

DEAPS-An Alternative to DMAIC? A Case Study.

Abstract

“To provide leadership in the promotion and protection of the health and social well being of the community through advocacy, education and community-based health services” is a sample mission statement of a prominent Department of Health and Human Services in large metropolitan city. Creating an effective, innovative and modern Information Technology (IT) division driven strategy to support hardware, desktop software, and health department applications which are specifically aligned to goals of health department programs is a necessary but daunting task for management. A strategy based on Lean tools and a revised Six Sigma approach, DEAPS was created to implement Integrated Health Care Systems (IHCS) and the results were demonstrated in a public health and human services department. Discussion includes an economic analysis to demonstrate how health care operations can be enhanced with the implementation of IHCS.

Keywords

DEAPS, Integrated Health Care Systems (IHCS), Voice of the Customer (VOC), Lean Tools, Quality Function Deployment (QFD)

1.0Introduction

Strategic planning about Information Technology (IT) operations leading to Integrated Health Care Systems (IHCS) is a difficult task but it is fundamental to health care providers' ability to provide adequate services to the community. Short and long-term Information Technology (IT) goals must be weighed against a health care provider's mission, as defined by their charter and available resources needed for those programs to support the provider's mission. Decisions must be well informed and made in a timely fashion. Some decisions require sensitive information and require strategic planning to take decisions. It is prudent not to make this information readily available to the entire organization until all viable solutions have been evaluated. To further complicate the strategic planning process, the mission statements, goals, available

resources, performance measures, and solutions tend to be non-quantitative, subjective, and sometimes opinion based. Thus, this research sought to answer the following questions;

1. Can existing Lean tools and Six Sigma approaches be utilized in the Health Care Executive Strategic Planning Process?
2. How can IHCS be evaluated to determine its effectiveness for a Health Care operation?

Six Sigma is fundamentally a quantitative and analytic approach to improvement (Does, 2002). Several Six Sigma methodologies or roadmaps have been proven in the manufacturing sectors and are robust methods for improving processes and products. In general, Six Sigma methodologies can be separated into Operational Six Sigma (OSS) and Design for Six Sigma (DFSS).

The Define-Measure-Analyze-Improve-Control (DMAIC) roadmap is commonly referred to Operational Six Sigma (Breyfogle, 2003). DMAIC has been traditionally applied for improving an existing manufacturing processes and products; however, it is also valuable for design or improving non-manufacturing processes. Does (2002) provides examples of these applications to demonstrate that the DMAIC roadmap can be made robust beyond its traditional use in the manufacturing arena. DMAIC methodology should be used when a product or process is in existence at the company but is not meeting customer specification or is not performing adequately. DFSS takes the Six Sigma tools to the next level (Chowdhury, 2002); designing ways for improved products and services to keep an organization efficient and dynamically evolving to maintain its vitality in an ever-changing dynamic public environment. If DFSS is not driven by top level objectives, it is difficult to make things happen in the lower levels of the organization (Mader, 2002).

DFSS as a methodology is used when a new process or service is to be developed or an existing process has been improved by DMAIC and results are not satisfactory. The main goal of project selection for design for Six Sigma (DFSS) is to determine which development projects can benefit the most with regard to the value of the mission statements. Because there is no standard approach for DFSS, many corporate executives will attempt to deploy DFSS on their own (Mader, 2003).

Several roadmaps have been developed and promoted by the use of DFSS in manufacturing and non manufacturing areas like service industry, health care. Some of the DFSS methodologies are Define-Measure-Analyze-Design-Verify (DMADV), Define-Measure-Analyze-Design-Optimize-Verify (DMADOV), Define-Customer-Concept-Design-Implementation (DCCDI) (Tennant, 2002), and Identify-Design-Optimize-Validate (IDOV). Each of the DFSS methodologies utilizes tools that are valuable for

executive decision-making, such as Quality Function Deployment (QFD), Pareto charts and other statistical tools.

Some common themes within all of the established Six Sigma strategies are well analyzed by true Voice of Customer (VOC). The analysis of interview data collected indicates the best way to meet goals and decisions to determine sustained success of the project. The majority of the activities in a Six Sigma project are carried out by a team assembled for a specific purpose as defined in the project charter. An executive strategic planning project may not lend itself to analysis by employees at lower levels within the organizational hierarchy. Examples in which this may be the case are projects that may result in large personnel changes or projects in which the most qualified teams may be unable to approach the problem objectively. In these cases, the Six Sigma team members may not be intimately familiar with the existing landscape. The project may encounter additional obstacles if direct questioning of those familiar with the process creates undue alarm.

The Department of Health and Human Services (DHHS) of a large city in the southwestern United States initiated a project to review the functional integration of Information Technology (IT) division with respect to clinic services, public preparedness, environmental conditions analysis, neighborhood services, epidemic analysis, and cross divisional assistance along with other systems. The goal was to evaluate the costs of having multiple health care software applications and support procedures compared to the benefits of a new strategy that utilizes an Integrated Health Care System (IHCS) approach. Also to develop a feasible reorganization of the division inclined to achieve the organizational goals, upgrades that support IHCS and also to accomplish the mission statements of DHHS.

