ABSTRACT

Customer Relationship Management (CRM) products and services attempt to produce a better connection between businesses and their customers. These tools are being employed in all fields of business and information technology industries. In this paper we focus on the development of one very specific CRM tool to serve the needs of a small consulting and software development corporation. Though specialized for one company, many aspects of this CRM tool can be generalized for the wider range of small and midsized consulting businesses, which are becoming software development firms. These midsized companies deal with very specific issues in customer interactions. This CRM system solves some of the most common struggles companies in this category have keeping their customers satisfied. Primarily this system provides a conduit for businesses along with their clients and customers to deal with support and service problems. We have developed the necessary database schema and structure to support a web-based CRM system and front-end portal for both the clients and employees to access, input, and transfer information. This CRM tool shows how customer service systems can work for small consulting and software businesses.

1 INTRODUCTION

1.1 Problem Definition

When consumers have questions for a company or problems with a product, they often become frustrated with the response time and lack of compassion they face from the company. Our client, Appian Corporation, a professional technical services company, is entering the packaged software market. As it shifts into the software sales industry, it wants to avoid these common negative sentiments by implementing a quality customer relationship management (CRM) system. Appian contracted our University of Virginia capstone team to act as consultants to generate such a system. The purpose of our project was to develop the features of an effective CRM prototype and how our client company could use a web-based application to facilitate the management of their client relationships. Thus, this project produced a comprehensive CRM system including design requirements, web-based prototype, and mappings of fundamental business processes, all of which were specifically designed to meet our client’s unique business needs.

1.2 Introduction to CRM

“Customer relationship management [CRM] is an enterprise approach to understanding and influencing customer behavior through meaningful communications in order to improve customer acquisition, customer retention, customer loyalty, and customer profitability” (Swift 12). CRM improves these four factors by personalizing companies’ relationships with customers and providing them with ways to easily communicate with the business. Personalization occurs by gathering information about clients through data mining technologies and analyzing these data to better understand client needs. CRM has two main objectives: To retain current customers by increasing customer loyalty and to attract new customers by providing individualized customer service.

In 2003 there was a 14% increase in spending on CRM and predictions show that the CRM market will
continue to grow rapidly. Due to the saturation of CRM implementation among large businesses, “it is the mid-sized companies that are seeing the most increase in IT spending and are predicted to be the largest customer base for CRM applications over the coming years” (Guglielmo). CRM’s promising future for smaller business structures combined with the predicted strength of the market gives companies ample need to implement an outstanding CRM system.

With the proper CRM implementation, companies should benefit economically. According to Ronald Swift’s *Accelerating Customer Relationships*, effective CRM increases profits in six ways: lowering customer recruiting costs, dissipating customer recruiting needs, reducing cost of sales, increasing customer profitability, increasing customer retention and loyalty, and evaluating customer profitability (28). Furthermore, an article based on University of Michigan research shows that if a CRM product can increase customer satisfaction by only 1%, then the company for which this product was implemented will increase its market presence by an average of 3% (Siebel, 2003). In these ways, our client will benefit by implementing our recommended CRM system.

1.3 CRM for Emerging Software Enterprises

Gibson’s six steps, taken from his book *How to do a Systems Analysis*, were the guiding principles we used to complete our project (Louis). First we defined the problem: How could our client improve its customer-employee relationships and garner benefits for both parties? Next, the objectives were stated, focusing on increasing internal and external communication, allowing customers to be self-sufficient, and decreasing employee workload per client. Third, we developed the indices of performance, which helped us determine which features to include in our prototype. These indices were based on conversations with the company employees covering their expectations and needs. Next, we developed alternative solutions, which were merged into an intensive requirements document. Based on the indices of performance, we then ranked the importance of the requirements. Our web-based prototype encompasses the most critical design requirements. We conducted several rounds of usability testing and made corresponding modifications to the web application. Once our client implements our solution, iteration should continue based on changes in its business goals, technology, or CRM industry demands.

2 CRM REQUIREMENTS

2.1 System Design

In order to recommend an appropriate CRM system, we researched CRM concepts, key players, and competitors. We also interviewed employees in five different areas of the company – consulting, technical support, quality assurance, product management, and sales. Speaking with employees also allowed us to determine how employees interact with customers and to identify beneficial CRM functionalities. These varying opinions were then taken into account when developing the design requirements.

By producing an exhaustive list of requirements, we established the functionality of the complete system. We selected a subset of the requirements as the scope of work for the prototype. The prototype achieves the core functionalities, aims to solve the problem of assisting internal support, and facilitates solving client problems.

