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Abstract:

This article presents the results of an empirical evaluation of the use of a real-world case study, based on an actual Big Four consulting engagement, to teach information systems and accounting courses. While alternative approaches for adopting the case are suggested, we used the case study in an undergraduate case competition judged by Big Four partners to enhance realism. Students, working in teams, assumed the role of consultants and defended their recommendations involving the assessment of key business process controls within the final phase of ERP implementation. In this process, students are expected to benefit by understanding the relationship between information systems and accounting in an ERP implementation project; learning to work more effectively in teams; and improving analytical, oral, and written communication skills. Evaluation of the use of the case study in an undergraduate case competition, judged by Big Four partners, shows that the students generally agreed that they had attained these benefits. The actual case materials, questions with suggested solutions, case competition rules and procedures, judges' assessment form, and the winning team's written report and PowerPoint presentation slides are provided.

Keywords: ERP implementation, internal controls, security, teaching case study

I. INTRODUCTION

The widespread acceptance and implementation boom of enterprise systems in the 1990s could very well be the most important development in the corporate use of information technology [Davenport, 1998]. Such an outburst of enthusiasm in the field to adopt and implement ERP systems fueled academic interest that led to a significant amount of research output along various dimensions of ERP implementation. A number of critical success factors (CSFs) of ERP implementation were identified through various meta-analyses (e.g., Akkermans and van Helden, 2002; Al-Fawaz, Al-Salti, and Eldabi, 2008; Hong and Kim, 2002; Somers and Nelson, 2001), including top management support, project team competence, interdepartmental cooperation, and clear identification of goals and objectives up front. Recognizing the key issue is IT adoption, the technology acceptance model (TAM) has produced a steady stream of research (e.g., Amoako-Gyampah and Salam, 2004; Hwang, 2005). Since adoption and implementation of ERP systems is only a precursor to usage of the system to realize the intended benefits, post-adoption user behaviors proved to be a fertile research topic (e.g., Jasperson, Carter, and Zmud, 2005), as much as the pre-adoption decision research mentioned above.

According to Gartner Group's review of ERP implementations, between 20 percent and 35 percent of all ERP implementations fail, and up to 80 percent exceed time and budget estimates [Ganly, 2011]. Naturally, research flourished in the areas of ERP risk factors (e.g., Sumner, 2000) and failure factors (e.g., Gargeya and Brady, 2005; Rettig, 2007). Tracing the causes of ERP implementation failures from the organizational and human sides, ERP failure research tends to point toward issues of training [Duplaga and Astani, 2003; Robey, Ross, and Boudreau, 2002] and change management [Bagchi, Kanungo, and Dasgupta, 2003; Robey et al., 2002].

Grounded on the relationship-based theory, Newman and Westrup [2005] argue that ERP implementation success is a function of the relationship between accountants and ERP systems. Due to the integrated nature of ERP systems, many perspectives of auditing and internal controls differ from the pre-ERP environment. The information system (IS) itself becomes both the tool for controls and the source of risks. A well-designed and managed system can gradually reduce the risk for human factors of error and fraud, while it generates some challenges from the systems side. For example, the risk factors shift from employees who conduct the business processes to IT personnel who are traditionally behind the scenes.

To bring practical experience with ERP implementation into the classroom, we provide and discuss a real-world case study, ClientCo Pharmaceutical, Inc. (ClientCo), based on an actual consulting engagement of a Big Four Accounting and Consulting firm (BFAC). The motivation for this case is derived from increasing industry demand for employees skilled in both accounting and IS [Beard, Schwieger, and Surendran, 2008; Chang and Hwang, 2003; Nandan, 2010; Senik and Broad, 2011]. "Information systems and information technology are viewed as integral parts of accounting" [Wosu, 2008]. Hence, this case is designed to enhance students' knowledge of the relationship among IS, accounting, and controls. While the situation is factual, names used are fictitious. Use of this case is intended to bring realism and enliven the classroom by providing an opportunity for students to experience the decision-making process in an enterprise-wide system implementation. In particular, studying this case involves the assessment of key business process controls within the final phase of ERP implementation, referred to as Phase 3 ERP implementation by ClientCo and BFAC.

This article is organized as follows. We first discuss the uses and benefits of the case study in Section II. To put the dynamics at play within the case into their respective theoretical context, we provide a brief overview of real options in system adoption/investment, the phenomenon of project escalation, and the role of project champion in Section III. Implementation guidance, including five alternative approaches that can be considered to flexibly adopt the case for classroom use, is presented in Section IV. To gauge the degree of effectiveness of the case study, a team-based case competition was implemented, which included a survey of students who participated. The survey instrument, an analysis of the data collected during the case competition, and concluding comments are included in Section V. The ClientCo case study materials, composed of two business documents: (1) the letter of agreement between the client firm ClientCo and the accounting firm BFAC and (2) the executive summary prepared by BFAC, entitled "Pre-implementation Review," which reports the results of the ERP security and controls study, are provided in Appendix A. Along with these case materials, eight questions were assigned to participating groups of students. These case study questions and suggested solutions are presented in Appendix B. The case competition rules and procedures are presented in Appendix C. The assessment form used by Big Four partners to score each team's written report is

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provided in Appendix D. The written report of the winning team is shown in Appendix E, and their PowerPoint presentation slides are provided in Appendix F.

II. USES AND BENEFITS OF THE CASE STUDY

The ClientCo case study is suitable for adoption in an IS course, an Accounting Information Systems (AIS) course, or an Auditing course, at either the undergraduate or graduate level. There is also a potential for these courses to jointly adopt this case and, thus, uniquely focus on bridging the areas of accounting and IS. Students who study this case in such a joint adoption situation can acquire a superior understanding of both internal and external audit practices in IS implementation. Expected benefits derived from the use of this case study are presented in Table 1.

Table 1: Expected Benefits Derived from the Use of This Case Study
1. Understand the relationship between accounting and IS. This case allows students to experience the link between an integrated enterprise-wide IS accommodating the accounting information flow generated from the daily operation of a firm and ERP implementation issues.
2. Understand internal control assessment in an ERP system. In a complex IS such as an ERP, many perspectives of internal controls and auditing practice differ from a traditional systems environment.
3. Gain insight into the dynamics at play in project implementation. Students can play different roles in this case, either as an individual or as a team. Students thereby learn about the different perspectives in a dynamic business context and observe the human factors in decision making.
4. Understand security and privacy issues in an ERP system. There are many security and privacy issues that are specific to an ERP environment, such as access security for each ERP business process area and segregation of duties.
5. Provide insight into a career that involves knowledge of IS and accounting. The demand for employees who are well-prepared to work with IS in a business environment has increased due to the advantages IT provides [Thibodeau, 2013] for accounting as well as other functional areas.
6. Appreciate the importance of interdisciplinary teams. The ability to perform in a multidisciplinary environment is one of the keys to a successful career [Betts, 2013].
7. Learn to work more effectively in teams. Most accounting and IT projects are done by teams rather than by an individual. The dynamics of team work in a professional context can help prepare students for a successful career.
8. Improve students' analytical skills. Students are required to formulate analytical evidence to support their decisions and recommendations.
9. Improve students' oral and written communication skills. Through this case, students have the opportunity to communicate with their team members, which can improve their skills. Optionally, students may present their case analysis in either or both oral or written forms.