DMAIC and DFSS roadmaps were initially considered as strategic means for analysis and possible implementation. However, due to the subjective, non-quantitative nature of the information and the sensitive nature of possible solutions, these established strategies were not appropriate for this strategic initiative. A modified methodology to DMAIC was developed and implemented for the specific purpose of completing this IHCS Strategy based on Six Sigma roadmap. This method is called DEFINE – EVALUATE – ANALYZE – PRIORITIZE - SUSTAIN or DEAPS and is shown in figure 1. DEAPS differs from DMAIC; in DEAPS a new process or an existing process can be designed or redesigned. But in DMAIC methodology, ways of improving an existing process with identification and reduction of root cause of the variation is the area of interest. The importance of DEAPS has been explained in the later sections.

2.0 DEAPS

2.1 DEFINE:

DEAPS starts by defining a problem in the customer domain to understand the voice of the customer (VOC) and customer's use of the products or transactions. Before a well-informed decision can be made in an organization, the objectives for the specific operation must be defined. Important initiatives within the organization, relevant historical events, and past successes may provide a starting point for which individual efforts would be the most effective. Devising a descriptive analysis between common themes and current operational performance should be identified and critically evaluated. Analyze the current operations of the organization and review them. To complete the "define" phase, a clear portrait of the what problem is being solved, how it is currently being measured (metric), and the goals for improving the metric during the project timeline must be documented. Tools such as a project charter and or mission objective should be used to accomplish this goal, identification of internal and external customers of the organization. DMAIC and DEAPS are similar to some extent that both define the project goals and identifies the customers both external and internal. But "define" in DEAPS includes a strategic analysis (like SWOT analysis) of the project ensuring that the project is grounded in accomplishing the organizational goals and also strategic review of the existing operations. The "define" phase of both DMAIC and DEAPS are same to a large extent. In DEAPS, "define" identifies the customer needs in relation to a product or service. In DMAIC, "define" identifies the business process and its applicability.

2.2 EVALUATE:

The "evaluate" phase is primarily an information seeking and qualitative evaluation process. Reliable and honest input is critical for effective decision-making. Individuals with intimate knowledge are a valuable source of information. In addition to internal experts, operational stakeholders may possess important information that may influence the decision making process. Other sources of information may include current and future public policy, research trends and consultants. The common themes that are identified which have previously hindered current operations need to be critically evaluated. This evaluation is qualitative, but must be objective with respect to the true capability of the IHCS to perform.

A quality tool that can be integrated in this phase is a Strength, Weakness, Opportunity, and Threat (SWOT) analysis which provides leadership a high level strategic view of operations. Upon completion of the "evaluate" phase are common themes should be identified, assessment of current performance to

support those themes, and identification of possible long and short term solutions. The organizational themes identified in the define phase are evaluated with inputs given by the managers and results are evaluated based on the importance and rating given to the problem.

2.3 ANALYZE:

In the “analyze” phase, performance, themes and solutions are quantified. Scoring of subjective variables facilitates the evaluation of a diverse group of possible solutions. This scoring is best supported by a cross functional executive team and or an outside consulting group. Selecting an appropriate alternative through this process facilitates meeting the needs or voice of the customer which in turn may provide the expected benefits. Some scoring techniques include creating a weighted scale to estimate costs against perceived benefits. A Benefit to Cost ratio (B/C) for each proposed solution is recommended. Benefit to Cost ratio (B/C) is an activity of determining the values of anticipated benefits likely to accrue compared to costs that will be invested. Quality tools such as the Quality Function Deployment (QFD) or House of Quality (HOQ) analysis can support quantifying customer wants and needs. A lean tool that is recommended at this stage is a Value-Stream Map that may identify waste within some organizational operations. It is important to exhibit caution over this type of operational tool due to the sensitivity of the information collected and perceptions of lower leveled personnel who may not know that an executive analysis is taking place. In DEAPS, the strategic team analyzes the themes or tasks that support the goals of the organization with the help of data gathered in define. The strategic team analyzes the options to meet the customer needs. In DMAIC, the team focuses the root cause of a single problem at the tactical level and determines the factors contributing to variances.

2.4 PRIORITIZE:

The themes selected from evaluate phase are prioritized using the tools like economic analysis, B/C ratio, Return of Investment (ROI). This process of Prioritizing is performed at a strategic level with project charter, long term and short term goals. Oftentimes organizations may use a return on investment (ROI) strategy. In health care industry a simple ROI is not sufficient in evaluating the community impact. The use of B/C ratio has more impact and relevance on the community impact. But due to the fact that this initiative is focused in the health care industry benefits do not always translate easily into retained earnings. As mentioned earlier B/C ratio which provides scaling factors for benefits and costs may be a better

approach. In this method the B/C ratios from the “analyze” phase can be organized in a prioritized list of recommendations to accomplish the mission of the organization. These prioritized recommendations are based on the goals defined in the define stage of the methodology. A strategic plan can then be formalized to accomplish short-term and long-term goals without exhausting available resources through an implementation plan, or a series of smaller plans. A lean tool initiative such as 5S should be considered during this phase. A successful initiative will benefit the strategic redesign of standardized operations and this type of tool will support the project objective. Although there is no substitute for executive experience; the deliverable from the “prioritize” phase can be used as prioritized leadership project list that will support the operational level management.

