

Overview

Boeing has hired our team to analyze and develop requirements for a new system. The Purchasing and Provisioning departments work together in providing post delivery support for Boeing customers. This includes making sure that spare parts are available upon customer request and subsequently guaranteeing that the correct parts are delivered. Therefore to do their job, these departments need to know which parts a customer will need and when, so that parts can be ordered and made available prior to the customer's request. Maximizing knowledge of their customers' needs would allow these groups to better estimate their costs.

Currently, an Excel based inventory system is being utilized to handle the post delivery support and this has been an acceptable solution. The Excel based system is comprised of only a few hundred rows of data making the system manageable for employees due to the relatively small amount of data being accessed. However, the system is obviously not a viable long-term solution due to an inevitable increase in supported parts. Even at a few hundred rows though, the Excel based system is not the most efficient and effective solution. With the recent addition of a new plane and its many -variations, the amount of data contained in the spreadsheet has increased from a few hundred rows to over ten thousand rows making this system impractical.

A detailed look at the system reveals many obvious weaknesses. In regards to security, the Excel spreadsheet currently resides on a shared server and therefore anyone within Boeing can access and edit it. Access should be limited to those within the Purchasing and Provisioning departments. Furthermore, the Purchasing department should only be allowed to view the data to assist with customer support. The

Provisioning department should have the ability to view the data along with the ability to create and update new parts. Another problem is the failure to mark or flag changes made in the Excel based inventory system. For example, if a part is updated with a new part number, two part numbers would exist within the spreadsheet with the current setup. There is also no way to tell which part is the most current or which one was changed. In regards to accountability, the lack of historical data is another problem with the current system. The Excel spreadsheet provides no information on who made the changes or when the changes were made. Our team is proposing a solution that focuses on solving the above mentioned problems.

Recommendation

Our solution proposes an interactive Microsoft Access database overlaid with a user friendly interface. The Access database will easily handle the extensive data requirements, allow for multiple tables, and allow concurrent users when viewing, creating or modifying data. Our recommendation includes the creation of a login screen that limits system access strictly to the Purchasing and Provisioning departments. The login screen will also allow the Provisioning group to create, update and view data, while the Purchasing department will only be allowed to view data. The two main pieces, the database and the login screen, of our proposed solution will solve the aforementioned problems associated with the current Excel system. While developing our recommendation, we found great evidence of the business need for this project. The business need for implementing this solution is obvious due to the limitations of the current system. Implementing this system will undoubtedly cost money in the short-term,

but in the long-term, this system will bring Boeing increased profits by the reduction of costs. After reading our detailed analysis on cost reduction, we are confident that Boeing will undoubtedly see reason enough to proceed with our recommended solution.

Alternatives

Alternative resolutions were explored before deciding on our recommended solution. Quantum Control and Advance Pro are the packaged software options that we researched. The continued use of the current Excel based inventory system was also studied; however, this option was quickly rejected as this is not a practical solution. Advance Pro is an effective inventory management system consisting of several modules like customers, vendors, inventory, reporting, and administration. While this software does offer many features that will fix the current issues, it does not fix one main problem. This software package lacks the security that the login screen our proposed solution will give to the system. Advance Pro also offers several features that are not needed in the new system. Quantum Control is another aircraft parts management system that was considered as a solution to the problems of the Post Delivery Support department. While this software package was closer to fitting your needs, it still did not match. As with the first package considered, Quantum Control offered more than just the necessary features, and again it does not offer the security that is essential to your system. These package software options were also more expensive than our proposed solution. Therefore, our team proceeded to show the economic justification for our recommended solution.

Economic Feasibility

The proposed solution provides both tangible and intangible benefits that economically justify the cost of implementation.ⁱ The tangible benefits of our proposed system will fall into three categories: cost reduction and avoidance, error reduction, and increased speed of activity.