One of the special characteristics of this case is that the assessment occurs in a later stage of a system adoption, the final phase of an ERP implementation. The case can heighten one's appreciation of the tension which may arise in consulting engagements between consultants and managers of the client firm. Managers may be wedded to system implementation during this phase, whereas consultants may be concerned about the limitations of the system. Typically, the later the phase of adoption, the higher the level of tension. Some potential explanations for such an occurrence include the following:

1. The managers' potential bias against a suggestion from consultants that reverses the earlier adoption decisions [Smock, 2003]

2. The potential loss of power or respect due to the closure of the "pet" project [Sipior, 2000]

3. Disagreement on the evaluation methods used by the consultants [Perren and Atkin, 2000]

This case study provides an opportunity for students to experience some of the dynamics at play in an ERP implementation project, including real options in system adoption/investment, the phenomenon of project escalation, and the role of project champion. Each of these is addressed below to guide discussion of the dynamics in the case study.

III. REAL OPTIONS THEORY IN SYSTEM ADOPTION/INVESTMENT

Real options theory is widely used to examine economic value when making the decision of whether to invest in IT [Fichman, 2004; Kumar, 1999; Taudes, Feurstein, and Mild, 2000; Yang, Lim, Oh, Animesh, and Pinsonneault, 2012]. Taudes et al. [2000] applied the real options theory in examining investments in ERP in particular. Real options can be used when the initial investment decision is made and when continuous investment at a later stage is required to complete the investment or project. In practice, firms determine the fit between strategy and IT investment using the estimated cash outflow and inflow of the project. The options model is then applied to determine whether the investment project is worthwhile. After the initial investment is made, the true cash flow will be revealed. By the time the decision for the next stage is to be made, the estimated cash flow for future stages is updated by the revealed cash flow information.

Project Escalation

As mentioned, BFAC entered into the consulting engagement, while their client, ClientCo, was in a later stage of ERP implementation. At this point, the ERP implementation had already expended valuable company resources. The cost of funding the project, relative to the benefits, reached a level of investment questioned by the consultants. An IT project which receives *continued commitment* despite *negative information* about the resource commitment exhibits the phenomenon of project escalation [Keil, 1995, emphasis in original].

General types of determinant factors of project commitment that may promote project escalation, based on previous research [Keil, 1995; Mähring and Keil, 2008], are presented in Table 2. Our purpose is not to undertake an in-depth case study analysis to illustrate these factors. Rather, we address project escalation to shed light on understanding the theoretical basis, recognizing indicators, and presenting approaches to reduce this phenomenon.

Table 2: Factors That May Promote Project Escalation		
Factors	**Definition**	**Example**
Project factors	Factors which characterize the project itself and how it is perceived by management	A large potential payoff A long-term investment to receive benefit An investment in research and development Perception of setbacks as temporary surmountable problems Continued unsuccessful coping with problems arising during a project
Psychological factors	Factors which convince management that problems can be overcome, eventually leading to success	Previous success with similar projects High level of personal responsibility for the outcome Psychological and cognitive biases affecting how information about the project is perceived or processed
Social factors	The influence of superiors and peers	Competitive rivalry between the decision-making group and other social groups The need for external justification from stakeholders who are led to believe the project will be a success Norms of behavior to "stay the course"
Organizational factors	The structural and political environment	Political support for the project by senior management or a project champion Empire building The institutionalization of the project with the goals and values of the organization Slack resources and loose management controls

The theoretical underpinnings of project escalation provide a fuller understanding of this phenomenon. Several theories, which address psychological and social factors, explain project escalation [Desai and Chulkov, 2009; Wright and Capps, 2011]. Self-justification theory [Staw, 1981; Staw and Ross, 1978], grounded in the theory of cognitive dissonance [Festinger, 1957], suggests that managers may commit additional resources to a project in an attempt to turn a project around, rather than admit earlier decisions were incorrect [Ross and Staw, 1993; Staw and Ross 1987; Whyte, 1986]. The concept of "saving face" is based on this theory [Montealegre and Keil, 2000; Ross and Staw, 1993; Staw and Ross 1987; Whyte, 1986].

Prospect theory proposes that cognitive biases influence decision making under uncertainty. How the decision maker frames the problem may affect the decision [Brockner, 1992]. In choosing between two losing alternatives, decision makers may seek risk, but tend to be risk averse in choosing between two winning alternatives [Kahneman and Tversky, 1979, 1982]. The "sunk cost" effect, in which decision makers "throw good money after bad," is derived

from this theory [Garland and Conlon, 1998]. Decision makers frame the project as "bad" and thereby exhibit risk-seeking behavior in escalating the project. Approach–avoidance theory may explain the natural tendency to escalate IS projects due to the "completion effect." The motivation to attain a goal increases as the realization of a goal comes closer [Garland and Conlon, 1998; Pan, Pan, Newman, and Flynn, 2006a, 2006b]. Allocating additional resources based on goal attainment is also explained by expectancy theory [Vroom, 1964]. Allocation of additional resources is based on the decision maker's expectancy that additional resources will lead to the intended goal. Decision makers may assess the expected utility of additional resources based on the estimated value of goal attainment (i.e., benefits minus costs) and the probability that additional resources will result in goal attainment [Brockner, 1992].

To recognize whether a project is escalating, managers can ask themselves [Staw and Ross, 1987, p. 72]:

- Am I unable to clearly define what would constitute failure for this project? Has my definition of what would constitute success or failure changed as the project has evolved?
- Do I have trouble hearing other peoples' concerns about the project?
- Am I more concerned about the welfare of this project than I am about the organization as a whole?

To avoid or reduce the potential for project escalation, the following have been suggested [Keil, 1995]:

- Periodically evaluate the project, from an outsider's perspective, by undertaking a project audit.
- Assess risks early and often throughout the project.
- Consider alternatives to the project to which resources may be devoted.
- Properly manage the project by addressing project management in accordance with the stage of the project.
- Change top management overseeing the project to break the pattern of escalation.
- Remove or encourage the project champion, the role of which is discussed in the next section, to exit.

Project Champion

The project champion actively drives the project forward by persuading others to perform tasks necessary for success. This role has been recognized as important to successful project development since the time of Schon's [1963] seminal work. A project champion for IS is defined as "a key *individual*, whose *personal* efforts in support of the system are critical to its successful adoption" [Curley and Gremillion, 1983, p. 206].

The characteristics of a project champion, based on previous research [Sipior, 2000], are described in Table 3. Again, our purpose is not to analyze the case of ClientCo to identify the presence of this key role. Rather, we focus on the project champion to provide an understanding of this role, the theoretical basis, and the impact the presence of this role may have, should the champion not be removed or not depart.