2.5 SUSTAIN:

To ensure the success of the project or initiatives, benefits gained from the planning process are manifested through real impact that the change is beneficial and can be sustained. Some level of monitoring is essential to measure and determine if the changes are indeed improving the system. The results must be monitored and feedback evaluated to determine if any additional adjustments are necessary. The lessons learned from all phases are documented for future reference. An executive dashboard is one method to provide the executive decision maker confirmation of the quality of the decision and contribute to future strategy .This is similar to control but “sustain” is more specific as the priorities accepted must be tested in an organization and they must sustain so that project objective is achieved. The results obtained from the pilot testing are sustained in the long run and to eliminate any new variances created by the implementation of the new process.

3.0 Improvements of DEAPS over DMAIC

DMAIC as mentioned earlier is an operational methodology of implementing Six Sigma. But when the decisions at executive level are required, strategic planning becomes an integral part of executive level management. Initiative is more than simply training everyone on how to use the technical tools. Particularly in executive level managements of health care industry, strategic planning is bound by guidelines and regulations that have to be taken into account without altering the present structure of public health and safety. Decisions have to be taken by executive management with the help of strategic planning. The best option(s) suitable for achieving the objective is selected rather than improving a process. In DMAIC

methodology; operational level managements develop the plan for improving the process. The need for a new methodology that can assist the executive management to identify and prioritize the goals that are aligned with the mission and vision of the organization can be fulfilled by DEAPS.

Like DMAIC, DEAPS provides a highly structured, sequenced approach for using tools such as value stream mapping, quality function deployment etc. The detailed DMAIC framework provides some idea of how to create an analogous DEAPS framework. But because the DEAPS framework embodies key elements of Lean Six Sigma tools and data based decision making—it results in a consistent approach and language for the organization's improvement infrastructure. The similarity of DMAIC and DEAPS ends with “define” phase driven by strategic teams. Whereas in DEAPS, evaluate, analyze, prioritize, sustain are driven by strategic teams. While in DMAIC, the measure, analyze, improve and control are driven by tactical teams. The comparison of DMAIC and DEAPS has been shown in table 1.

4.0 DEAPS Case Study

Background

Consider a large metropolitan city with a Department of Health and Human Services (DHHS) determined to be one of the best in the United States in areas such as public preparedness, epidemic responsiveness, and neighborhood service delivery. The current Information Technology (IT) Division has recently taken the task of consolidating legacy applications, hardware, and technology development that were previously controlled by individual health care programs. In essence the IT department seeks to provide an IHCS that will allow for the DHHS to continue their world class performance in a more modern technological fashion at a reduced overall IT cost.

The DHHS initiated a project to identify opportunities in IT innovation to support an IHCS, such as application software, data capture devices (RFID, barcodes, kiosks), and wireless network systems. The anticipated benefits of this project include recommendations and an executive plan to direct upgrading applications, hardware, upgrading phone and communications technologies, creating a more efficient departmental structure, and processes to better manage IT funding. The overall benefits were for this initiative to contribute to the overall improvement of the delivered health care services to the city. Since the existing operations were redesigned as part of the project and the current DMAIC was not suitable for redesign. DEAPS is most suitable when the subject matter experts are not available. The decisions were

based on strategic planning and evaluate and prioritize phases provides the platform and required tools to suit this specific requirement.

4.1 Application: *DEFINE* Phase

In the “define” phase of the project, the internal and external customers of the health department were identified and analyses that details the current health care operations was defined. These operations of the current health care operations were categorized into three types of IT services: hardware and desktop software, application software, innovation and new technology. Desktop software includes software commonly utilized across many divisions of the DHHS, such as Microsoft Office and Explorer and phone services including management of cell phones and fixed lines. The hardware and desktop software category includes historical IT responsibilities that have been provided over the previous decade.

Application software referred to software that is purchased or created for a specific division task, for example the Centers for Disease Control’s reporting interface program. An Enterprise Resource Planning (ERP) such as SAP would be considered application software due to the fact that this software has application embedded onto a common platform. The application software category included the consolidated systems and subject matter experts which were recently added to the responsibilities of the IT department.

Innovation and new technology included support of technology not currently utilized by DHHS or new uses of existing resources. It was discovered that innovation was an undocumented service that IT was providing support for but not budgeting time resources to perform. Each of these categories required management time, personnel time, and equipment (hardware and software) budgeting.

The DHHS and current IT landscapes were summarized into 10 themes based on the interview of Assistant directors and benchmarking with other health departments.

- 1) A Public Health Information Network initiative,
- 2) Development of a Clinical Management System,
- 3) Facilitation of a RFID contract for vendor tracking,
- 4) Population of required information into existing databases,
- 5) Replacement of outdated application software,

- 6) Pharmacy inventory tracking systems,
- 7) Development of web enabled field tablets,
- 8) Data warehousing,
- 9) CDC reporting, and
- 10) Voice translation software.

These themes were utilized as the project themes and all the methodology of the project was to concentrate in and around these themes. The Project Charter was provided in the form of a mission statement for IT: Develop a strategic approach to optimize the function of the centralized IT department. Identify & prioritize IT tasks and system improvements that will enhance the ability of the DHHS departments to provide world-class health care services to the community. Application software implementation, development, and maintenance, hardware and desktop software improvements, new innovations, new technologies, IT departmental structure, external vendor solutions, and financing will be considered to facilitate operational effectiveness, departmental innovation, and regulation of data storage and maintenance.

