Application of Visual Decision Making Process in the Development of Business Process Reengineering Vision and Implementation Plan*

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ABSTRACT

Business process reengineering (BPR) aims at a radical redesign of our business processes in order to achieve dramatic improvements in their performance. However, the fact that many BPR projects have failed hesitates the companies who have started to use BPR or who are planning to do so. Implementing a radical plan from a cross-functional perspective needs a more careful consideration of process vision, preventive measures and contingency plan. Our research suggests to use a visual decision making process (VDMP) in the development of a process vision and implementation plan. A BPR project of Carlson School of Management (CSOM) at the University of Minnesota is illustrated to show our suggested methodology.

Key Words: Business Process Reengineering, Visual Decision Making Process, Process Vision, Implementation Plan

1. Introduction

Recently, new business terms such as business innovation, business process reengineering, new management, process innovation have drawn the foremost attention of business executives and managers as well as academicians throughout the world. Organizations begin to realize that BPR is the only survival strategy in this competitive, ever-changing, turbulent global market [7, 8, 10, 12]. Therefore, process oriented BPR is necessary for business systems to be productive, effective, responsive, adaptive, and timely. The basic philosophy of BPR is that we need totally different business systems in information society compared to industrial society with enabling power of information technology [4, 5, 6, 7, 13]. Also companies need more effective business systems to

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respond to rapidly changing business environment, variety of customer needs, and fierce competition. Therefore, proactive companies utilize BPR to bring necessary changes in order to move from industrial business design to information-based business design [6, 7].

The concept of BPR has been well understood and accepted by executives and managers, but "how" issue of BPR remains mysterious and informidable. Hammer and Champy (1993) reports that 75% of organizations which attempted BPR have not achieved the intended results. Several other studies confirm this astonishing BPR failure rate [1, 3]. This is a reason why organizations are looking for solid BPR methodology to enhance the chances for BPR success. While there are a number of BPR methodologies developed by either consulting firms or academicians, general BPR steps are analysis of "As-Is" process, design of "To-Be" process, and implementation. A number of studies report that while the analysis of "As-Is" process is relatively scientific, objective, and easy to proceed, the design of "To-Be" process and implementation require much more than just the words' meaning. And BPR experts advise that BPR success depends upon the development of sound and solid "To-Be" process vision and carefully devised implementation plan. Review of BPR literature strongly suggests that without careful consideration of these two factors, BPR efforts are doomed to fail [2, 4, 5, 7, 14, 17].

Visual Decision Making Process (VDMP) is well accepted in the strategic decision making situation as an indispensable tool of decision aids [9, 11] Contrast to other strategic decision making tool like PPM (Product Portfolio Matrix), VDMP suggests a step by step process to solve complex and uncertain decision problems. Especially, GDA (Group Decision Analysis) and PRA (Potential Risk Analysis) of VDMP are believed to be applicable and helpful for the development of process vision and implementation plan of BPR respectively.

The purpose of this research is to show that application of VDMP is theoretically and practically plausible and useful in the development of process vision and implementation plan. We describe step by step the process of applying VDMP to a BPR project of Carlson School of Management (CSOM) at the University of Minnesota.

2. Theoretical Background

2.1 Concept of Business Process Reengineering

The division of labor has been the basis for organization design and business principles since Adam Smith first introduced the concept in "The Wealth of Nations" in 1776 and have worked quite well in industrial society companies for the last 200 years. But this old way of doing business simply does not work anymore in this rapidly changing environment. Hammer and Champy (1993, p.17) states "... In today's environment, nothing is constant or predictable - not market growth, customer demand, product

life cycles, the rate of technological change, or the nature of competition. Adam Smith's world and its way of doing business are yesterday's paradigm...." In this age of information society, we need new paradigm to successfully prepare ourselves for future.

