Abstract

The United South End Settlements (USES) is a nonprofit organization that plays a prominent role in the planning and implementation of a diverse set of community development programs in Boston’s South End and Roxbury neighborhoods. As USES has grown over the years since its initiation in the 1950’s, its directors have increasingly recognized the need for a more robust and sustainable organizational framework to enhance the interoperability between their divisions and to establish and maintain useful and efficient cross-departmental linkages supported by technology-based platforms. One of their main hurdles has been the absence of a systematic methodology for handling processes. The organization lacked standardized approaches to operations management and human resource coordination. The implications of this are that each event is carried out in an ad-hoc manner and many inefficiencies are produced because it becomes very difficult if not impossible for experiences to be transferred from one initiative to the next, thereby inhibiting organizational growth and the quality of their outputs. The capstone group recognized an opportunity to add value to USES’ organization by developing for them a packaged database system that enables them to enhance the way they operate their facilities. The team designed two databases systems, one to handle task management and another to sort and maintain the organization’s invoices. These databases add value by laying the groundwork for a more stable and process-based organizational structure that incorporates work ordering, automated record keeping, generation of an evaluation system for the facilities department and adoption and implementation of best practices for the building maintenance operations and personnel. The team made an overall workflow analysis of the various departments of the firm. In addition, the team standardized and documented all operations by organizing and aggregating them into an automated operations manual. The automation of the operations manual employs a system that makes work-related information much more accessible to USES personnel in a manner that directly enhances their workplace productivity.
The absence of a systematic model for initiation and execution of organizational operations generates avoidable burdens and stresses that inhibit organizational effectiveness.

The USES can benefit tremendously on an organization-wide level from the adoption of tools and frameworks of a more systematic operational methodology. It needs to standardize routine processes in order to develop flow-charts for how decisions should be made under foreseeable circumstances, as well as a decision-making model for more open-ended cases that leads to outcomes consistent with the mission and value proposition of the organization. The capstone team identified an automated operations manual as a key component of an effective operational policy. This would provide the organization’s personnel with access to the resources that help them learn what their job responsibilities are and a systematic means of engaging those obligations.

The Design Project Objectives and Requirements

An automated operations manual and integrated database can offer a technological nexus for the management, aggregation and standardization of organizational information and records important to operational planning and execution.

**Design Objectives**

Based on the organization’s work flow chart (generated based on discussions that were held with the client) it is clear that an automated version of the Operations Manual constitutes the optimum feasible vehicle for enabling convenient access to clear sets of instructions regarding how each activity; action, process and operation should be performed. A key objective of this project was to achieve uniformity in the work performed by several different individuals and to educate and train USES personnel in a methodological framework built upon and consistent with the organizational values held by USES.

Secondly, execution of the Work Flow Analysis uncovered new opportunities for improvement. Maintenance work orders were found to be scheduled as a result of a wide array of notification methods including email, telephone, as well as verbalization through direct interpersonal communication in the common areas. The team finds that with respects to USES, the value of adopting standardized systems for initiation and tracking of maintenance work orders could not be understated.

**Design Requirements**

One requirement of this project is to establish an optimum protocol to streamline the routine execution of maintenance tasks, from the first step where work order requests are submitted by clients straight through planning, execution and termination of an initiative. The goal is to help USES keep track of tasks and report its progress. The USES Organization currently schedule maintenance’s tasks manually or by phone; they do not keep any records/history of it. Consequentially, there is no opportunity to track past performance in a manner that is conducive to prospective growth and development planning within the organization.

The Task Management database created by the team provides a formal channel of intra-organizational communication that incorporates a mechanism for streamlining task input and outputs. It renders more transparent the exchange of work-related communications and in doing so offers a robust and well positioned system for generating
performance reports and archiving company information as historical econometric data suitable as a basis for process benchmarking. This database allows for analyses that will help USES minimize or eliminate no value added times in the future. It will make USES processes more efficient by minimizing the time needed to fix things.

In addition to creating a Task management database, the team has found an additional possibility for improvement. The team used the information collected from the gathered invoices to design an Invoice database system. The invoice system assigns an ID number to each invoice; it gathers and analyzes data from all invoices. The statistical analysis made by this Invoice system helps minimize the budget to operate the facilities. It also keeps electronic records of all the invoices processed within the organization.

### Design Concepts considered

We developed four candidate design concepts of which two fully meet the requirements.

The research and evaluation of possible solutions were an important part of this project. Team members researched and considered novel process applications that would enable us to meet the needs of the key problems identified above. The team’s efforts pointed towards CHM files, Google sites, FileMaker and Microsoft Access as the most suitable candidates for implementation.