4.2 Application: EVALUATE Phase

A series of interviews with division leadership, assistant directors, and other key personnel within the divisions were conducted to collect information for use in the “evaluate” and “analyze” phases of the project. Only relevant executive personnel were interviewed for confidentiality and expert opinion in sensitive areas, more than 20 executives were interviewed. The interviewing techniques, based on the methods presented in Mahan (1999), were designed to identify customer needs and understand the importance of those needs. Table 2 summarizes the basic interview strategies for the various levels of initial knowledge. The structure of the interviews focused on responses in three categories; fundamental IT functions (printers, computer replacement, network, phones), application software, and new innovations and technology.

The first evaluation of the interview responses was a Strength, Weakness, Opportunity, and Threat (SWOT) analysis. The abbreviated summary of the SWOT analysis is shown in figure 2. The SWOT described the “*strengths*” of the DHHS are increased involvement in community through outreach

programs. The “*weaknesses*” include non-traditional services, such as pharmacy and drug tracking that have been in operation for only a short time. The extension of the DHHS mission to include tracking drugs is necessary; however, the in-house expertise is still being developed. Patient health information network initiatives, and national healthcare informatics initiatives and childhood obesity trends provide “*opportunities*” to improve health services offered. The division personnel appeared to be well informed about these upcoming trends and have the capability to gain initiative funding. The largest “*threat*” to the DHHS is the dynamic nature of public health. The desire to advance public health toward preparedness supports the need for flexibility in order to accommodate ever-changing healthcare needs.

4.3 Application: ANALYZE Phase

Benchmark comparisons of current and short-term initiatives, intermediate and long term initiatives, and current IT support structure were conducted against national level standards and equivalent community health departments. These results supported the previous SWOT analysis. A detailed SWOT analysis has been shown in Figure 2. The analysis indicated that some IT system hardware and application platforms were out dated, in comparison to for-profit businesses which were not necessarily in the health care arena. The benchmarking is incorporated into the weighted scores for the Quality Function Deployment (QFD) analysis. QFD analysis, also referred to as a House of Quality (HOQ) is a powerful tool to extract the voice of the customer (VOC) from collected data and make inferences about business activities to improve the service provided. The procedure of VOC is shown in figure 3. The interview data is also converted into quantified values using a QFD analysis. For the purpose of these QFDs, the customer of interest is defined as the internal DHHS divisions receiving services from the IT department. The end customer is the public as described in the DHHS mission; however, creating an alternative customer would serve better than aim to achieve the overall objective of the organization. Internal divisions that incline their vision towards that of organization also provide indirect support the mission statements are considered as the prime customers.

Three HOQ are created for the three types of IT services; hardware and desktop software, application software, innovation and new technologies. The customer expectations (or requirements) are listed on the left wall of the HOQ; the competitive assessments from the benchmarking results are on the right. Technical requirements and associated benchmarking results are listed on the top and bottom of the

HOQ. The QFD analysis for hardware and desktop applications is shown in figure 4. IT training is the most significant with a reported relative factor of 0.55 and updated desktop software has the second strongest effect with a relative factor of 0.19.

From the HOQ it is clear that IT training of DHHS employees is correlated with all technical requirements. From the quantified customer requirements values, it is apparent that timely computer repair is important to completing the DHHS mission. It is logical to focus on improving IT training through help desk operations. Figure 5 shows the QFD analysis for application software. This analysis indicates a need to modernize application software. Secondary technical requirements for investigation are common database and common data capture, implying a need to share information and systems across divisions. The QFD analysis of innovation and new technology is shown in figure 6 indicates the most influential technical requirements are the technology evaluation process, knowledge of new application software, and utilization of Subject Matter Experts (SME) with relative factors of 0.21, 0.19 and 0.18, respectively. Based on the analysis it is clear that a technology evaluation strategy is necessary. This strategy should include utilization of subject matter experts, vendor analysis, process standardization, and integration of innovation.

Once potential solutions are identified, the benefits to cost (B/C) ratios are calculated. Blank (2005) defines a benefit to cost ratio in terms of dollars. The primary focus of this project is adherence to and achievement of the DHHS mission; therefore, an alternative value scale is utilized for the B/C calculation. The capability of the solution to meet DHHS goals is assessed and assigned a benefit value ranging between 1 and 5; 5 representing a strong adherence to the DHHS mission and 1 representing a very weak adherence. The total cost of ownership is estimated and assigned a cost value according to the scale:

- 1 for cost range \$0 to \$50K,
- 2 for cost range \$50 - \$100K,
- 3 for cost range \$100 - \$250K,
- 4 for cost range \$250 - \$500K, and
- 5 for cost range \$500K or more.

The B/C ratio is calculated using $B/C = \frac{\text{Public Benefit Value}}{\text{Invested Capital Value}}$ and the resulting values are listed in

Tables 3-5.

4.4 Application: PRIORITIZE Phase

The recommendations from evaluate and analyze phase are presented by a prioritized list mainly driven by innovations, B/C ratio. The other important factors influencing the recommendations that outweigh the B/C ratio would be public benefit to the project that in turn supports the DHHS mission. After potential solutions analyses have been completed, the most effective improvements are identified, prioritized and the compiled list of recommended tasks were formulated into a preliminary implementation plan. An abbreviated list of recommendations is summarized in Table 3. For clarity, the recommendations are presented in three categories; immediate implementation (quick hits), operational recommendations, and innovation recommendations.