BPR is to remove unnecessary, non value-added activities and come up with brand new way of doing business to improve productivity and gain competitiveness [4, 5]. To accomplish this competitive advantage, BPR discards traditional functional orientation and adopts process-wise view to maximize customer satisfaction since the best strategy is to satisfy customer needs. This approach is totally different from traditional business improvement techniques such as TQC (Total Quality Control), TQM (Total Quality Management), TPM (Total Process Management), CS (Customer Satisfaction) and so on. BPR requires not only dramatic changes in business process itself, but also all related business elements including organizational structure, control mechanism, reward system, etc. Since BPR demands considerable amount of organizational resources and commitment of organizational members, success or failure of BPR casts vast impact on growth of companies.

To be successful in this turbulent environment, existing corporations need to reinvent themselves and one way of reinventing business is BPR. According to Hammer and Champy (1993, p.32), "Reengineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed." This definition highlights four key words: fundamental, radical, dramatic, and process.

In pursuing BPR, we must ask ourselves the most basic questions about our companies and how they operate: Why do we do what we do? And why do we do it the way we do? Asking these "fundamental" questions forces people to look at the taking for granted rules and assumptions that underlie the way they conduct their businesses. Often, these rules turn out to be obsolete, erroneous, unfit, or inappropriate. BPR challenge all assumptions and rules. "Radical" redesign stands for digging to the root of something. In BPR, radical redesign means disregarding all existing rules, procedures, or structures and reinventing absolutely new ways of performing tasks. BPR is not aiming at small or incremental improvements, rather targeting quantum leaps in performance. "Dramatic" does not mean 10 or 20 percent improvements. The goal of BPR is to achieve as high as 100 percent growth in critical measures.

Process is defined as a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer [7]. This "process" concept is totally different from Adam Smith's division of labor concept that the latter breaks process into simple tasks and assigns each of tasks to an individual while the former integrates the whole tasks into one process. BPR is to think, view, work, and measure in the basis of process and customer rather than individual task since the division of labor concept tends to lose sight of the whole process and does not fulfill the objective. Since the concept of BPR and illustrated BPR cases can be easily found in the literature and are not

the main focus of this paper, therefore the discussion on these topics will not be elaborated .

2.2 Visual Decision Making Process

Visual Decision Making Process (VDMP) is an indispensable tool of decision aids for complex and uncertain decision problems, especially for systematic analyse of the strategic decision situation of a cooperation and implementation of the selected alternative [11]. Contrast to other strategic decision making tool, VDMP suggests a step by step process to develop a strategy for complex and uncertain decision situations. VDMP is composed of the following 5 subprocess: PSA (Problem Structure Analysis), CIA (Causal Information Analysis), GDA (Group Decision Analysis), PRA (Potential Risk Analysis), ISD (Integrated Strategic Decision). VDMP classifies various managerial problems into 5 classes, and each subprocess supports its corresponding class using the help of visual tables and diagrams. Each subprocess is linked to others as shown in Figure 1.

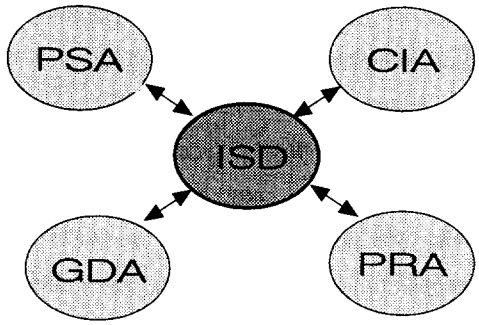

Figure 1. Five Subprocess of VDMP

PSA specifies what is a problem and the relation of subproblems (or factors) in the problem. It is an analyzing process to decide the subproblems which should be analyzed first considering correlation and importance of each factor. And it also decides which methodology could be used to analyze it. PSA process helps a manager to understand an overall problem structure and a problem scope.

CIA is useful to verify why this result has occurred. If a situation has occurred and the cause of it is unclear, CIA process collects the facts which is necessary to analyze the cause of occurrence. CIA process specifies the causes and their relations which has triggered the situation. It uncoveres implicit causes in a systematic way.