Table 3: The Characteristics of a Project Champion	
Characteristic	Description
Formal position	Holds a formal position within the organization [Mayhew, 1999; Pinto and Slevin, 1989; Thomas, 1999]. Frequently an executive from the area of application [Willcocks and Sykes, 2000].
Leadership qualities	More than ordinary leaders, the champion exhibits transformational leadership behaviors [Howell and Higgins, 1990]. Tends to go well beyond job responsibilities [Beath, 1991; Curley and Gremillion, 1983], putting himself on the line, risking his reputation, to complete the project [Sipior, 2000].
Base of power	Holds some level of power [Mayhew, 1999; Pinto and Slevin, 1989], attributable to formal position or personal relationships.
Visionary perspective for change	Serves as a visionary and directs energies to bring about change to achieve that vision [Landers, 1999; Willcocks and Sykes, 2000]. Primary among the influence strategies is persuasive communication [Sumner, 2000; Mähring, Keil, Mathiassen, and Pries-Heje, 2008]. However, influence tactics are not always regarded in a positive light [Beath, 1991].

The role of the project champion is based in transformational leadership theory [Burns, 1978]. Transformational leaders have been found to possess the leadership qualities of inspiration, charisma, and intellectual stimulation

[Bass, 1985; Conger and Kanungo, 1998]. Inspiration is the ability to motivate followers, primarily by communicating great expectations [García-Morales, Matias-Reche, and Hurtado-Torres, 2008], using charismatic influence to empower subordinates [Zaccaro, 2001] and by establishing interpersonal connections to enable action [Searle Hanrahan, 2011].

The presence of a strong project champion can hinder efforts to exit from a failing course of action, including both project redirection and project cancellation [Mähring et al., 2008]. The project champion may oppose initiatives to de-escalate a project and, further, may try to curtail such initiatives by discrediting those advocating or exploring de-escalation [Royer, 2003]. Managers may need to become more involved in directing decision making for costly projects which take the organization in a new strategic direction [Kelley and Lee, 2010], especially if the decision to exit the project is being considered. A proponent, or champion, for exiting is likely to be external to the project or a new arrival, rather than involved in the project early on [Mähring et al., 2008; Royer, 2003]. Consistent with the external role in supporting an exit, the BFAC consultants in the case voiced concerns about the continuation of the ERP implementation. The presence of a project champion may explain the tension observed between the consultants and managers of ClientCo.

IV. IMPLEMENTATION GUIDANCE

This case may be used in various ways, targeting freshmen through graduate level students, as the reader sees fit at his or her university. Listed below are five plausible alternatives that have been implemented or can be explored. We undertook the first alternative, which is described in detail in the following sub-section, as are the remaining alternative uses.

1. A large scale case competition with external judges
2. A large scale case competition across classes
3. A case competition within class
4. A case assignment
5. A mini-case focusing on only the engagement letter

Regardless of the alternative use of this case, we suggest sharing the overview of ERP provided in the Introduction section by covering it in class. Preparedness of students to analyze this case will vary based on curriculum requirements in effect at the readers' universities. At our university, for example, freshmen are prepared for all of the alternative uses through a required two-semester course sequence called Business Dynamics I and II, which covers all business disciplines. At the time our students participate in the competition, they have had three to four weeks of accounting and two to three weeks of MIS. We suggest that the readers should determine the appropriate alternative use for their own students.

The student experience is greatly enhanced by the participation of practitioners. However, coordination with practitioners to provide feedback to student teams, to serve as judges at a case competition, and to review the written case analysis is not always possible. Nonetheless, practical relevance is still attained by the real-world case study drawn from an actual Big Four consulting engagement. Based on the dynamics at the readers' universities, we acknowledge that student experience may vary.

Large Scale Case Competition with External Judges

This case was used by the authors as part of a freshman case competition that took place during the spring and fall semesters of 2010.

Students formed teams of four or five members, and each team was advised by a Big Four professional. A total of seven teams participated. Big Four advisors sent progress reports to the case competition chair, and weekly conference calls were used to resolve any issues that arose during the competition. Suggested solutions to each of the eight case questions are provided after each question, as shown in Appendix B.

It is important to set up the rules and procedures before the case materials are distributed or groups are formed. The rules were established, communicated among the partners of the Big Four firms, and announced to the freshmen pool of potential participants. The rules facilitated establishing expectations in all parties involved and also served as guidelines to keep up with the agreed upon schedule, as well as to handle major milestones. Table C1 depicts the rules and procedures used in 2010.

To facilitate fair and consistent evaluation of case reports, an evaluation form was devised and used by the Big Four partners, serving as judges, to score each team's written report. The Case Report Assessment Form that was used

in the 2010 case competition is shown in Table D1. If the large scale case competition is a course requirement, we suggest allocating 20–25 percent of the course grade to the case competition.

Case Competition Across Classes with Instructors as Judges

The case could be used in a similar manner to our actual use, implementation alternative 1, described in the above section. The difference would be the replacement of the Big Four partners, who are external to the university, with instructors serving as advisors and judges. This would require knowledge of IS, accounting, and internal controls on the part of committed participating instructors. One approach might be to coordinate multiple sections of IS and accounting courses during one semester to form student teams comprised of four or five members. The student teams would prepare a case presentation, addressing the case questions presented in Appendix B. The instructors of these courses, as well as other willing instructor participants as needed, would serve as advisors and as judges. If the case competition across classes is a course requirement, we suggest allocating 20–25 percent of the course grade to the case competition.

Case Competition Within Class

The case competition described in implementation alternatives 1 and 2 above could be undertaken within one IS or accounting class. The difference would be the replacement of either the external Big Four partners or the instructors from multiple sections with the instructor of the class itself, serving both in an advisory role to the student teams and as the judge of the case presentations. Student teams would be formed in class, the size of which is dependent on the number of students in the class. A minimum of two teams would be required for a competition. Again, the student teams would prepare a case presentation, addressing the case questions presented in Appendix B. If the case competition within class is a course requirement, we suggest allocating 20–25 percent of the course grade to the case competition.

Case Assignment

Rather than a case competition, the case could be used in one course as a case assignment. Student teams would be formed in class, the size of which is dependent on the number of students in the class. Student teams would prepare written responses, rather than a case presentation, to the case questions presented in Appendix B. The instructor would grade the quality of the written responses. The case could serve as the basis for class discussion, focusing on the case questions. If the case assignment is a course requirement, we suggest allocating 10–15 percent of the course grade to the case assignment.

Mini-case Focusing on Only the Engagement Letter

Instructors may wish to focus on only the Letter of Engagement, presented in Appendix A as part of the case materials. This approach may be appropriate for freshmen, for example, if the instructor wishes to reduce the scale of the case. Students are provided thereby with insight about the role of consultants and the considerations in contracting an engagement. Student teams would be formed in class, the size of which is dependent on the number of students in the class. Based on the "ERP Security and Controls Pre-implementation Review" engagement letter from BFAC, student teams may be requested to answer all or some of the questions presented in Tables 4a and 4b. The engagement letter could serve as the basis for class discussion, focusing on these same questions. Some of the responses to questions 1 and 2 are based on TechRepublic [2002]. If the mini-case assignment is a course requirement, we suggest allocating 5–10 percent of the course grade to the mini-case assignment.

**Table 4a: Question 1 with Suggested Solutions for the Mini-case
Focusing on Only the Engagement Letter**

Question 1. What is generally included in an engagement letter? Is BFAF's engagement letter inclusive in terms of the areas which should be included?

Suggested Solution

The following are generally included in an engagement letter:

1. Description of the problem, need, or opportunity to address—A brief description of the problem, need, or opportunity to be addressed confirms that you, the consulting firm, understand the client's situation and their request for consulting services. Your restatement of the problem, need, or opportunity and the relevant issues, as described by your client, help to confirm your interpretation, respective responsibilities, and the terms of the engagement.