The quick hits are tasks that are possible to implement within 60-90 days. They are less expensive and should be acted upon quickly. The quick hits recommended in this project (Table 3) are as follows:

- 1) Vendors should be included in the upcoming grant renewal. Those vendors to be required to retrain key personnel on usage and re-implementation,
- 2) Improve communication with the DHHS IT department to better understand commitments from existing grants,
- 3) Incorporate EMS Scheduling Software into Clinical Management System,
- 4) Hire consultants to facilitate fast track selection of technology through committee meeting.

The operational recommendations (Table 4) are as follows:

- 1) Install pharmacy tracking system,
- 2) Replace laptops with handheld devices to collect information in the field,
- 3) Enhance help desk management and DHHS-wide training,
- 4) Realign the IT hierarchy to support innovation and investigation of new technologies.

The innovation recommendations (table 5) are summarized as follows:

- 1) Implement RFID systems for vendor tracking,
- 2) Implement voice translation software at phone centers to support services provided to the ESL (English as a second language) individuals,

- 3) Utilize remote monitoring systems for aging, childcare, and obesity initiatives.

4.5 Application: SUSTAIN Phase

In the *SUSTAIN* phase, due to the complexity of the current operations, the need to measure, improve the new proposed layout was necessary to know the effectiveness of the new design. Measure, improve can be achieved at operational level with the help of executive strategic planning. This integration of measure and improve, has been comprehensively termed as sustain. The lessons learnt from phases by improvement and innovation plans were implemented and the results were monitored. For this purpose an executive dashboard was created to compare performance statistics with expected results, for example the numbers of employees who utilize IT help desk services. This monitoring will indicate and maintain the continuous level of improvement over time and the information on data is documented so it may be useful for future Six Sigma projects, utilizing DEAPS, DMAIC, or DFSS strategies. In addition to the executive dashboard, periodic polling for assessment of IT services to the internal customers will provide feedback about the implemented changes. Regular assessment of IT responsibilities, monitored results and DHHS mission will provide consistent vision, despite the dynamic nature of health care services and technical requirements within the DHHS.

5.0 Discussion

It is the opinions of the researchers that the tools of Six Sigma and lean techniques provide near limitless opportunity for organizations to improve the way they conduct business. Evolution of applied Six Sigma methodologies apart from DMAIC, new methodologies from DFSS like DEAPS demonstrate the necessity of management initiatives to adapt to meet the dynamic needs of the organization. Health care industries present unique challenges with the limitations regarding the regulations protocols and rules to be followed. As with most industries, profits and funding must be maintained to continue operations; however, healthcare has the added confounding consideration of the preservation of life and the intangible quality of life. The subjective nature of health complicates quantitative analysis of health care systems. The DEAPS roadmap provides a structured approach to establish and justify strategic business plans. The strength of the DEAPS approach is its focus on seeking valid information when solid expertise is lacking. The IT centralization scenario of this case is representative of strategic planning challenges commonly

encountered. It presents large scale planning with similar scale effects on operations, employees, and capability to conduct business efficiently. In addition to implementation of a strategic plan, groundwork for future Six Sigma projects is laid in the *SUSTAIN* phase. The improvements in IT data management can facilitate quicker, easier access to quantitative data, such as help desk use, incidence of disease or prevalence of chronic conditions for use in future improvement projects or epidemiological studies.

6.0 Conclusions

Uncovering the true Voice of the Customer (VOC), defining goals, consistent data collection and analyzing information, and performance feedback for sustained improvement are repeated themes in Six Sigma methodologies and Lean techniques. Use of a predefined roadmap is invaluable to maintain focus toward achievable improvements. In this paper we introduced a methodology to assist the executive strategic planning project initiated by a public health department of a large metropolitan city. Commonly utilized DMAIC & DFSS strategies do not adequately address the non-quantitative, subjective, and opinion based data available in this project.

The project analysis was further complicated with the sensitive nature of potential personnel changes and the desire of executive to avoid undue alarm within the workforce. A new Six Sigma based roadmap, DEAPS, was formulated to accommodate the project with adequate flexibility for future application. DEAPS incorporated a broad range of Six Sigma tools. The application the DEAPS roadmap resulted in a feasible IHCS strategic plan to address the large scale challenges presented as results of IT centralization. The landscape of a public health department is defined to demonstrate how this application can be utilized and successfully implemented. A qualitative SWOT analyses are shown along with other quality tools that can be used in this type of initiative. Quantitative analysis resulted in a comparison of organizational performance to benchmark standards, revelation of the needs and voice of the internal customer for three categories of IT service, and numeric benefit to cost ratios for selection of the best solutions.

The most promising solutions were prioritized and recommended in the context of an implementation plan to standardize service. This implementation plan included feedback components to facilitate sustained improvement and opportunity for future analysis. Moreover the methodology identifies

opportunities to use Six Sigma and lean tools such as advanced interviewing techniques, SWOT analysis, benchmarking, QFD analysis, and benefit to cost analysis,

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DMAIC		DEAPS	
Define	Define the business process and its applicability	Define	Define the customer needs in relation to a product or service.
Measure	Measurement techniques for the defects and levels of perfection that exist.	Evaluate	Information seeking and qualitative evaluation process
Analyze	Team focuses the root cause of the problem and determines the factors contributing to variances	Analyze	Analyzes the themes or tasks that support the goals of the organization
Improve	Study the data and root causes of process defects, designing creative solutions to eliminate those root causes	Prioritize	Prioritize the goals that support the project objective and goals
Control	Variations in the processes are rectified before they have a negative effect	Sustain	Sustain the results obtained by the implementation of the new process or project

Table 1: Comparison of DMAIC and DEAPS.