GDA is a process to make a decision about what can I do or which one is a good decision. It certifies what kind of decision is needed and builds the criteria to select effectively. It helps to generate some alternatives and evaluates each alternative considering risk and preference. It evaluates

the positive effects of each alternative under the following three criteria: S (seriousness), U (urgency), and G (growth). And it also evaluates the negative effects of the risk of each alternative using possibilities and seriousness of the effect. GDA can decide the best alternative considering positive and negative viewpoint.

PRA lists up the potential tasks and problems which may cause a risky situation. It predefines the causes, preventive measures and contingency plan for the possible problems. PRA is helpful for adjusting the implementation plan, and can minimize the possible regret.

ISD suggests an integrated strategy of CIA, GDA, and PRA processes. A large problem is generally divided into several subproblems and each problem is conquered by CIA, GDA, or PRA processes. ISD collects main causes and related information from CIA process. ISD suggests an integrated strategy considering the alternatives of GDA process and contingency plans of PRA process. ISD is known to be useful for the long term strategic decision problems [9, 11].

2.3 Application of VDMP in BPR

As stated in introduction section, general BPR approach can be summarized as analysis, design, and implementation. While there are a number of tools available for the analysis of "As-Is" process and their application is straightforward, not so prominent for the design of "To-Be" process and the implementation. Sung's (1996) study reports that many BPR participants consider analysis process as scientific, while design process as artistic or magic and implementation as endless journey. To succeed in design phase of BPR, organization members including BPR team members should share common process vision [2, 5, 14, 16]. A vision must be uplifting enough for people to consider it worthy of their time and their energy. It is a kind of thing they want to talk to their friends about, brag that they are participating in. A good vision supports good communication among the people who are making the effort. People understand the overall mission, and how their part fits in as a necessary and useful ingredient.

VDMP is very well fit to developing process vision because VDMP itself is developed to uplifting the process vision of group decision makers. Among the 5 process of VDMP, PRA and CIA process is related with analysis of "As-Is" process. And GDA and PRA process can be used to the design of "To-Be" process and the implementation plan. As stated above, many BPR participants consider design as artistic or magic and implementation as endless journey. This fact makes people hesitate to do BPR projects. So this research have focused how to use the GDA and PRA process to design "To-Be" process and implementation plan.

To succeed in "To-Be" process, organization should consider carefully the possible pros and cons of each alternative. At the same time, the possible risk of each alternative should be carefully examined.

The possibilities and the amount of impact of each possible risky situation should be considered. GDA process is very well fit for this situation. It makes it possible to consider systematically the possible advantages and risk of each alternative "To-Be" process without conducting BPR projects.

The success in implementation phase of BPR depends on carefully devised implementation plan. The implementation plan must take the following into considerations: (1) major problems anticipated in implementation phase, (2) possible causes for these problems, (3) how these causes are related to the problem, (4) preventive measures to avoid these problems, and (5) contingency plan if problems do occur. PRA of VDMP is especially well suited for developing an implementation plan. The specific application of GDA and PRA to BPR is illustrated using the case studies in next section.

3. Case Study

3.1 Project Overview

In recent years, the Carlson School of Management (CSOM) at the University of Minnesota have been facing increasing financial scrutiny by the providers of these funds. To maintain current top business school reputation, it is imperative for Management School to secure significant and sustained funding from the legislature and other sources. For this reason, the Carson School must demonstrate that it uses these funds effectively and efficiently. Thus, the financial reporting process is critical to the long term success of the management school. This is the most important objective of the Financial Services Organization (FSO) within the Carson School.

The responsibility for managing these funds is rightfully divided throughout the Carson School. The Deans Office represented by the Financial Services Organization must ensure that the entire School is fiscally responsible. The vast majority of the funds flow through the seven academic departments at the Carson School. The chairs of each one of these departments must ensure fiscal responsibility within their respective areas.