Yes, this is included.

2. Definition of the engagement's goals and objectives—The goals of the engagement are communicated as broad statements of the general intentions of the engagement. The objectives provide specific statements of the outcome of the engagement. Enough detail should be included to ensure the client's problem, need, or opportunity, and objectives are clearly, but briefly, communicated.

Yes, this is included.

3. The plan or approach—Define the specifics of the work plan or approach to be pursued. The plan or approach should include key milestones and estimated timeframes to the extent that you can define them. Provide enough detail to assist the client in understanding what you plan to do during the engagement. Clarify any issues or areas of uncertainty to keep your client informed to contribute to a positive experience of doing business with you.

Yes, this is included.

4. Resource needs—Specify the resources needed from the client so that plans can be made for the effect your work will have on the organization.

Yes, this is included. ClientCo is informed of the systems to which BFAF will need access and, by inference, the personnel who should be available to BFAF.

5. Specification of engagement outputs and deliverables—Describe all outputs and deliverables that will establish the successful completion of the engagement. Be sure to include the scope of the engagement to avoid any expectations later as to what is included/not included in the engagement.

Yes, this is included.

6. Cost and payment method—A specific cost estimate should be provided to prevent misunderstandings later. Cost may be based on different cost models, such as billing time and material, applying a fixed project cost, or working on a monthly retainer fee. Make it easy for your client to justify your engagement expense by clearly articulating your cost, the purpose of the cost, and the deliverables the client will receive for the cost. There should not be any guesswork on the part of the client about how much the engagement will cost and what is provided in exchange. Finally, define when and how you should be paid for the engagement.

No, neither cost nor payment method is provided.

Table 4b: Question 2 with Suggested Solutions for the Mini-case
Focusing on Only the Engagement Letter

Question 2. Please address the following questions about BFAC's consulting engagement.

2a. What is the main purpose of BFAC's consulting engagement?

Suggested Solution

The main purpose is to assess the design of key business process controls within ClientCo's ERP implementation.

2b. What is the expected outcome of the engagement?

Suggested Solution

The expected outcome is to provide management with an independent perspective on whether any significant financial risks are apparent in the ERP implementation prior to go-live.

2c. What is the follow-up to the outcome?

Suggested Solution

The follow-up is not only incorporating controls to reduce the risks prior to go-live, but also to undertake testing at go-live to assess the operationalization of the key business process controls. That is, after the ERP system is implemented, testing should be undertaken to determine whether the process controls are effective in daily operations.

2d. What type of controls are preferred? Why?

Suggested Solution

Automated, rather than manual, controls are preferred. Automation is one of the principal drivers to sustaining an effective and efficient compliance program. Such an approach is typically the most effective and efficient way to support a long-term internal controls and compliance program. Manual controls are inherently risky because they are prone to human error and may be more susceptible to fraud, thus driving up costs, complexity, and inefficiencies.

2e. What is the purpose of stating the scope of the engagement?

Suggested Solution

Documents, such as this engagement letter, are used to control what is in and out of the scope of the engagement. The inclusion of a statement of scope is a good means to manage ClientCo's expectations. ClientCo knows what specific business processes and ERP modules are included in the review of controls. In turn, BFAC knows what work to perform and results to deliver. The statement serves as an agreement of what BFAC will assess and the specified outputs and deliverables from the engagement, as well as what is specifically excluded.

V. EVIDENCE OF EFFECTIVENESS

Students who participated in our large-scale case competition with external judges were given a survey to assess the achievement of the case's learning objectives. The focus in obtaining student feedback was for the purpose of identifying areas for improvement for the case competition, rather than for publishing the results. After analyzing our results and implementing responsive improvements in subsequent case competitions, using different published case studies, we saw value in sharing this real-world case. Hence, the data reported is from 2010. However, the problems encountered in the ERP pre-implementation reported in the case are still relevant contemporary problems.

The survey questions appear in Table 5. A total of fourteen out of thirty participating students (ten males and four females) returned surveys. All were freshmen when the case competition began and first semester sophomores when it completed. Students with declared majors were either accounting or finance majors or double majors in these areas, while the remaining were undecided business majors.

Table 5: Case Competition Participant Survey								
Please indicate the extent to which you agree or disagree with the following statements.								
Questions	D							
	1	2	3	4	5	6	7	
1. I found the advice from my Big Four advisor helpful for understanding the								
As a result of participating in the case competition:								
2. I learned a lot about the relationship between accounting and systems.								
3. I learned a lot about internal controls.								
4. I learned a lot about the importance of interdisciplinary teams.								
5. I learned a lot about ERP systems and controls.								
6. I may have developed a mentoring relationship with my Big Four advisor.								
7. I am more likely to pursue a career that involves knowledge of accounting information systems.								
8. I learned how to work more effectively in teams.								
9. My oral communication skills improved.								
10. My written communication skills improved.								
11. My analytical skills improved.								
12. I learned a lot about security and privacy issues.								
13. Please indicate if you are male or female (circle).								
14. Please indicate your major:								
15. Did the case competition influence your choice of major: yes/no (circle). If yes, please explain below.								
16. Please add any comments about the case competition below.								

As shown in Table 6, students generally agreed that they learned a lot about the importance of interdisciplinary teams, ERP systems and controls, security and privacy issues, how to work more effectively in teams, and that their analytical skills improved. They also generally agreed that they learned a lot about the relationship between accounting and systems and found the advice from their Big Four advisor useful. They also tended to agree that they had learned a lot about internal controls, that they were more likely to pursue a career that involves knowledge of accounting information systems, and that their written communication skills improved. They were somewhat neutral about whether they had developed a mentoring relationship with their advisor and whether their oral communication skills improved.

Table 6: Descriptive Statistics of Survey Responses						
Question	N	Mean	Std. Dev.	Median	Min.	Max.
1. I found the advice from my Big Four advisor helpful for understanding the case.	14	5.57	1.34	6	2	7
2. I learned a lot about the relationship between accounting and systems.	14	5.64	0.93	5.5	4	7
3. I learned a lot about internal controls.	14	5.29	1.14	5.5	3	7
4. I learned a lot about the importance of interdisciplinary teams.	14	6.00	0.88	6	4	7
5. I learned a lot about ERP systems and controls.	14	5.93	1.14	6	3	7
6. I may have developed a mentoring relationship with my Big Four advisor.	14	4.07	1.21	4	2	6
7. I am more likely to pursue a career that involves knowledge of accounting information systems.	14	5.29	0.91	5	4	7
8. I learned how to work more effectively in teams.	14	5.79	0.89	6	4	7
9. My oral communication skills improved.	14	4.86	1.03	4.5	4	7
10. My written communication skills improved.	14	5.29	1.44	5.5	2	7
11. My analytical skills improved.	14	5.71	0.99	6	4	7
12. I learned a lot about security and privacy issues.	14	5.93	0.92	6	4	7

Qualitative Comments

Question 15 of the case competition participant survey asked students if the case competition influenced their choice of major. Individual student comments in response to this question are shown in Table 7. While the perception of the influence of the case is mixed, a couple of students reported, "I am now considering a major in MIS." Others indicated the case competition "did not influence" the choice of a major.