Current level of knowledge	Research method	Output (what you get)
No knowledge	Interviews & focus groups	Customer wants and needs (general ideas, un-prioritized, not clarified, all qualitative)
Know preliminary wants and needs	Interviews & focus groups	Customer wants and needs (clarified, more specific, preliminary prioritization) Customer input to list of competitors, bets-in-class
Qualitative, prioritized customer wants and needs	Surveys, face to face, written/mail, telephone, electronic	Qualified prioritized customer wants and needs Competitor comparative information

Table 2: Interview Data Collection Strategy

QUICK HITS						
Rank	Recommendation	Est. Cost \$	Estimated Investment Origin	Benefit Type	Benefit/Cost Ratio	Benefit Description
1	Use Software Selection Process to choose software vendor	25K -50K	Neighborhood service grants	Meet grant's goals Improve Operational Productivity	5/2	Use dedicated consultant, or PM; Technology committee facilitate software internal evaluation component of process
2	Improve communication for grant requirements & funding	0		Improve Operational Productivity		
3	Use Scheduling Software previously purchased (EMS)	0	Already purchased	Improve Operational Productivity	4/1	Allows for effective scheduling of facility resources
4	Hire consultants for technology selection			Improve Operational Productivity		

Table 3: Recommendations & Benefit and Cost Ratio – Quick Hits.

OPERATIONAL RECOMMENDATIONS						
Rank	Recommendation	Est. Cost \$	Estimated Investment Origin	Benefit Type	Benefit/ Cost Ratio	Benefit Description
1	Pharmacy Install an RFID Tracing System	50K - 99K	DHHS Op. budget	Improve Operational Productivity	5/3	Pharmacy should use automatic tracing technology to track drugs in and out of pharmacy; program can extend to confirm the taking of medicine by patients
2	Utilize Automatic Data Capture technologies	250K - 2M	Subject to division funding and grants, Use external Software Vendors	Improve Operational Productivity	5/4	For all in field personnel instead of manual paper systems Short term upload type system Long term web enabled
3	Help Desk further utilized	0	No external - internal training and management	Improve Operational Productivity	4/1	Training and Hot ticket processes should be investigated
4	Strategically hire and align hierarchy to IT strategy to support innovation creation and investigation of new technologies	300K - 500K	Hiring 2 PM and 1 innovation manager	Improve Operational Productivity	4/4	Utilize technology committee to drive circuit application needs; short or continue innovation project.

Table 4: Operational Recommendations & Benefit and Cost Ratio.

INNOVATION RECOMMENDATIONS						
Rank	Recommendation	Est. Cost \$	Estimated Investment Origin.	Benefit Type	Benefit/Cost Ratio.	Benefit Description
1	Use RFID at conservatries.	150K	Waiting on city council.	Improve Operational Productivity.	3/3	Use RFID to audit vendors.
2	Use Voice Translation Software for helpdesk.	100K - 250K	Operational grant	Operation Efficiency.	3/3	More Spanish speaking people can be served.
3	Utilize remote monitoring systems for aging, childcare, and obesity initiatives.	250K - 3M	System details designed for application in Division.	Innovation	5/5	Capitalize on internet, mobile phone optics, RFID, barcode technologies to create RMS for aging initiatives, diet monitoring for adult and childhood obesity. Houston could lead the country by developing a system in these areas and possibly pharmacy drug monitoring.

Table 5: Innovation Recommendations & Benefit and Cost Ratio.



Figure 1: DEAPS process

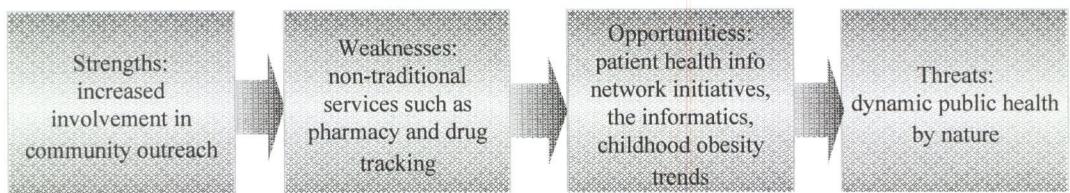


Figure 2: SWOT analysis for DHHS

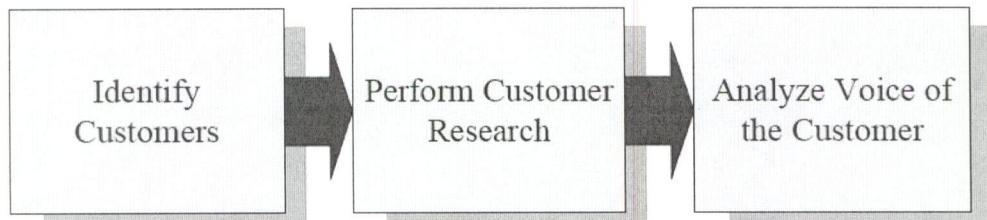


Figure 3: Implementation of Voice of Customer.