In 1991, the University Central Financial Organization has provided the College and University Financial System (CUFS), a product of AMS, to assist the Carlson School in managing its funding. CUFS has been used to provide department managers and deans with the financial information necessary to keep track of Carlson Schools budget. Problems with CUFS meeting the needs at the department level have resulted in the creation of shadow systems within several of the academic departments within the Carson School. The administrators of each of these departments are nearly unanimous in the opinion that the level of detail and timeliness of CUFS reports is not sufficient for effectively managing the department. The shadow systems fill this need but at a cost. Duplication of effort is needed to support both the shadow systems and CUFS. A lack of standardization in the way

these shadow systems are used makes it difficult for the Deans of FSO to fulfill its role as overseer for the entire school.

In this project, the objective is to investigate this problem and reengineer a new process that radically improves the financial reporting process at the Carson School. The project scope is limited to the Financial Services Organization and the seven academic departments within the Carson School. A client team consists of the administrator and account specialist from each of the seven department.

3.2. Process Overview

To accurately and systematically examine "As-Is' financial reporting process, BPR team utilizes (1) independent interviews with all departments administrators and account specialists using the System User Analysis (SUA) software to generate job descriptions and current process flows, (2) supplemental questionnaires to gather information on why shadow systems are necessary, and (3) evaluation of information gathered by CSOM internal re-engineering team. Careful and thorough analysis of the "As-Is" process revealed several problems that we were able to group into six categories:

(1) *CUFS related problems*
- Viewed as being difficult to use
- Reports are considered incomplete and not in a desirable format
- Multiple reports must be combined to get desired information
- Reports timing is inflexible

(2) *Shadow system related problems*
- Data being stored twice (CUFS and Shadow)
- Department time required to use shadow systems
- Formats of shadow systems and reports are not uniform across departments.

(3) *Overall process related problems*
- Paperwork hand-offs between departments and central
- Entry delays at central (day to weeks delays)
- Reports distribution delays (12 to 15 day delay)
- Duplication of effort between central and departments

(4) *Central university related problems*
- Training on CUFS inadequate
- Features of CUFS not well publicized
- Poor performance entering data and distributing reports

(5) *Deans office related problems*

- Dean's needs of departments (with regards to fin. reporting) not communicated
- No access to shadow(departments and Dean's office dealing w/ different data)
- No metrics for measuring adequacy of financial reporting process
- Need more centralized control over financial data control

(6) *Department related problems*

- Different methods used by each department
- No metrics for measuring adequacy of process
- Lack trust in Central and Dean's Office ability to meet financial reporting needs
- Require detailed reports in customized formats.

Once all the problems associated with financial reporting process are identified, BPR team proceeds to the next step, developing "Case for Action." For this step, BPR team performs (1) benchmarking activities with Arizona State University, (2) literature search for information about other colleges, (3) customer survey to determine needs, (4) customer survey to estimate current performance measures, and (5) value added analysis of activities in current flow. After in-depth analysis, BPR team concludes that there are opportunities to improve the financial reporting process within the Carson School. The opportunities are: (1) Eliminate the entry and report distribution delays, (2) Eliminate the duplication of effort required to store data in shadow and CUFS, (3) Eliminate the need for departments to create their own financial reporting systems, and (4) Provide Carlson FSO with the aggregate data needed to monitor the entire School.

The key to improving this process is to view the department administrators as key customers of the financial reporting process. The departments created shadow systems because the existing financial reporting process (CUFS, Central) was not providing them with everything they needed to manage their budgets.