2.2 Design Requirements

2.2.1 Connect people to information

- Login routes users to personalized pages
- User’s information displayed based on their needs and relationship to the company
- Draw from a single knowledge database that allows real time updating

2.2.2 Help employees recognize and anticipate client needs

- Collect and organize information about clients and their projects through use of relational database
- Display questions & feedback posted by clients
- Display general FAQ and basic product info
- Enable users to update personal profiles
- Allow employees to post updates, software patches, trial products, etc. for clients
- Display positive feedback and reviews on products
- Allow employees to post similar case studies or information on products that may fulfill client’s needs

2.2.3 Help technical experts support clients quickly and effectively

- Allow tech support to update information to the knowledge database at any time
- Upload knowledge articles
- Allow tech support to extract information and profiles regarding the specific client and project
- Access to client profiles – product schematics, coding, modification made for the specific client
- Take suggestions and feedback from the customers and other consultants

2.2.4 Demonstrate the company’s potential services

- Display example case studies
- Advertise financial benefits of and customer feedback on products
- Provide links to the company history, current events and press releases on the common interface
- Search by client, product, consultant, project
- Allow users to access deliverables from past projects similar to their own
- Allow employees to search internal areas of expertise to locate who should be contacted for answers

3 RESULTS

3.1 Database

Using MS Access, we created a database to support the web-based prototype. This relational database, hosted on a UVA server, connects to the CRM web-system using ASP. By storing and organizing information fundamental to the CRM system, it enables the prototype to be a dynamic system that provides personalized, up-to-moment information and allows users to search for desired information. The functionality of the website depends on the relationships between fields of the database. Each field of the database has a unique identifier so that none of the fields are repeated. These unique identifiers and the relationships between data minimize the size, the complexity, and the overall maintenance of the system. This is important so that all information remains current and consistent to prevent the storage of unnecessary information.

A client only has to update their information once, and it will be updated throughout the system, which allows for users to personalize their pages. Users can also search the database for any information within the system, which helps customers and employees solve their own problems.

3.2 CRM Web-based Prototype

The CRM web-based prototype, which can be accessed at www.sys.virginia.edu/crm using the username “lpool” (client view) or “jcoleman” (employee view) and password “user” for both, successfully satisfies the design requirements previously detailed in section 2.2. The web system was designed focusing on our client’s specific needs and in accordance with Nielsen’s Usability Heuristics. The general layout and color scheme is shown by the screen shot of the log in page, Figure 1, and Workflow product page, Figure 2. They, along with the other web views, were designed to match our client’s existing website, with which users are most likely familiar. This provides an easy transition from our client’s corporate website to the web-based CRM.

The log in page, Figure 1, effectively fulfills the design requirement “Login routes users to their personalized page.” From the point users log in, they view their personalized page, connecting the users to information that applies to them. The single knowledge database stores client, project, and product information and enables this personalization of the system with user specific views and content.

Figure 1. View of log in web page

The Workflow product page, shown in Figure 2, works to demonstrates the company’s potential services. It highlights the financial benefits of the product and provides links to related company web pages. The links are easily identified because they are underlined and blue, following the real-world standard. The most important information is centered, larger than other text, and in bold, so that the user’s eye naturally pays more attention to this text. Users have the freedom to navigate themselves through the system, by controlling what pages are visible using links and available exits. Lastly, the text was written to be clear and straightforward. The main page contains only necessary and frequently needed information to maximize the availability of this important information. Tables were used to separate distinct blocks of information and to keep lists in line, as on the Workflow page shown in Figure 2.

Figure 2. View of detailed product page

3.3 Client-User Functionality

The proposed system helps serve clients from the time they buy their first product and throughout the entire product lifecycle. The client aspect of this system fulfills our client’s business strategy, of “Connecting people to
information.” Client-users can update their own information, needs, and feedback after they log into the system. The CRM tool has an area set aside for software upgrades and patches that reduces the customers’ time spent on contacting and waiting for the necessary solutions. If a client buys a product from this company such as a Portal, then employees can offer complimentary products such as Workflow or Personalization software that increases the Portal’s performance.

Oftentimes, clients come in with an idea but do not have the expertise to make the most of the company’s services, since they do not know adequately, how the company’s products work. These examples show how employees can anticipate and fulfill clients’ needs. They show the client that their success is important to the company, which increases customer loyalty and trust to a company.