Table 7: Individual Student Comments in Response to Being Asked If the Case Competition Influenced Their Choice of Major
"I am now considering a major in MIS. I understand and relate to most of the MIS material presented in the case."
"Although the case did not influence my major decision, I did learn a lot about what it is like to be an accountant and what their job entails. I think I will be better off in the upcoming years doing case studies because of this one. The case has increased my interest in accounting, and I look forward to learning more about the major next year in my financial management and reporting class."
"The case did not influence my choice of major, but it did help me see that I am definitely interested in the fields of Accounting/Finance. I can certainly see myself performing these types of consultation reviews in a future career."
"I always thought that accounting is tedious and monotonous, but through the case competition I found that accounting is more than balance sheets, it's actually interesting."
"I have been debating MIS as a major, and this allowed me to see where this major might take me."
"I was always planning on majoring in accounting, and now this project has strengthened my desire to do so."

Question 16 asked students for any other comments they had about the case competition. Their responses are shown in Table 8. Students described their experience as "good," "helpful," growing "knowledge … drastically," "excellent," "attractive and interesting," and "a great way to gain further insight." Interestingly, a couple of comments mentioned appreciation of the real-life aspect of the case.

Table 8: Individual Student Comments in Response to Being Asked If They Had Any Other Comments About the Case Competition
"It was a good experience, and the case was definitely challenging!"
"The case competition was helpful in providing an example of what traditional accounting firms do and how they operate. It was nice to see something that could happen in real life, rather than through a book."
"At the beginning I didn't understand anything of what I was reading in the case study. However, through the discussions with our Big Four Advisor and independent research on my own, I felt that my knowledge of the subject has grown drastically. A major part of this was the competitive element of the competition which spurred me to work hard to develop a quality case study."
"The case was excellent experience, and I do not think I would have been able to gain such real-life experience, as a freshman, without participating in the case. I look forward to citing my participation in the competition in upcoming interviews."
"The Big Four case study is an attractive and interesting opportunity, but it happens during the closing of courses and right before finals week, making it difficult to really enjoy. Perhaps the competition was supposed to be held during this time to see how students fare in time management, but not only were our advisors busy and could not work with our schedule most of the time, but also some students have other obligations aside from school work."
"I found the case competition to be a great way to gain further insight into real world accounting and information systems."
"I found my Big Four advisor was very helpful in the beginning of the case, but at the end did not seem to have the time to really help me and my team. I understand that she had her own work, but it definitely negatively affected my team's morale when it was clear she did not read the draft we sent her and only commented on our format 4 days before it was due."

Enhancements to Case Competition Based on Student Feedback

Overall, the qualitative comments indicate students had a very positive experience and felt they had a unique opportunity to learn about careers in accounting and IS. Based on this feedback, future competitions, which continue to the current day, have been scheduled earlier in the spring semester and have allotted more time for interaction with their Big Four advisors. The latter has further been enhanced with the addition of an introductory face-to-face kick-off meeting.

The same rules and procedures continue to be used year-to-year, with necessary adjustments. A different case study is employed each year. As mentioned, we added a kick-off meeting for the purpose of promoting greater interaction between students and advisors. For this same purpose, we now require student teams to email their

advisors a draft of written responses to the case questions and designate one week for advising during which student teams finalize their written responses prior to submitting the final case analysis. Further, the addition of a next-tier accounting firm has brought the total of participating global accounting firms (GAF) to five. Finally, we coordinate the timing of our case competition with that of the local annual Pennsylvania Institute of Certified Public Accountants (PICPA) and Philadelphia chapter Institute of Internal Auditors (IIA) (PICPA/IIA) case competition. To encourage participation in the PICPA/IIA case competition, student teams may enter both competitions with the same case analysis. The number of participating student teams increased from nine in 2010 to thirteen in 2011 to fourteen in 2012.

Limitations

The major limitation of this research is the small sample size, based on the number of participating students. The small sample limited data analysis to descriptive statistics and qualitative comments. Thus, general findings and perceptions, rather than objective measures that quantify the benefits attained by the students, were reported. Further research in other disciplines, with larger populations, and in cross-cultural settings is needed to examine the benefits of role playing in the use of real-world case studies.

VI. DISCUSSION AND CONCLUSION

Adopting this real-world case study based on an actual Big Four consulting engagement may offer alternative approaches, based on the way in which the case is applied, to enhance realism for students. In assuming the role of consultants, students may gain experience and insight into the dynamics at play in an actual ERP implementation project. Most noteworthy is the unsolicited recognition by students of the real-world experience provided by the case. For example, one student noted, "It was nice to see something that could happen in real life …," while others gained "real-life experience" and "further insight into real world accounting and information systems." Another learned "a lot about what it is like to be an accountant and what their job entails." Such active learning may provide potential benefits to students. Our research results show that use of these materials among undergraduate students elicited positive responses and comments regarding the nine benefits we expect our students to attain.

We believe that we achieved our primary goal of enhancing students' knowledge of the relationship between accounting and IS, to serve increasing industry demand for employees skilled in both. Overall, students indicated that they did understand more about this relationship as a result of participating in the case competition. In addition, qualitative evidence suggests that some found MIS and the accounting profession to be more interesting than they had thought prior to completing the case. Further, the case competition reportedly did have some influence on the students' choice of a major. Anecdotal evidence suggests the realistic experience as a contributing force based on comments such as "… this allowed me to see where this [MIS] major might take me" and "this project has strengthened my desire to [major in accounting]."

However, it appears that students' interactions with the accounting professionals serving as advisors could be improved. Our descriptive survey results revealed that students were somewhat neutral about whether they had developed a mentoring relationship with their advisor. Further, one student commented that although the advisor "was very helpful in the beginning of the case, … at the end did not seem to have the time to really help." Future case competitions have begun with a kickoff meeting between students and advisors to try to enhance this relationship and communicate the importance of it, thereby encouraging students to be more comfortable asking their advisors for help and asking for help earlier. Nevertheless, the students did find the advice from their advisors helpful and had a very positive experience overall.

Options for both individual and team assignments are offered by the alternative uses suggested. While both challenge students, as evinced by the qualitative comment that "the case was definitely challenging!", the team option offers a competitive element in pitting team against team. We found value in competition, based on a student reporting that "the competitive element of the competition … spurred me to work hard to develop a quality case study." We also provided the theoretical underpinnings of real options, project escalation, and project champion to explain the tension between consultants and managers of the client firm. Discussion of the tension is intended to foster realism for students, otherwise difficult to include in classroom settings. It is our hope that the actual case materials, questions with suggested solutions, case competition rules and procedures, judges' assessment form, and the winning team's written report and PowerPoint presentation slides will serve as valuable pedagogical resources to adopters and impart the expected benefits.

