Implementing Industrial Engineering in the Non-Profit Community

Design Team
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Abstract

This capstone project will implement improvements within the non-profit organization, Let’s Get Ready (LGR), in the Boston, Massachusetts area. Using industrial engineering tools, LGR’s current systems have been measured to identify areas of waste within the organization. From this analysis two primary objectives have been determined: improving the site director training process and enhancing the usability of LGR’s database – Efforts to Outcome (ETO) – and automating the reporting process.

The solutions of this project include: the development of a comprehensive online training process, the creation of programmed tools that automate the reporting process, and an accompanying documented process. Upon implementation, the solutions achieved a 49% improvement of the training process, and a 99% improvement of the ETO reporting process. Documentation on how to use ETO and create reports allows LGR employees to allocate reporting responsibilities. The industrial engineering tools and methods used to create and implement the solutions are documented for future capstone groups working with other non-profit organizations.
The Need for Project

The training process is complicated, has a high learning curve, and site directors are dependent upon LGR’s permanent staff for frequent assistance.

Although functional, the ETO database is not intuitive and valuable time is wasted manually manipulating data to create reports.

Let’s Get Ready’s (LGR) shorthanded, hard-working staff is often overwhelmed with the responsibilities of operating multiple college-preparation programs. The permanent staff is responsible for training and supervising site directors and coaches (volunteers), managing the Efforts to Outcome (ETO) database, and seeking expansion and fundraising opportunities.

Currently, the training process for site directors and coaches has a very steep learning curve. Critical documentation and information needed to successfully run a program is difficult to locate and understand. This results in volunteers frequently seeking assistance from the already busy LGR staff. In addition, the ETO database that was purchased to track program data and to analyze critical statistics is problematic to the staff and volunteers. Thus far, the functionality of ETO has not been realized by LGR, and as a result the database capabilities and usability have been limited. ETO is not intuitive, not effectively utilized, and is frustrating to use. Employees waste valuable time manually manipulating data to obtain reports that should be fully automated in ETO.

The Design Project Objectives and Requirements

The objectives are to measure and analyze LGR’s current systems, shorten the learning curve of their training processes, and enhance the usability of their database. The solutions provided must be inexpensive, intuitive, and easy to maintain.

**Design Objectives**

The team identified three objectives to improve the overall effectiveness of LGR’s programs, and to provide the opportunity for future program expansion. First, measures of LGR’s current systems must be established, and waste must be identified. Secondly, a comprehensive training process must be developed in order to shorten the learning curve, and alleviate site directors’ dependence on program managers. Lastly, tools must be provided to enhance the usability of the ETO database and automate the reporting process.

**Design Requirements**

Since LGR is already limited in both human and financial resources, the solutions proposed by the capstone team must be inexpensive, intuitive, usable, and easy to maintain. Whenever possible, the solutions should seek to achieve time and cost savings so that LGR can focus efforts and resources on expansion opportunities.
Design Concepts considered

To improve the training process, the team considered re-organizing the current training materials and creating a list of best practices and FAQ’s. A low-cost website created with an XHTML editor was also considered. Ultimately, the team decided to create a wiki in which all the information and documentation is centrally located and easily maintained.

To improve the usability of ETO, the team initially planned to re-map the relational schema, edit the interface, and update forms within the database. Since another company owns ETO, the team was not granted authority to directly modify the database. Instead, a facilitator guide was created to clarify how to use ETO and a pre-programmed tool was created to quickly calculate critical statistics.

Design concepts considered for achieving the objectives of this project fall into two categories: improving LGR’s site director training process and improving the usability of the ETO database.

Improving LGR’s Site Director Training Process

To improve the effectiveness of the training process, the team first considered re-organizing the training materials currently used, and creating a list of best practices from past LGR site directors. A facilitator document and answers to frequently asked questions would also be developed to eliminate any confusion of the previous training methods. Next, the team considered developing a training website using an XHTML editor. The website would encompass material from the site director manual and include important documents that could be downloaded for use. Using an XHTML editor was discarded since the staff at LGR does not have experience in building or maintaining websites. Also, a small cost would be incurred with implementing this solution. The last solution considered is the development of a wiki – an easily navigated and edited, no cost website – to centrally locate the training material and documents. The wiki is created, housed, and accessed through Google. Since LGR already uses Google as its e-mail and document sharing source, they are familiar with its structure and can easily modify the wiki without any need for training. The wiki can only be accessed by users with whom it is shared, and cannot be accessed publicly, so as to protect the information on the website.

LGR Database Improvement

To improve the usability of the ETO database, the team first explored the possibility of an overhaul of ETO. This would include re-mapping the relational schema, editing the interface layout, and updating evaluations and attendance forms. The team could confidently supply LGR with the tools they need that were not built into the original design of the database. However, since ETO is owned by a company called Social Solutions, the team did not have the authority to edit the actual database. Therefore, the team decided to provide LGR with facilitator guides that clarify how to use ETO to input and extract data, as well as a programmed tool that can quickly analyze critical statistics. These supplemental tools will allow the functionality of ETO to be achieved, and the usability of the database to be improved.
Recommended Design Concept

The wiki is a website that provides a centralized location for LGR employees to communicate with site directors, and a means for providing site directors with the necessary information and documentation to successfully execute a program semester. There is a 49% time savings achieved in utilizing the wiki.