#### First Problem: Automation of the Operations Manual

The team found two solutions that could help with the automation of the USES Operations Manual. These methodologies included CHM files and Google Sites. The team conducted an analysis to evaluate the potential software and concluded, as indicated by the chart below, that CHM File has a higher rating than Google sites. This was believed a solid rationale for finding it more appropriate to use CHM files for automation of the operations manual.

<table>
<thead>
<tr>
<th>Software Requirements</th>
<th>CHM</th>
<th>Google Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Efficiency</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>User Friendly</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Reliability/Security</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Web Publishing</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Rating</td>
<td>19</td>
<td>16</td>
</tr>
</tbody>
</table>

#### Second Problem: Task Management Database System

FileMaker offers a system that is considerably more convenient and straightforward to use than Microsoft Access, owing to its low technical learning curve. Considerable time was invested studying FileMaker and Microsoft Access in order to ascertain which of the two systems was a more suitable match for the needs of the USES database. The team evaluated the advantages and disadvantages of using FileMaker over Microsoft Access to design the database system (results of the analysis reported in Table 1). This analysis compared and summarized the advantages of Using FileMaker over Microsoft
Access. It also allowed the team to give a rating to each of the important requirements taken into consideration. FileMaker has a higher grade and therefore is a better match to what we need. As seen on the table below, the FileMaker rating is a lot higher than Microsoft Access; 19> 15.

<table>
<thead>
<tr>
<th>Software Requirements</th>
<th>FileMaker</th>
<th>Microsoft Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Efficiency</td>
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<tr>
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<td>3</td>
</tr>
<tr>
<td>Reliability</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Interaction with Outlook</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Rating</td>
<td>19</td>
<td>15</td>
</tr>
</tbody>
</table>

Recommended Design Concept

The Team recommended the use of FileMaker to design the Invoices and Task Management database Systems. The CHM Files have also been used for the design of the automated operations manual.

# 1: The Two Designed Database Systems

- FileMaker Database Systems

# 2: New Record
# 3: Delete Record
# 4: Customers, Products, Invoices, Task Management
# 5: View Customer List Report, View Address Labels

#6
#7

#8
#9
As shown above on the Figure #1, the team designed two database systems: a Task Management Database and an Invoice Database System. The Main Figure, at the center of the page, is a screenshot of the Invoice system. This system includes most of the information about USES contractors and clients. Figures #2 and #3 allow users to add and delete records. Figures #4 shows the tab that relates the Task Management Database to the Invoice System. Figures 5 shows different list reports: Customer Report, Products reports, List of Tasks etc. Figure #6 and #7 are examples of how the database uses the created records to automatically locate clients. As shown on Figures #8, the System automatically opens websites and Google Maps to easily locate contacts.

**Remark:** Both Database systems have many tabs; we cannot include the pictures of all the windows in this Executive summary. They have similar figures as the information presented above and are used similarly. The other tabs, however, are used to perform statistical analysis, draw charts, report progress of tasks/statues of tasks etc.

- Automation of the operations manual with CHM Files

**CHM Design Screenshot**

When designing the database, the team relied heavily on a core toolbox of CHM-facilitated components, including the Answer Wizard, interface, design and the topics stored to the CHM. The Answer Wizard is a tool that enables users to query all support topics using key words tagged to topics in the automated operations manual. The straightforward and aesthetically pleasing from an industrial design perspective, and the team is confident this was accomplished without functional compromise. In short, the team produced a convenient channel for USES personnel to access a wealth of aggregated employee-pertinent data about USES’ organizational structure and processes. Topics were created by subdividing and indexing the aggregated data in a manner that can be intuitively navigated by the user. After the topics in the operation manual are documented into CHM Help, we can assign hyperlinks for the most important sections. This will search and help the user to easily find what they are looking for.
(2) Analytical Investigations
- The Invoice database system performs a statistical analysis and draws control charts accordingly.
- The Task Management Database System tracks the progress and statues of tasks. It also analyzes the time that should be spent on average on recurring tasks.

(3) Experimental Investigations
An experimental investigation the team conducted involved testing the products and an evaluation by the clients. USES board members tested the different products: the Task Management and Invoices database systems, and the automated CHM operations manual. It was easy for them to familiarize themselves with the products. What the team has created met their expectation and they were very satisfied. It was an opportunity for the team to listen to the organization final requests.