REFERENCES

Editor's Note: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the article on the Web, can gain direct access to these linked references. Readers are warned, however, that:

1. These links existed as of the date of publication but are not guaranteed to be working thereafter.
2. The contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced.
3. The author(s) of the Web pages, not AIS, is (are) responsible for the accuracy of their content.
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APPENDIX A: CLIENTCO PHARMACEUTICAL, INC. CASE STUDY MATERIALS

Letter of Engagement

January 17, 2010
Mr. John President
Vice President of North American Finance Operations
123 Street Road
Wayne, PA 19087

Subject: ERP Security and Controls Pre-implementation Review

Dear Mr. President,

This letter confirms that Big Four Accounting & Consulting LLP ("Big Four Accounting & Consulting," "BFAC," or "we") has been retained by ClientCo Pharmaceutical, Inc.'s ("ClientCo," the "Company," "Client," or "you") to provide the services (the "Services") set out below. The purpose of this letter is to confirm the understanding of our respective responsibilities and the terms of this engagement (the "Agreement").

Objectives

ClientCo has undertaken ERP implementation, which will significantly impact how the Company processes and reports transactions at its North American operations, primarily those operations at its U.S. headquarters and distribution center. The project is in the final stages of realization and is expected to go-live May 1, 2010. This is an integral part of a significant undertaking by the Company toward the successful migration onto a single integrated ERP system.

As a result of this project, significant changes will be made within ClientCo's internal control environment, specifically within the key business processes and financial reporting. You have requested BFAC to assess the design of key business process controls within the Phase 3 ERP implementation. The purpose of this request is to provide management with an independent perspective on whether any significant financial risks are apparent prior to go-live and to help management gain assurance that the investment in the ERP solution is being fully leveraged. This engagement will also assist management with its efforts to comply with their assessment on the operating effectiveness of the Company's controls over financial reporting (i.e., Sarbanes-Oxley requirements—"SOX"). The primary objectives of this engagement are provided below and are based on our meetings with you and other key members of your team.

- Assess available controls within the ERP implementation (as defined in the Scope & Approach section) supporting ClientCo's internal control structure and determine gaps. Our focus will be on automated business process controls and ERP security controls, including segregation of duties.

- Identify and suggest available control options based on our technical and industry experience to address identified gaps.

- Identify potential areas where efficiencies can be gained within the internal control environment to reduce the effort to maintain effective internal controls and support the Company's SOX efforts.

Scope and Approach

Our review will focus on identifying and assessing the controls within select business processes and in ERP security. This section outlines our understanding of the scope and approach based on our discussions.

Business Process Controls

Our primary focus will be on assessing ERP automated (configurable) controls. Business process control reviews include testing of key configuration settings for transactions that support the initiation, authorization, recording, processing, and reporting of data. These configuration settings include things such as tolerance levels, access privileges, validations, etc. Where appropriate, we will also provide recommendations on potential manual detective controls when key risks do not appear to be mitigated through automated controls.

We will perform the above review for the business processes and ERP modules presented in Table A1.

Table A1: Business Processes and ERP Modules to Be Reviewed	
Business Processes	Modules
Revenue & Receivables	SD—Sales & Distribution IM—Inventory Management (distribution; see section below) FI—Accounts Receivable
Inventory Management: Distribution Receiving Warehouse Management (Distribution Center)	MM/IM—Materials Management/Inventory WM—Warehouse Management
Purchasing & Payables	MM—Materials Management (purchasing) IM—Inventory Management (receiving; see section above) FI—Accounts Payable
General Ledger/ Controlling	FI—General Ledger CO—Controlling PCA—Profit Center Accounting
Fixed Assets	FI—Asset Management/Accounting

ERP Security and Segregation of Duties

Testing of access security for each ERP business process area is necessary to determine if appropriate segregation of duties (SOD) exists to support the preparation and reporting of authorized and reliable financial information. Based on an understanding of the functionality being implemented and discussions with key business process owners, we will develop a listing of sensitive financial transactions within the ERP, as well as assess SOD cases across the environment, as part of this review. Our approach to this area of our review is as follows:

- Assess the final security design required to support the business processes (i.e., role design)

- Review the roles for access to sensitive transactions and SOD conflicts within the roles using our proprietary ERP security tool, Automated Controls Evaluator (ACE)

- Review and provide recommendations on the current SOD security matrix developed by ClientCo to maintain security following go-live

- Review the user assignments for SOD conflicts once role assignment is completed using our ACE security tool

- Discuss results and recommendations with key functional/security team members

The security review will be conducted in a two phase approach:

1. The role review will be conducted first since final assignment of users to roles has not been completed. We will assess access privileges within the roles and provide management with real-time recommendations to mitigate any identified risks. Our assessment of access privileges will review the Company's current listing of sensitive transactions and SODs and provide recommendations for additions/changes/deletions for the business processes in scope.

2. The user review will be completed following the assignment of users to roles within the ERP system to assess for SOD conflicts when multiple roles are assigned to a user. This will provide management with a thorough assessment of conflicts to determine if any additional risk has been introduced following role assignment.

For any SOD control weaknesses identified, BFAC will meet with management to discuss the potential gap and provide recommendations to improve controls. In the event that management cannot mitigate the risk through appropriate segregation of duties, BFAC will provide recommendations on potential manual mitigating controls.

<u>Project Outputs/Deliverables</u>

As a result of this engagement, the following deliverables will be created:

- Documentation of automated controls within ClientCo's ERP application, including detailed instructions on how to review/assess these controls in the future

- Recommendations outlining controls reviewed and gaps identified including:
  - Recommendations for improving the security design and user security assignments

- o Recommendations for key automated and manual controls with detailed instructions on how to implement and/or specific reporting for manual controls
  - o Summary of any significant risks or control implications identified during the project
- A listing of key ERP security controls for the areas within our scope including sensitive transactions and segregation of duties that should be evaluated by management
- Recommendations on effective methods to automate any key financial manual processes

Engagement Assumptions

The following assumptions have been made in preparing this scope and approach for the security review:

1. Design/blue print documentation exists demonstrating how ClientCo plans to implement ERP, including manual processes.

2. Configuration for the ERP system being reviewed by BFAC (Development or Quality assurance) is significantly complete and is representative of the expected production system as of May 1, 2010.

3. Any significant changes made to the ERP configuration by management during our review procedures will be highlighted to BFAC to understand the impact on our procedures and impact on the control environment.

4. Key business process owners and project team members provide appropriate time and cooperation to answer questions and provide input on our recommendations.

5. Our review is focused on the functionality being implemented at U.S. headquarters and the distribution center. Accordingly, previously implemented ERP functionality will not be reviewed as part of this engagement.

6. Security roles/profiles have been appropriately documented offline for review in order to understand the makeup of the roles.

7. The role design is significantly completed within the ERP system being reviewed by BFAC (Development or Quality assurance) and is representative of the expected production system as of May 1, 2010.

8. Any significant changes made to the ERP security roles by management during our review procedures will be highlighted in a timely manner for BFAC to take into account for our review.

9. The role to user assignments will be completed within the system prior to March 10, 2010, to allow enough time for BFAC to conduct our Phase 2 review to meet the reporting timeline

We have excluded the items below from our review per your request.

- ERP supporting infrastructure
- Interfaces to/from ERP
- Data conversion controls
- System Development Life Cycle (SDLC) controls

Knowledge Transfer

It is our expectation that we will work closely with Internal Audit and Finance management throughout the engagement. As a result, we expect to work with management to transfer our ERP security and controls knowledge, where appropriate so management can leverage this knowledge going forward. Our ability to transfer the knowledge of our information will be dependent on the time and effort provided by those at ClientCo during this project.