3.4 Back-End Processes

The CRM system provides many valuable tools to the company’s employees that they can use to support and gain loyalty from their customers. Ideally companies need to recognize who their customers are and what products they buy. Customer typing exists as a way for companies to identify who their most profitable customers are, by looking at past purchases or anticipated future transactions. A formal way for companies to recognize their most profitable clients will make sure that their best clients receive the best service. For example, most valuable customers would be given “Gold” status. This will be visible on the employee view of a client. If an employee recognizes that they are working with a gold client then they will be more inclined to offer continuous support such as onsite visits, and make the extra effort to anticipate client needs.

When an employee enters the CRM interface, they will be notified of new questions regarding their area of expertise, and their current project, similar to an inbox. After reviewing the customer’s question the employee can post their answer to the database. If the employee wants to consent additional employees then he can post his answer to the database as a work in progress type and receive feedback from additional employees. Using the additional feedback the employee can post the final answer back to the customer through changing the question status to final. The database will display the answer to the customer and the question will no longer appear on the employee’s page. This will make sure that each answer is determined because the employee will be constantly reminded of the question’s status when using their page.

Employees can also search to see what products each project uses and what questions arise from each product and or project. This will allow employees to track what areas of their software may be unclear to their customers so they can recognize problem areas and make proper adjustments.

3.5 Business Process Flowcharts

While this project has produced an effective web-based prototype, true CRM is not achieved with only a website; it is a customer-centric business strategy. Every aspect of the business must be focused around the customer’s needs. Thus, integrating customer focus into business processes beyond the website is essential. To address this need, we produced flowcharts of the business processes that are fundamental to CRM. Figure 1 shows the process diagram for a customer submitting a comment. While the web-based CRM system plays a key role in this process, as in most, it is vital to recognize the responsibilities that fall outside of the web system’s capabilities onto the shoulders of the company’s employees.

![Figure 3. Process flowchart for a client reporting a comment.](image-url)

4 EVALUATION OF RESULTS

4.1 Usability Testing

In order to evaluate the web system, we conducted usability testing. The test was designed to judge how easy the system was to navigate by testing how intuitive
10 distinct functionalities were. Testers were given 10 tasks associated on these functionalities to accomplish and rate on a 1 to 5 scale (5 being the easiest) how easy the task was to complete. If the user did not complete the task successfully, the task was given a zero rating.

4.2 Testing Results

In examining the results, we determined a rating of 4 or higher to be an approvable usability level. By this criterion, the usability test produced positive results. The average task ratings are shown in Figure 1. Seven of the ten functionalities received acceptable ratings. The three tasks rated poorly revealed that the “Recent News and Information” layout, the detailed project information page, and the main page product information layout needed to be modified.

![Usability Test Results](image)

Figure 4. Bar graph of Usability Test Results

In addition to these quantitative usability scores, testers provided qualitative comments and suggestions. According to this feedback, corresponding modifications were made to the system. As further development proceeds more through sets of usability analysis will be completed to ensure that this systems meets all it requirements.

5 CONCLUSION

5.1 Summary

The goal of this project was to develop a CRM system for Appian Corporation, a mid-sized and growing company that recently shifted into a new industry. Though this system culminated in a web-based CRM prototype; the research we conducted to achieve these goals was the most critical part. By combining our market research, CRM development study, and employee interviews we devised a complete system requirements document. Building on these requirements we developed a database and web interface to demonstrate the fundamental CRM functionalities. This system, along with the supporting documentation, provides an understanding of the business processes along with the functionalities necessary for implementation of a complete and effective CRM system.

5.2 Interpretation

The results of this project have the potential to help small and mid-sized businesses overcome their current customer relationship limitations. Along with gaining a strong understanding of the business we also employed best practices development standards completing such things as human computer interface usability testing.

5.3 Recommendations

We recommend integration of the ideas outlined in the design requirements definition, business process flow charts, and web-based prototype into its existing software. The implementation of any CRM application must be coupled with constant awareness of the market and willingness to iterate the system. It is important to understand that the web application is not the entire CRM system. The CRM system can only be complete and effective by integrating our web interface and database solution with all other means of communication. In other words, “today’s organizations must manage customer interactions across multiple communications channels—including the Web, call centers, field sales, and dealers or partner networks” (Siebel).

After successful implementation of the web-based CRM, with a specific business strategy complementing this application, employees must also be educated about proper usage and importance. With complete integration Appian will be able to fully realize the financial and corporate benefits of effective CRM.

6 REFERENCES


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