most viable solution for Capital One.

Results of Software Solution Implementation

The system will seek to improve the overall productivity at Capital One by improving the manner in which work requests are undertaken. The work flow of the system will be improved by automation and ‘decision-based’ business rules so the BUL and WFC will reduce work-order demands enabling them to concentrate on their primary duties and responsibilities.

A significant amount of time will also be saved from the new system as a result of improved communications through automatic email notification and a centrally linked database with the name, phone number, email, workstation number and department of every user.

The new system will also add the capability to do managerial and strategic functions such as forecasting the demand of each individual work order. By doing this the purchasing department may be notified before a deficit in the equipment really comes into place. It will also improve resource allocation by making specific Site Analysts available to work on jobs that require particular expertise. All the improvements said above will lead to better customer satisfaction ratings.

Managers will also benefit from the implementation of the new system. By providing a better resource allocation and scheduling system, managers will be able to better analyze and monitor the performance of each person involved in the process. The system will also allow managers to provide fast and easy feedback evaluations to the associates. The reporting tools in the system add a new functionality to the manager’s job.

In 2000, Capital One spent $296,255,000 on communications and data processing alone so the implementation of a commercially-available IT work order system has the potential to reduce costs and improve productivity—thus saving Capital One money in the long run.

REFERENCES


BIOGRAPHIES

David Poppert is a fourth year Systems Engineering major and he was a database administrator at Bennett Group Computer Consultants this past summer using Cold Fusion applications to create and design 3-D computer games. He will be working in the Northern Virginia area next year for Getronics Government Solutions.

Cyrus Sadiq is a fourth year Systems Engineering major and he did an internship at UBS Warburg this past summer gaining financial experience in the Private Banking division. He will be moving to Charlotte, NC next year to work in the financial services industry for First Union Wachovia.

Fabio DeOliviera is a fourth year Systems Engineering major who did an internship with Capital One Corp last summer and worked on the current project that the Capstone team undertook. He will be working in New York next year also in the financial services industry with UBS Warburg.

Jeff Balser is a fourth year Systems Engineering major who also did an internship with Capital One Corp last summer and also worked on the current project side by side with Fabio Oliveira. He will be moving to Richmond to continue to work for Capital One.