We will perform the Services in accordance with Standards for Consulting Services established by the American Institute of Certified Public Accountants (AICPA). Accordingly, we will provide no opinion, attestation, or other form of assurance with respect to our work or the information upon which our work is based. The procedures we will be performing will not constitute an examination or a review in accordance with generally accepted auditing standards or attestation standards. We will not audit or otherwise verify the information supplied to us in connection with this engagement, from whatever source, except as may be specified in this Agreement.

It is the Company's responsibility to establish and maintain its internal controls. In addition, it is the Company's responsibility to determine the procedures deemed necessary in connection with your compliance with the provisions of the Sarbanes-Oxley Act of 2002 (the "Act") and related SEC rules, to execute those procedures and to assess the results of your procedures and the adequacy thereof. We provide no opinion or other form of assurance

with respect to your compliance with the Act, related SEC rules, or your procedures. We make no representation as to whether your procedures are sufficient for your purposes. Our Services should not be taken to supplant inquiries and procedures that Client should undertake for purposes of obtaining and using the information necessary in connection with the Company's compliance with the provisions of the Act and related SEC rules.

*   *   *   *   *

We are pleased to have the opportunity to provide our services to ClientCo and appreciate your confidence in us. If you have any questions about the contents of this letter, please discuss them with me at (267) 555-1985. If the Services and terms outlined herein are acceptable, please sign one copy of this letter in the space provided and return it to me.

Very truly yours,
Big Four Accounting & Consulting LLP
By J.H. Partner

ACKNOWLEDGED AND AGREED:

ClientCo Pharmaceutical, Inc.

Signature of client official: _____

Please print name: _____

Title: _____

Date: _____

Executive Summary

<div align="center">
ClientCo Pharmaceuticals, Inc.
ERP Security and Controls
Pre-implementation Review
</div>

INTRODUCTION

During the period from January 30, 2010, to March 10, 2010, Big Four Accounting and Consulting LLP (BFAC) was engaged to perform an ERP Security and Controls Pre-implementation review of ClientCo's Phase 3 ERP implementation. This executive summary contains the scope of this review, significant observations noted, and recommendations for improving the reliance on ERP controls (configurable, access, and where appropriate, manual) in the company's Phase 3 ERP environment. The project deliverables provide more detailed observations and recommendations for improving the overall effectiveness and efficiency of the company's internal controls.

This report has been prepared for ClientCo only in accordance with the terms of our engagement letter dated January 17, 2010, and for no other purpose. We do not accept or assume any liability or duty of care for any other purpose or to any other person to whom this report is shown or into whose hands it may come, save where expressly agreed upon by our prior consent in writing.

Automated versus Manual Controls
Automation is one of the principal drivers to sustaining an effective and efficient 404 compliance program. Manually intensive processes are inherently risky because they are prone to human error and may be more susceptible to fraud, thus driving up costs, complexity, and inefficiencies. Such an approach is typically the most effective and efficient way to support a long-term internal controls and compliance program. The company recognizes this and has taken the proactive approach to assess automated controls as part of the Phase 3 ERP implementation. Integration and reliance on preventative automated controls can, if appropriately balanced with manual controls, result in a more effective and/or efficient internal control environment. As a result of this project, BFAC has identified a number of areas where ClientCo can take advantage of automated controls to drive efficiencies in the Company's Sarbanes-Oxley 404 compliance processes.

The remainder of this report contains the project objectives, assumptions, scope, and results.

PROJECT OBJECTIVE

The objective of the engagement was to assess the design of key business processes and security controls within the Phase 3 ERP implementation. Management also requested an independent perspective on potential financial risks and controls and on ERP security prior to go-live to assess segregation of duties and sensitive access.

ASSUMPTIONS
BFAC performed testing in the Development interval of the application, for both the configuration testing and security areas of focus. Both configuration and security may be changed between the time of BFAC testing and the anticipated May 1st Go-live. So please note that this is a point-in-time assessment.

SCOPE
In order to achieve the below objectives, BFAC performed the following ERP supported business processes:

- Orders to Cash (SD & FI-AP Modules)
- Inventory Management (Distribution, Receiving, and Warehouse Management—MM, IM, WM Modules)
- Purchasing & Payables (MM & FI-AP Modules)
- General Ledger/Controlling (FI/CO Modules)
- Fixed Assets (FI-FA Module)

BUSINESS PROCESS CONTROLS
- Gained an understanding of ClientCo's business processes and the ERP internal control environment.
- Documented the ERP internal automated controls that were in place for the areas noted above.
- Performed testing of key configuration settings to measure the adequacy and effectiveness of the internal automated controls
- Identified automated control opportunities that can be implemented to increase efficiencies in business processes and in Sarbanes-Oxley Section 404 compliance
- Identified potential manual detective controls where key risks appeared not to be mitigated through automated controls

ERP SECURITY AND SEGREGATION OF DUTIES (SOD)
- Assessed the security design required to support the business processes
- Documented sensitive access transactions that should be monitored in ClientCo's environment
- Documented SOD conflicts that should be restricted or mitigated in ClientCo's environment
- Reviewed the Phase 3 roles for access to sensitive transactions and SOD conflicts identified in the steps above

TO BE COMPLETED
- BFAC will perform a review of the sensitive access and SOD violations by user, once user assignments have taken place. We will work with management to finalize the timing of this review.

RESULTS
The results of our work include the following project deliverables:

- Documentation of ClientCo's Phase 3 ERP automated controls, including detailed instructions on how to review and assess these controls in the future for business processes identified in the scope.
- Recommendations outlining controls reviewed and gaps identified including:
  o Recommendations for improving ERP role design as it pertains to sensitive access violations and SOD conflicts
  o Recommendations for key automated controls with detailed instructions on how to review and assess these controls in the future. These recommendations also include a few configuration settings where the actual configuration was not representative of management's intended configuration.
  o Summary of any significant risks, recommendations, or control implications identified during the project
- A listing of key ERP security controls for the areas within our scope, including sensitive transactions and SODs that should be evaluated by management
- Recommendations on effective methods to automate key manual financial processes

Table A2 below is a summary of the number of controls tested by BFAC for each business process and the number of recommendations that were made as a result of the controls testing. The controls tested were selected based on discussions with appropriate project team members, internal audit, and review of project documentation. When there

was no recommendation made, the control was in line with BFAC's expected results and the configuration settings tested supported the corresponding control objectives.

Table A2: Summary of Control Testing and Recommendations		
Business Process	Number of Controls Tested	Number of Recommendations
Fixed Assets	8	4
General Ledger/Controlling	19	7
Inventory/Warehouse Management	44	13
Purchase to Pay	26	7
Order to Cash	45	8
Total	142	39

A select group of key observations that are included in our recommendations and improvement opportunities are summarized in Table A3 below.