To replace the shadow systems the new financial reporting process must improve the CUFS/central process in three areas: accuracy, timeliness and flexibility (completeness of reports). The current problem with accuracy is not due to errors, the error rate of CUFS is relatively low. Instead, the accuracy complained about most often was that the available balance stated in CUFS did not reflect the true available balance. Entry delays and report mailing delays are currently creating several weeks worth of "open transactions" which are financial obligations which have been incurred but not reflected in the monthly CUFS reports. Reporting procedures outside the control of CSOM will prevent complete elimination of "open transactions" but it is estimated that 90% or more of them can be eliminated by reducing the entry and report distribution delays from weeks to days or less. Accounts are tracked in one month periods and each period is closed on the tenth day of each calendar month. These reports

are not received by the CSOM until the 20th or 25th day of the month. Most administrators generally view these reports as outdated and essentially useless by the time they are received. Most departments require more detail then the current CUFS reports provide. In addition, almost all the departments are looking for more flexibility in the reporting periods (for example: quarterly roll-ups).

Therefore, process objectives are listed as follows:

(1) To develop a plan for improving efficiency of financial transaction reconciliation and reporting.
(2) Numerical and qualitative estimates of savings and improvements, if plan is implemented.
(3) To identify the risks of plan implementation.
(4) To propose the alternatives to the recommended plan.

3.3 Development of "To-Be" Process Vision using GDA of VDMP

The generation or design of the "To-Be" model is known to be the most challenging aspect of the BPR project [7, 11, 13]. In addition to designing more effective process, this step is to be the best opportunity for developing and sharing common purpose or vision among the process participants.

The seven academic departments within the Carson School operate relatively independently. This unusual situation creates somewhat unique situation of having process participants who neither worked together nor needed each other to complete the process. Further complicating the situation is the fact that the process owner, though responsible for the process, does not have direct authority over how it is carried out in the seven departments. In fact, there are seven independent processes.

The strategy to tackle this problem is to break down department barriers by the process participant brainstorming meeting. It creates cross department teams of people with common roles and responsibilities. The outcome from the meeting is a collection of good ideas rather than detailed process flows and these aggregated ideas are incorporated into a single process vision. Through a series of brainstorming and storyboard exercises, information about current problems, blue sky solutions, barriers to change, possible changes in short-term, and potential performance measures are gathered. Most of the time BPR team acts as facilitator and secretary such as to present the topic and record the ideas being generated. When there are difficulties confronted, BPR team reminds them that there are no preconditions, no barriers, they have a clean sheet of paper, so they can work from the nothing. Living daily with the current process has made very hard for them to think radically, fundamentally, and dramatically. To overcome this difficulty, members of BPR team assist them by throwing some radical ideas to get the ball rolling.

The next step is to develop final process vision and implementation plan. This effort requires multiple stages. First, a fishbone diagram is developed to identify the key problems, causes and effects. Force

diagrams are also used to identify key issues and barriers. Through these tools, a list of process attributes is generated. This list is divided into two categories. Category one is the attributes that the new process must have, category two is attributes that would be want to have in the new process.

VDMP, especially GDA(Group Decision Analysis) process allows BPR team to evaluate each alternative vision in a systematic manner. There are slight changes in GDA to reflect specific situations this case dictates and GDA application procedures are as follows:

(1) Evaluate each alternative vision based on all must have attributes.
(2) Eliminate any alternative that does not meet each must have attribute.
(3) A weight is given to each want to have attribute relative to the perceived importance of the attribute to the customer.
(4) The remaining alternatives are rated on how well they satisfy each want to have attribute.
(5) The average score and standard deviation of the ratings are used to arrive at a pessimistic, average, and optimistic rating for each alternative on each attribute.
(6) The weighted sum (importance x rating) of the want to have attributes is computed for each alternative vision.
(7) The alternatives with the highest scores are then evaluated for negative impacts.
(8) The probability and each negative impact are used to arrive at a "minus" score for each alternative vision.
(9) A decision is then made based on which decision has the most favorable positive and minus score.

This method allowed BPR team to take a very structured and sound approach to reaching our final recommendation. It also provides a list of alternatives to present to the client and reasons why some of them are accepted and others are not. Figure 2 shows process objectives composed of must have and want to have attributes, 5 process visions out of them are rejected because they don't meet must have attribute), and the weight, score, and total score of pessimistic, average, and optimistic cases.