Design Description: LGR Wiki Knowledge Base

A no-cost, comprehensive online training website, the “LGR Wiki Knowledge Base,” (wiki) was developed to streamline the site director training process. This provides a centralized location for LGR employees to communicate with site directors, and a means for providing site directors with the necessary information and documentation to successfully execute a program semester. The wiki replaces the 130-page training manual and zip file of over 90 attachments, and provides the site directors a quick and intuitive method of learning and understanding their roles and responsibilities.

Analytical Investigations

After discussions with the LGR staff, the team created a survey for past and current LGR site directors to assess the effectiveness of the training process from the user’s perspective. The results of the survey showed that site directors found only 80% of the training manual useful, and required frequent assistance from the LGR staff. In addition, the overall structure of the training process was overwhelming, confusing, and hard to follow.

Using the vast amount of information from the site director manual and documents within the zip file, process flows were mapped for the current method of training, and then new process flows were created to reflect a chronological order of the training process. From here, nine main site pages were created, and all pertinent information and documentation were organized within the wiki.

To measure the success of the wiki, a test was conducted on a group of freshman from the College of Engineering at Northeastern University. The students were assigned fifteen common tasks that site directors perform, and recorded the time it took to find the information or documentation using the site director manual and zip file. The study was then counterbalanced using the wiki to complete the same fifteen tasks. Comparing the recorded times of the two methods, there is a 49% time savings achieved in utilizing the wiki.

Key Advantages

All documents and templates that site directors need to use throughout the duration of the program are uploaded and integrated into the training procedures within the wiki. The wiki also provides a
An automated tool was created to analyze exported reports and create LGR’s one-pager. The team’s improvement on the database system achieved a time savings of 99%. The process has also been documented so that the responsibility of reporting can be performed by all LGR employees.

**Design Description: ETO Database Tool & Documentation**

To improve the usability of the ETO database, the team documented an easy-to-follow process for ETO users. To automate the reporting process, the team saved queries within ETO, and created a Visual Basic (VBA) code-based reporting tool in Excel. Data from the ETO queries can be exported into the automated reporting tool to rapidly fill in a “one-pager” report that is used to evaluate the success of a program at the end of each semester.

**Analytical Investigations**

The team conducted meetings with LGR staff and volunteers to determine what data is regularly imported and exported from ETO. A survey was then conducted to understand the learning curve, usability, training time, and reporting time associated with the database. The results showed that running queries and reports within ETO and exporting data into Excel to create a one-pager were the most time consuming tasks. To create a one-pager, 11 separate reports had to be run in ETO and then exported and manually combined within Excel. The total process to create a one-pager took approximately 8 hours per report. Only two key staff members at LGR knew how to create the one-pager, and this report had to be created for all 52 programs at the end of each semester. The annual time spent on reporting was upwards of 1000 hours for these two employees.

The team’s improvements include three major changes: saved report queries in ETO, a coded reporting tool in Excel, and a documented process on how to use ETO and generate the one-pager. The team has saved the queries needed to generate reports in ETO so LGR staff can run a specific report in a click of the mouse. The data from the 11 reports can be pasted into the one-pager tool in Excel,
where the VBA code and pre-saved formulas calculate the statistics for the required fields. What used to consume an entire workday now takes only 5 minutes, and a 99% time savings per report is achieved upon implementation of the new tool. Any member of LGR’s staff can easily follow the documented reporting process so that all LGR employees can share reporting responsibilities.

**Key Advantages**

These three improvements significantly shorten the learning curve associated with ETO. Also, over-processing of data and wasted time and talent of LGR employees has been eliminated or significantly reduced. Any LGR employee or volunteer can easily create one-pager reports by following the documented process. The time savings realized from these improvements frees up LGR’s staff to work directly with their students, coaches, and programs. Also, LGR employees now have the availability to work on developing new programs and expanding into new communities.

**Financial Issues**

LGR will not incur any additional costs to implement and maintain the proposed solutions of this project. The financial issues faced throughout the duration of the project were preexisting, and pertain to the ETO database. Since LGR had invested a significant sum of money in ETO, the team was tasked with improving the system at no extra cost. However, Social Solutions – the company that designed and owns ETO software – charges an hourly service fee when LGR exceeds the allotted hours for customer service. Considering this, the team decided to independently develop a programmed tool that supplements the capabilities of ETO at no extra cost to LGR. The implementation and maintenance of the wiki knowledge base, ETO user guide, and ETO programmed tool will provide no additional cost to LGR.

**Recommended Improvements**

In addition to the improvements already made, the team has identified opportunities to further enhance the operational capacity and efficiency of LGR. These include developing a system for comparative analysis of programs, and developing a method for identifying optimal locations for future program expansion. The system for comparative analysis would allow LGR to evaluate
programs among different sites according to certain metrics and criteria. This would help LGR quantify the success of a program, and determine strategies to improve the operations of less successful programs. A method for identifying optimal sites for future program expansion could be modeled by linear programming. LGR chooses new program locations based on a list of certain qualitative criteria, and the linear programming model will help to validate the process by which new sites are selected, and also increase the probability that the new program site will be a success.