Controlling costs is a major element in companies being able to compete in a long-term market. The proposed solution will reduce your costs of doing business by nearly half a million dollars. Currently, your departments are spending an estimated \$430,560ⁱⁱ per year on ‘down time’ issues. These ‘down time’ issues consist of validating data and verification of the most current records. A Purchasing employee spends as estimated four hoursⁱⁱⁱ per week locating a part and then ensuring that part’s information is up to date and correct. With the proposed solution, this four hours a week per employee, would not be spent on ‘down time’ issues, but would be utilized more effectively. If the proposed solution is not implemented, and the current system consequently stays in place, the hours spent per week on ‘down time’ will increase proportionately with any increases in data.

Error reduction is also another said benefit of the proposed system. Currently, if a part receives a new part number, then there will be multiple entries in the Excel spreadsheet for that specific part. This results in redundant data, which can result in lookup errors and unnecessarily take up space. Approximately, one erroneous part is ordered per month as a result of the current system. The cost of this erroneous order was

ⁱ See Appendix A and Appendix B– Cost Benefit Analysis and Proposed Solution Costs

ⁱⁱ See Appendix A and Appendix B – Cost Benefit Analysis and Proposed Solution Costs

ⁱⁱⁱ See Appendix E – Statistical Overview of Questionnaires

estimated to be \$500^{iv}; however, it is feasible that this cost could be as high as thousands of dollars depending on which part was ordered in error. With the proposed solution, there is no chance that parts will be ordered by mistake because the user can not differentiate between the current and historical part data. The proposed solution allows for the users to view only the current parts. This database design will reduce and work to eliminate the amount of errors produced by the current system.

Increased speed of activity is another tangible benefit of the proposed solution. The new system will provide an interface to the data, which will allow users in Purchasing to easily view the parts they wish to look at, and also for the users in Provisioning to create new parts or modify existing parts. This interface will allow the user to navigate more effectively and inefficiently through the system as opposed to scrolling through an Excel spreadsheet.

In addition to the tangible benefits of our solution, there are also some intangible benefits. These benefits include faster decision making, increased accuracy, and improved work processes that will improve employee morale. With our proposed solution, the time spent validating data and verifying if parts are current will decrease from 140 hours per week to 2 hours per week. The drastic decrease in wasted hours will definitely speed up the decision making process. The elimination of redundant data by implementing the recommended database solution will increase the accuracy of the data and therefore increase the accuracy of the decisions made. With the proposed solution, users will have a more streamlined approach to finding a specific part. A user navigates from the main menu screen^v to a search screen where they enter a part number. Then the

^{iv} See Appendix A and Appendix B – Cost Benefit Analysis and Proposed Solution Costs

^v See Appendix F - Prototype

part and its corresponding data are displayed on the screen to the user. This streamlined approach to the proposed system will provide improved work processes and therefore increase employee morale. As you can see, our solution provides both tangible and intangible benefits to Boeing and specifically to your departments.

Technical Feasibility

Our team looked at project size, project structure, development group, and user group when determining the risk factors associated with this project. The size of this project looks at several different areas. Our team and any future team will be very small, ranging from two to four people. With four people on our team, the analysis phase has lasted just over two months, and the proposed timeline, assuming two to three resources, for the rest of the project spans two months as well. There are only two departments at Boeing that are involved in this project and that will be affected by this solution. Therefore project size is really not a factor in our risk assessment.

Project structure is another factor to consider when developing a risk assessment. Our proposed solution involves the development of a new interactive Microsoft Access database system that is highly driven by the users' needs. The data already exists in the current system; however, with the creation of a database to house this data, the structure is proposed to change. Our team does not associate any risk with this proposed structure change, as we are not changing the data, we are just modifying the organization of the data. This new data organization will require some additional fields though.^{vi} Microsoft Access is the tool we are recommended be utilized to develop the database. Microsoft Access can easily handle the extensive amount of data and is also capable of supporting