GDA process resulted in three alternative processes which would improve the CSOM financial reporting process. Online entry with client/server vision process vision got the highest average weighted score, but the difference between pessimistic and optimistic score is very high, which means a high risk possibility. The other two remaining process visions got relatively high average weighted scores and lower difference between pessimistic and optimistic score compared to the first vision. So analysis of negative effects is performed for the remaining three process visions. Analyzing negative effects of process vision is especially important when implementation of a process vision results a high risky situation. Each process vision determines possible negative effects. The factor of negative effects is evaluated from its possibility and seriousness. For example, the possibility and seriousness of "Reports

Process Objectives \ Process Visions			Online Entry, Client/Server			Paper sent to Central	FSO Shadow			Local CUFS Online	Low Tech		
MUST	TIMELINESS		GO			NOT GO	GO			NOT GO	GO		
	COMPLETENESS		GO				GO				GO		
	ACCURACY		GO				GO				GO		
	RELIABILITY		GO				GO				GO		
WANT	ATTRIBUTE	WT.	Pes	Avg	Opt		Pes	Avg	Opt		Pes	Avg	Opt
	Ability for ad hoc reporting	7	6.5	8.0	9.5		5.9	7.6	9.3		3.1	5.0	6.9
	Data stored only once	6	2.9	5.5	8.1		1.9	3.2	4.5		6.7	7.6	8.5
	Reduced labor to maintain	8	3.0	6.0	9.0		2.7	4.4	6.1		0.9	2.2	3.5
	Zero duplication of effort	8	3.5	6.5	9.5		2.7	5.4	8.1		5.7	6.8	7.9
	Paperless process	7	7.2	8.5	9.8		6.3	7.8	9.3		6.5	8.0	9.5
	Tied closer to budgeting	7	2.3	6.3	10.3		1.9	5.2	8.5		0.3	2.8	5.3
	Simple to use interface	8	3.3	7.3	11.3		5.7	6.8	7.9		6.0	6.8	7.6
	Ability to do "what-if" analysis	6	5.1	6.0	7.0		4.7	6.4	8.1		3.0	3.0	3.0
	Ability to view historical data	7	5.9	6.8	7.6		5.8	7.0	8.2		4.0	5.0	6.0
	Cost Effective	8	2.0	3.0	4.0		1.0	2.0	3.0		6.0	7.0	8.0
	Reconcile only once	7	7.5	8.0	8.5		1.0	2.0	3.0		7.5	8.0	8.5
TOTAL WEIGHT X SCORE			347	514	680		283	414	544		357	448	538

Figure 2. Group Decision Analysis

Not As Flexible" of Low Technology process vision is 8 and 4 respectively, which means that resulting reports is highly possible to be inflexible if the Low Technology process vision is implemented, but the seriousness of inflexible resulting reports is relatively low. The weighted sum (possibility x seriousness) computed for each alternative vision reveals that the Low Technology process vision has the lowest score of negative effects. Figure 3 shows the result. The recommended vision is a relatively low tech solution which provides the departments with the detailed information they need and the ability to get custom reports in a timely manner. And it provides the financial services organization with the aggregate data of all departments for monitoring the financial performance of the entire Carson School with relatively low cost and ease to implementation.