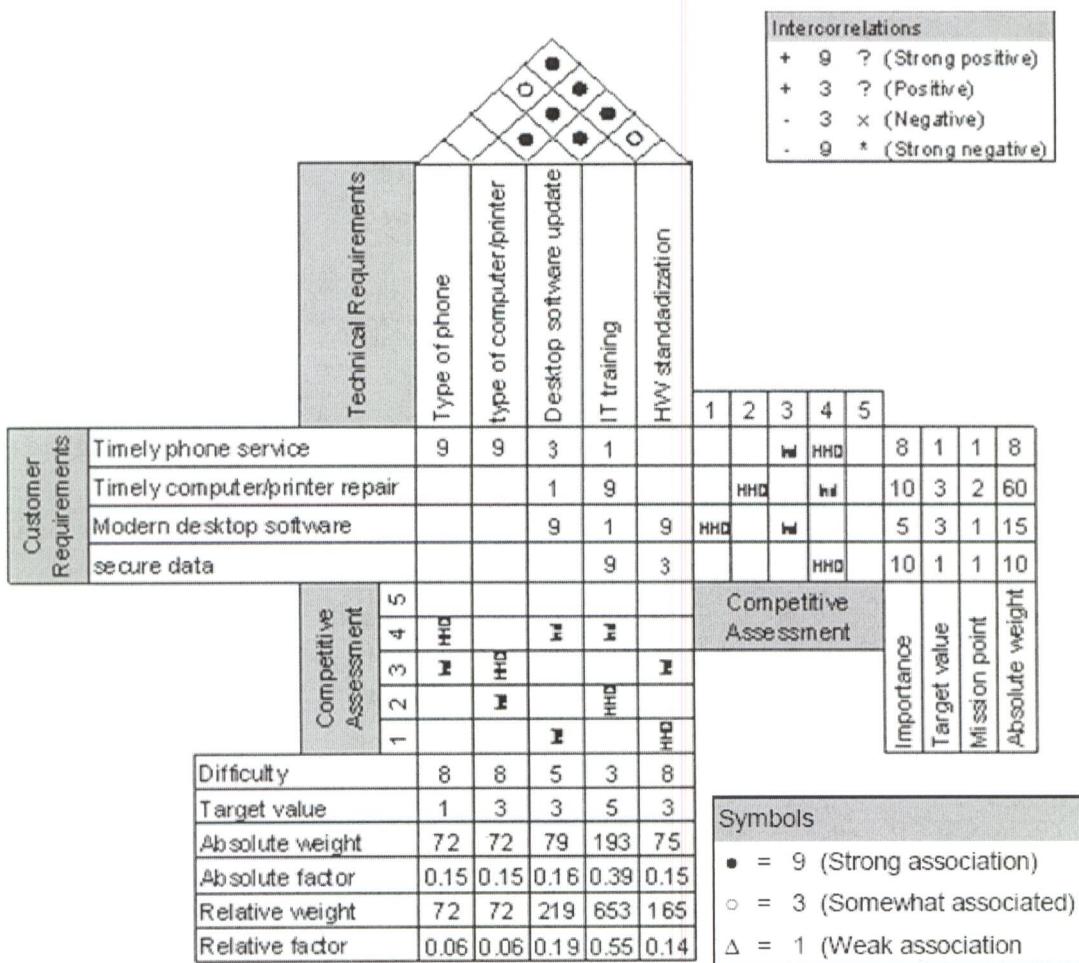


Figure 4: QFD Diagram for hardware & desktop software.