^{vi} See Appendix H – Data Dictionary

concurrent users. Another aspect of project structure, is the possibility of organizational and/or personnel changes resulting from the new system. Our team does foresee a possible personnel change, as someone will need to be responsible for maintaining this database. Depending on the current skills of the employees within the Purchasing and Provisioning departments, this could mean a change in job functions for one employee, or it could signify a new position with one of these departments. The final aspect of project structure deals with user perceptions and willingness to participate in this effort. While our team cannot state that the users of this system are unwilling to help us define requirements, our team does feel that our lack of contact with our users does increase the risk level of this project. Without having face to face meetings with users, our team loses out on hearing exactly what the users think, and also, we forfeit the chance to clarify each user's feedback. Therefore, our team associates a medium risk level associated with project structure.

The development group is another factor that must be looked at when determining risk for a project. Since our team will not be continuing with the development of this project, we cannot really assess the risk associated with the development group. Our team is recommending that resources with the correct skills be assigned to the project; however, we have no control over that occurring. Therefore, our team defines a conditional risk at this point. If the recommended resources are allocated to this project, the risk will be low, however, if resources are allocated that do not have the necessary skills, the risk would be medium to high depending on the resources' skills.

The final factor in assessing risk looks at user groups and their familiarity with different areas, such as the IS development process, proposed application area, and use of

similar systems. Due to the limited contact with the users, our team cannot make a qualified assessment of the users familiarity with the IS development process. However, our team does have enough information to quantify the risk level associated with the user group as low to medium. The users currently employ Microsoft Excel, and the recommended tool for the proposed solution is Microsoft Access. While these are not the same product, they do employ similar interfaces in the sense that the data will be still be presented to the user in a table format. The users have a high comfort level with Excel and how they currently see the data; therefore Access will still be able to give the users this same comfort level. The risk is low if the users do have an understanding of the IS development process, and medium if they do not possess any knowledge of this process.

Overall, the risk associated with the proposed solution is low to medium depending on the variables previously mentioned. Our team does not anticipate any major risks associated with the continuation of this project.

Operational Feasibility

The proposed solution will only be implemented within the Purchasing and Provisioning departments at Boeing, and therefore will not have an affect on organizational structures or procedures. The requirements set forth for the proposed system handle the problems associated with the current Excel based system. The recommended solution will not interfere with the way business is done at Boeing. Our solution is simply changing the way the data that is housed in an Excel spreadsheet is stored and organized. Through the implementation of a database, the users will be able to do their jobs more effectively and efficiently.

Schedule Feasibility

Our team consists of four individuals with limited availability, with one person working full time and another person taking four graduate courses. Therefore, a work plan for this analysis phase was developed early on within our project, and our team is striving to stay on line with this schedule.^{vii} The analysis is scheduled to be complete on December 7th, 2003, and all the documentation will be complete by December 12th, 2003.

Our client has specified that a timely solution is expected. With our proposed solution, the design phase should take approximately two to three weeks, coding and testing should take four weeks, and in two more weeks the solution should be implemented within the Purchasing and Provisioning departments. The four weeks set aside for coding and testing will include the development of the database. Therefore, approximately two months will be spent developing our proposed solution. This schedule is based on two to three resources depending on their skill level. Our solution recommends two programmers, one with design skills and the other with database skills, be allocated along with a database administrator. The more resources that are allocated to this project, the quicker the solution will be presented.

Political, Legal and Contractual Feasibility

No constraints have been identified at this time, however, our contact with the users and client has been limited and therefore these aspects of feasibility may need to be more researched.

^{vii} See Appendix G – Analysis Phase Schedule

Requirements

We used three different methods in helping us to determine system requirements. The first method was the initial interview with the client representative, which revealed the problems with the current system and capabilities the system should possess. Next, our team developed two questionnaires^{viii} that targeted users of the proposed system, both provisioning and purchasing employees. Throughout the course of our analysis we had frequent communication via e-mail with the client that focused on important issues and concerns.