3.4 Development of Implementation Plan using PRA of VDMP

After the process vision is decided, the implementation plan should be developed. PRA (Potential Risk Analysis) process of VDMP is very helpful to develop an implementation plan in the highly uncertain situation. PRA lists up a sequence of major tasks composing a process vision. Each task is evaluated and possible problems are selected for the task. Possible causes, preventive measures, and

Vision	Negative Effects	Possibility	Seriousness
I. Online Entry With Client/Server			
	Expensive Hardware/Software Needed	10	8
	Significant Training Needed	10	7
	Technology for Electronic Entry Via E-Forms May not Exist	6	5
	May not be Optimal for Client/Server	6	6
II. FSO Shadow			
	Expensive Hardware/Software Needed	10	8
	Technology Feasibility of Uploading to CUFS	7	8
	Training Needed	10	7
	Two Reconciliation Steps Still Needed	10	5
	FSO May Create New Bottleneck	3	6
III. Low Tech			
	FSO May Create New Bottleneck	7	9
	Reports Not As Flexible	8	4
	Reconciliation More Difficult	7	5
	Additional Labor	4	3
	Mistrust By Departments	7	5

Figure 3. Negative Effects Of The Process Visions

contingency plan are included for each problem. Possible causes for these problems elicit preventive measures that can be taken to avoid the problem in advance. Finally PRA suggests a contingency plan even if the problem occurs.

Figure 4 shows implementation plan for Low Technology process vision. All problems don't have preventive measures and contingency plan. In some cases, it is enough to only remind the problems and causes to BPR participants.

4. Conclusion

In this paper, we illustrated how VDMP can be used in the BPR project of Carlson school. Our clients prefer the GDA and PRA application to BPR, because it shows several visions with benefits and negative effect at a same time. And it shows an implementation plan composed of possible problems, causes, preventive measures and contingency plan. The result shows that using VDMP in the BPR project makes the clients feel comfortable against a radical, uncertain result of BPR project. So it can be used in the companies who have started to use BPR or who are planning to do so. The empirical study comparing existing BPR methodology and using VDMP for BPR is left as a future research area.

Tasks	Problems	Cause	Preventive Measures	Contingency
Assign Proj. Leader	May Lack Cross Department Authority.	Autonomous Depts.	Select Someone who is respected by Dept.	Dean intervention
Select FSO Central Resources	May not be available from departments	Other job responsibilities Dept. trust level	Loose matrix org. dotted. line to dept.	Hire additional people
Assemble Task Team	Getting Dept. Resources Getting Tech. Resources	Other Priorities & Projects	Dept. Chair. Adm. Buy In. Chk w/internal tech.	External tech Res. FSO Resources
Design E-mail Templates	Form compatibility w/ electronic transmission	Nature of forms may require paper		Eliminate form Use paper form
Acquire PC for FSO DB	Must size for growth (more expensive)	Future might require Client/server	Buy computer sized to meet future application	Buy computer for Today's app.
Determine Std Dept. Reports	Must meet needs of 7 Dept and Dean	Each department currently has their own style	Reach agreement on stds. Allow customized	100% custom for each dept
Determine Std Dept. Reports	Different Dept Procedures	Need standard methods for tracking financial info.	Use std procedures only when needed	100% std or up to dept.
Develop method to download CUFS databases	Frequency of download and history file size needs to be determined	Set needs based on Dept feedback.		
Develop method for Reconciliation	Could be cumbersome	Different storage formats	Look for elec. soln	Perform manually
Dry Run of system	Tech. Problems	Normal	Upfront design	Fix as they occur
Select Dept. for pilot run	Proper Choice	Need test but not too tough a test	Select department w/shadow but flexible to change	
Train dept for pilot run	Inadequate training	Poor design of training	Task team designs training. Use Feedback from Pilot to improve	
Pilot w/shadow in place	Duplicate effort w/shadow	Lack of trust in new system	Let Departments decide when shadow not needed. (per.meas)	Force shadow shut down after perf. confirmed
Train dept and turn on--one by one	Longer implementation	one by one rather than all at once	None - this is slower but allows concentrated effort on each dept.	
Future tasks Set up client/server	Cost	Not justifiable by this process alone	Design system w/this idea in mind. Since other items might combine to justify.	
Decentralized on-line entry	FSO loses track of open transactions	Transactions flow directly to CUFS	Speed of entry should reduce these to min	Copy of e-form sent to FSO

Figure 4. Implementation Plan For Low Technology Solution

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