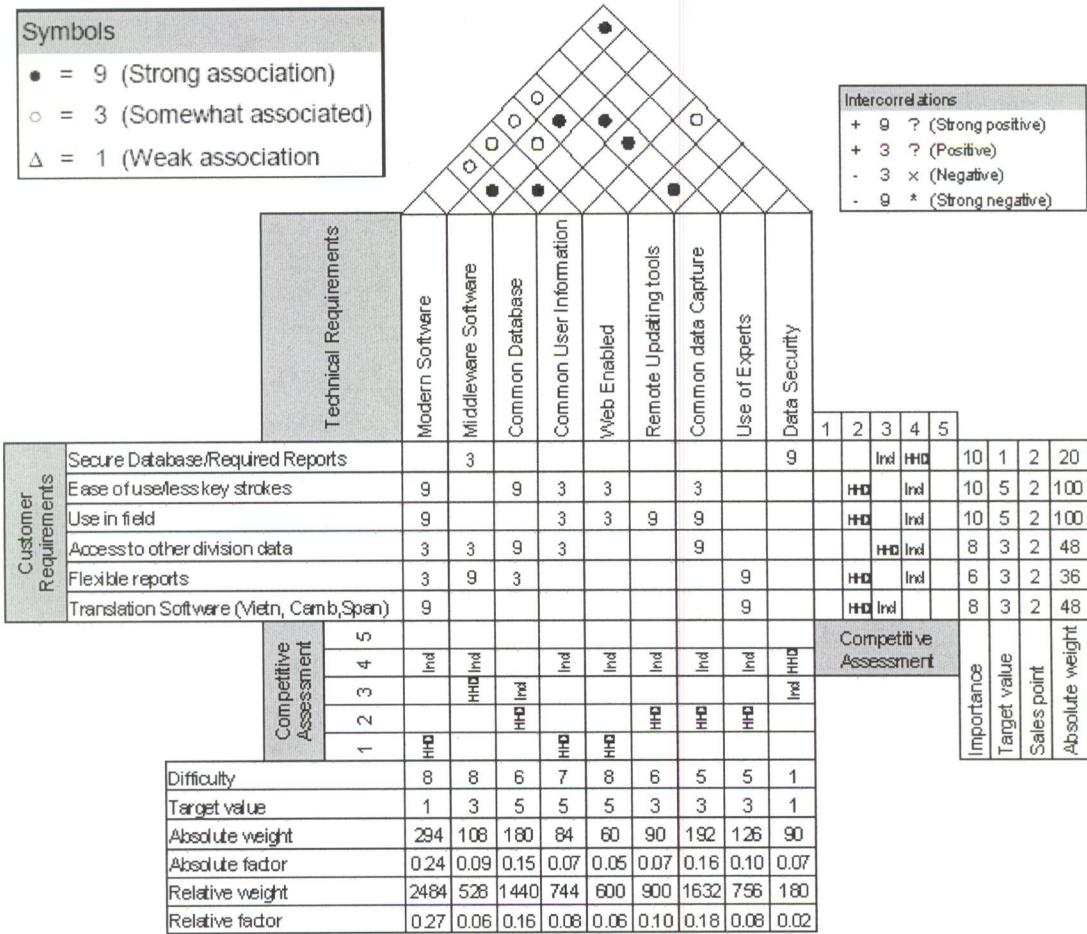


Figure 5: QFD Diagram for application software.

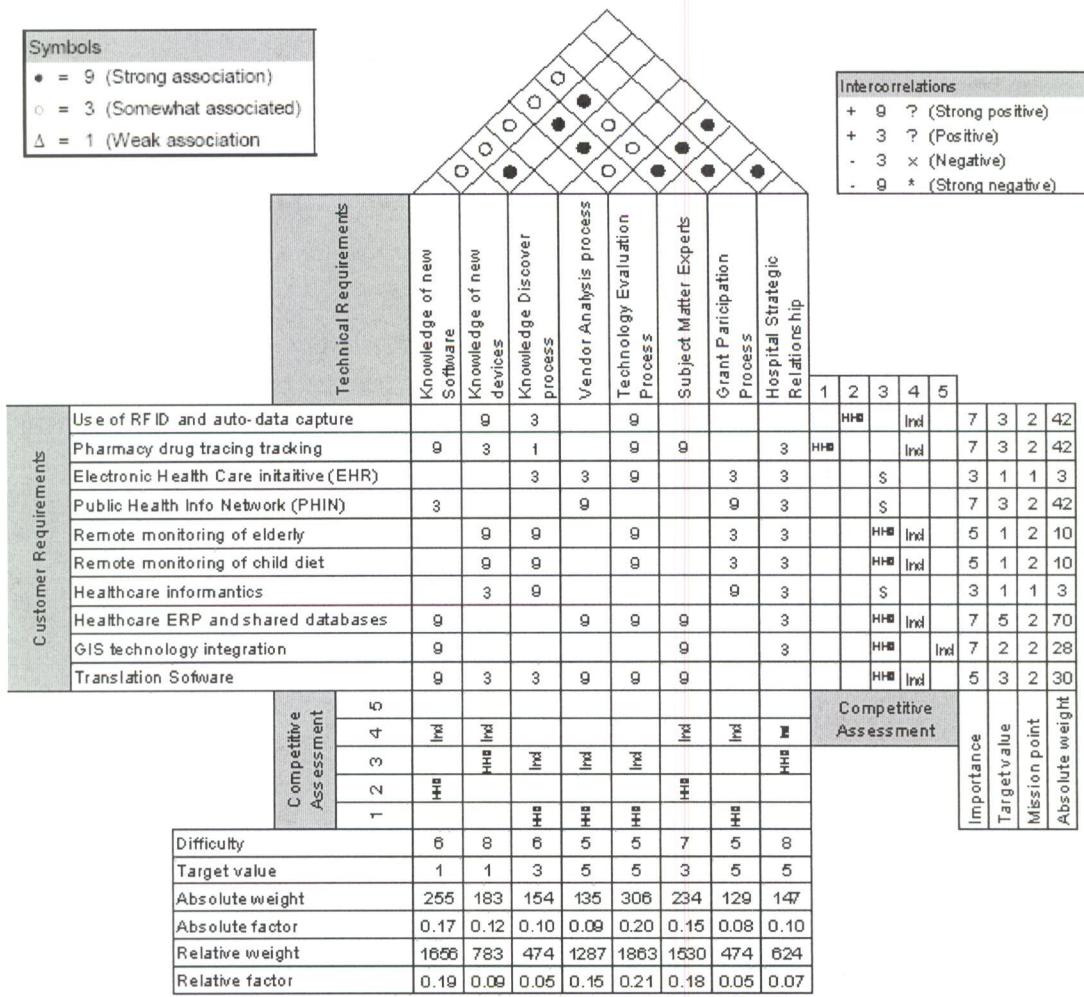


Figure 6: QFD Diagram for new and innovations technology.