After the initial interview with the client, our first step was to define the problem or problems with the current system. After this initial problem definition was formulated, a broad scope was developed for our project. The scope of this solution is to provide a new system for the Purchasing and Provisioning users that will give users the ability to create parts, modify parts, and search and view parts. Our next goal was to involve the Provisioning and Purchasing departments, the two types of users of the proposed system, in order to verify our problem definition and to help delve out requirements. Our purpose was to gain user perspective on the strengths and weaknesses of the current system. We also wanted to confirm that our users are comfortable using Microsoft Access, as it a vital part of recommendation. Two separate questionnaires were developed, one for Provisioning and one for Purchasing. We submitted 32 questionnaires (30 to Purchasing and 2 to Provisioning), and seven questionnaires were completed and returned. The responses received were quite supportive of our problem definition and scope. Both groups agreed that the Excel based inventory system is confusing, time consuming, inefficient and ineffective. The Purchasing group also complained about the inaccuracy

^{viii} See Appendix C and Appendix D - Questionnaires

of the data and also that key pieces of data are missing. Currently the changes within this system are communicated by email and phone, which again stresses the inefficiency of the current system. A strength identified from the questionnaires was the ease at which the users can locate a specific part number in the Excel spreadsheet. This lone strength is important to our solution as it is necessary to maintain the only strength of the system.

Users clearly defined that ease of use, ease of learning, part number history, and the history of who made changes to the data are features they wish to see in the new system. We have incorporated these ideas and features into our solution by proposing a simple interfaced database that will maintain a history of changes to parts. Our solution also recommends using Microsoft Access, and the majority of employees expressed a high comfort level with Microsoft Access as a tool. This fact only reemphasized our recommendation as a very logical and practical solution for your departments.

System Specifications

The backbone of our recommendation is the implementation of a Microsoft Access database. The key to any successful database design is to clearly define all pieces of data that are important to the system.^{ix} Our team carefully analyzed the sample data you provided to us and several suggestions were formulated. One important concept is that a part has four attributes: part number, lead time, quantity, and supplier id. Therefore, with our solution there is no need to store multiple part number, lead time, quantity, and supplier id attributes. Our solution calls for some additional data to be stored. The additional fields will provide ways to track changes and supply the user with historical information. We suggest adding Begin Effective Date, End Effective Date,

^{ix} See Appendix H – Data Dictionary

Changed By, and Part ID. It is imperative that you understand that these are our initial recommendations; however, during design it is quite feasible that other additions or deletions of data may be deemed necessary.

A detailed system description includes the following components: programs, interfaces, databases, schedules and procedures. Our solution has four main programs. These programs consist of add, update, search, and login. Interfaces are driven by programs and therefore most of our interfaces will directly match up to a specific program. Therefore, our solution will have separate interfaces for login, add, update, and search. Our solution proposed the creation of a parts database in Microsoft Access which can support multiple tables. Anytime a database is implemented, it is necessary to devise a backup and recovery plan. There should be a scheduled backup that would probably occur once a day, most likely at night. Procedures or business rules are associated with most every project. Our solution is no different. There are two main business rules that are analysis has discovered. Purchasing can search and view data, and Provisioning can add and update data. All of these components provide a detailed look at our recommended system specification.

Summary

Our goal in the analysis of this project has been to correctly identify the problem or problems, identify ways in which to solve the problems at hand, decide on a solution, and economically justify our recommendation. We have identified four problems with the current Excel based Inventory system which are the extensive data, lack of security, no flag to mark most current record, and no historical data. Our analysis led us to

consider many alternatives which included leaving the system as it is now, implementing an interactive database solution, or buying a vendor software package. The inability of the vendor options to satisfy your needs along with the cost provided enough reasons to not go forth with these alternatives. While our solution cost less than the vendor options, it was not clear yet whether or not to proceed with this solution. However, with the cost benefit analysis, our team has clearly proven the justification for proceeding with our solution as compared to the current system. Our team has met our goals during this analysis phase and we are confident that our solution will greatly benefit Boeing.