(4) Key Advantages of Recommended Concept
- User Friendly Systems. No technical background is required to use and/or modified the database systems
- Meets the client’s expectations
- Database system helps minimize wastes of times and money to accomplish tasks.
- CHM files ease the learning/familiarization process of new employees at USES
- The programs are inexpensive and the products are simple to implement

Financial Issues
The Team did not have any financial issues. It is the USES organization’s responsibility to buy the software.

No Financial request was necessary for this Project. We downloaded the Trial version of the FileMaker software from its website: www.filemaker.com. Similarly, we used the Free version of the CHM software offered online. The USES organization will buy the FileMaker software. It costs 299$.

Recommended Improvements
Our expertise in database integration solutions enabled us to educate the client in the differences between truly productive solutions and alternatives that lacked substance.

The USES organization expressed their interest in integrating FileMaker into Microsoft Outlook to add value to organizational communication. The management we spoke to proposed the purchase of the product Outlook Manipulator as a solution. Team members counseled against doing so, however, as the product is not only very expensive ($100 per user), but also lacking in substantive value in connecting FileMaker to Outlook.

Initially, the USES executive board members were not impressed by our proposal of an automated invoice database system. The team noticed that it was important for them to analyze the information
collected from the entire invoices vouchers. Data collected from the invoices was used to design a database architecture that generated and maintained digital copies of all USES invoices, and additionally provided a suite of statistical and data analytics tools to track performance over time. This database should prevent them from overspending money on recurring task. The team also connected this Invoice Database system to the Task Management System. When it was presented to them, they ended up really liking this idea.
## FileMaker and Microsoft Access: A Criteria-Based Comparison

If you're trying to decide what database is going to best fit your needs, but have been wondering what the difference is between Microsoft® Access and FileMaker® software, below is a comparison based on the criteria that third-party reviewers use to evaluate database products. Discover why FileMaker is the #1-selling, easy-to-use database and has received the most awards from the experts.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>FileMaker</th>
<th>Microsoft Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of Getting Started</td>
<td>Simple to learn. 30 basic database templates and intuitive, graphical interface allows new users to get started fast.</td>
<td>Requires database expertise. More intricate user interface and lack of built-in database views makes initial learning curve high for new users.</td>
</tr>
<tr>
<td>Scripting &amp; Programming</td>
<td>Point &amp; Click scripting. Point &amp; click scripting language with over 130 script steps allows users to easily automate any task. Programming expertise not required.</td>
<td>Programming knowledge required. Selection of 56 macros covers some database tasks but many solutions require use of Visual Basic® – a more complex programming language.</td>
</tr>
<tr>
<td>Customization</td>
<td>Simple customization. Toolbars guide users in modifying fields, layouts, reports, or menus® in a few straightforward clicks.</td>
<td>High-level customization. Numerous options and click paths require prior experience to navigate. Extensive customization requires knowledge of Visual Basic.</td>
</tr>
<tr>
<td>Reporting</td>
<td>Drag &amp; Drop reporting. Drag &amp; drop reporting tools help create a variety of custom reports. Create and share Adobe® PDF files using built-in PDF Maker.</td>
<td>Manual design interface. Wizards aid in creating simple reports however modifications require use of an advanced design interface. No PDF creation capabilities.</td>
</tr>
<tr>
<td>Database Capacity</td>
<td>8 terabyte capacity. 8 terabyte limit per database. Fields can hold 2GB of data.</td>
<td>2 gigabyte capacity. 2GB limit per database. Text fields hold 255 characters, memo fields hold 65,535 characters.</td>
</tr>
<tr>
<td>Scalability</td>
<td>Supports individual to large workgroups. FileMaker Pro supports up to 5 concurrent users, and FileMaker Server handles up to 250 users.</td>
<td>Supports small workgroups. User may experience less than optimal performance with 20 or more users. No Access server available.</td>
</tr>
<tr>
<td>Web Publishing</td>
<td>Share complete solution via web. In one click, publish an entire database solution to the web using FileMaker Pro - no additional software required. Sharing allows users full read/write privileges with built-in security features.</td>
<td>Share components of solution. Share individual forms and reports over the web, but not an entire database solution. Requires users to have installation of Microsoft Office to share files.</td>
</tr>
<tr>
<td>Security</td>
<td>Field-level access. Flexible security options allow user to restrict access to databases, or specific layout or fields within a database.</td>
<td>Database-level access. Allows user to restrict access at database level only, more granular security not supported.</td>
</tr>
</tbody>
</table>

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Table 1: FileMaker vs. Microsoft Access

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