Table A3: Recommendations		
Business	Control	Control Recommendation
Order to Cash	Approved pricing changes are input for processing completely and accurately.	Management should consider creating a custom ERP Price Override report to monitor and track manual price changes, as the system is configured to allow manual changes for certain conditions. In addition, management should consider setting up price tolerances for manual changes.
Order to Cash	Credit memos link back to the relevant customer and sales order. In addition, all credit memos are blocked from further processing until appropriate personnel authorize/release them.	Management should consider configuring credit memos that are not generated from the I-Many system to be appropriately linked to a sales order. Although in the pharmaceuticals industry it is typical that many credits (e.g., charge backs) do not reference an original billing document, ClientCo should implement appropriate controls around credit memos.
Procure to Pay	Invoices posted through Logistics Invoice Verification (LIV) are matched against goods receipts and purchase orders.	Management should consider setting the GR/IR indicator to "binding" to ensure that the 3-way match takes place and cannot be circumvented. In addition, the tolerances around the 3-way match appear to be high.
Inventory Management & Warehouse Management	General Ledger accounts are predefined by an automatic account determination for the movements of materials.	Management should consider suppressing certain fields to restrict manual account assignment for certain movement types.
Inventory Management & Warehouse Management	Cycle count settings appropriately propose materials to be counted.	Management should consider configuring the cycle counts to be in line with business requirements. As the system is currently configured, cycle counts will occur 6 times per year for 100% of the population. Per management's expectations, cycle counts should occur 12 times per year for 50% of the population.
Fixed Assets	Useful lives are controlled through asset class configurations and are changeable only for a selection of asset classes which require the useful life to be configured by asset.	Management should consider setting up the system to restrict modification of useful life only at the asset master record (note: this may require some customization). For the majority of assets, a predefined useful life will apply. Accordingly, it will not be necessary for the users to modify the useful life upon input. When necessary, a screen variant can be created for asset classes where the useful life field requires modification at the asset master record level, ClientCo can configure the other screen to suppress the useful life field for the remaining asset classes. This will help ensure that the assigned useful life is consistently applied across the majority of the asset classes and allow management to review the classes that were customized.

The transactions and business process functions were selected based on discussions with appropriate project team members, internal audit, and review of project documentation. Table A4 presents a summary of business processes tested for security and controls role analysis.

Table A4: Summary of Testing for Security and Controls Role Analysis				
Business Process	Number of Sensitive Access Function Tests Performed	Sensitive Access Function Violations	Number of SOD Function Tests Performed	SOD Conflicts Function Violations
Fixed Assets	4	3	12	5
General Ledger/Controlling	7	5	5	1
Inventory/Warehouse Management	7	7	12	8
Purchase to Pay	4	4	53	20
Order to Cash	8	7	38	12
Total	30	26	120	48

Other Pre-implementation and Post-implementation Risks

During the course of our work we became aware of additional risk areas during the course of the project that management should continue to focus on. These include:

- Data Conversion

- Interfaces

- Testing

- Infrastructure Integrity

- Security Settings and System Access

- IT ERP Change Management—change management process for the end of the implementation (last minute configuration change approval process) and go-live change management process

- Go-live Check List—Go-no-go decision, project signoff, etc.

- Ensuring an appropriate level of balance between automated and manual controls as management updates its 404 documentation to reflect the new operating environment

- Baselining of the current configuration on go-live to ensure configuration has not changed (post-implementation)

- Ongoing security administration and compliance with agreed-upon sensitive transactions and segregation of duties conflicts

We are pleased to provide our services and this report to ClientCo and appreciate the time and cooperation that ClientCo management and personnel provided in assisting us with this review.

APPENDIX B: CLIENTCO PHARMACEUTICAL, INC. CASE STUDY QUESTIONS AND SOLUTIONS

Now that you have read through the documents, your team is responsible for preparing a written report responding to the following questions. The report and responses should be long enough to include adequate detail and demonstrate your team's thinking process. Leverage your team's Big Four advisor to the degree you require; however, the advisor is not to provide answers to the following questions. Rather, they are to help answer questions about materials and details in the case. In addition, the advisor can help your team understand how this situation relates to their professional experiences, how their clients respond in similar situations, and how MIS and Accounting knowledge are incorporated in their daily client interactions.

The case study questions with suggested solutions are presented below:

1. What possible issues could ClientCo be experiencing to request this proposal?

Suggested Solutions

   a. Draw on the objectives in the proposal document and interpret along these lines:

i. Concerns over capabilities of the new system to operate correctly. In instances where the system and automated controls do not operate effectively, assist in identifying other configurations to be made in the systems, other automated controls, and manual controls to address the exposed risk.

ii. Concerns over the impact to the business and the significant changes that will occur. This is a major project to the company, likely in the millions of dollars, affecting significant operations in the headquarters and distribution center.

iii. Current processes are inefficient and should be made as efficient as possible. Efficiencies are gained by using inherent aspects of the system to identify automated controls. Remove reliance on manual controls, which by their nature are cumbersome, rely on human judgment, and are more prone to errors.

iv. Concerns over assessment of controls for compliance related areas (e.g., SOX)

2. Why would the Vice President of North American Finance Operations want this type of review performed? Consider his personal point of view (his responsibilities and personal pain points) and that of the company.

Suggested Solutions

a. All of the processes to be reviewed impact the financials of the company. Given his title, he will own all of the downstream effects that this system will generate. Basically the old "garbage in—garbage out" rule applies, and the issues from a system problem will impact finance.

b. Personally, it is assurance and/or recommendations that he can proactively address before the implementation. Within the organization, he is held responsible for the performance of the financial reporting process and many of the underlying processes. Beyond performance, for SOX compliance, if there are controls that are ineffective and leave exposed risk, he and his team will be held responsible.

c. The review will also provide assurance of the financials and, therefore, is a way to protect shareholders and shareholder value.

3. Why do you think the proposal contains "Engagement Assumptions"?

Suggested Solutions

a.To clarify role and responsibilities of the client and the accounting firm. Such assumptions assist the firm in defining and adhering to their objectives (scope of services) and the client will have an understanding of their responsibilities. During or after the course of work performed, if the client wants additional work to be performed beyond this original scope of services, then additional contracts and services can be negotiated.

4. If you were a member of ClientCo's management team, how would you interpret the detailed results? What conclusions would you reach about the ERP system and controls? How do you think the Vice President of North American Finance Operations would react compared to that of the Chief Information Officer (CIO) or the Head of Internal Audit (IA)?

Suggested Solutions

a. There were many areas of improvement noted, so it was clear that whoever implemented this system did not consider controls as part of their business requirements or design.

b. Based on this work, BFAC should review other areas that were out of scope to get comfort across the entire system and processes.

c. If this work was not done prior to go-live, there would have been numerous control and security issues that could have negatively impacted the business operations and financials.

i. The VP of Finance would be concerned as he and his team would be responsible for it and any exposed risk to the financials.

ii. The CIO would be concerned that the implementation team missed all of these issues. The work of the implementation team is likely the responsibility of the CIO. The CIO may also be defensive of these findings since they identify areas that were not considered and/or addressed by the implementation team.

iii. The Head of IA would react that bringing in specialists to work with/augment IA can help identify unaddressed risks up front prior to significant systems being implemented. Since these projects are less frequent, having the specialized knowledge in-house might not make the most sense. The amount and detail of the findings may make the Head of IA more inclined to bring in BFAC for additional work.

5. Does the final executive summary and the detailed observations meet the objectives set forth in the proposal? Please explain your position for both.

Suggested Solutions

a. Executive Summary: Yes—the work addressed the key objectives in that the final report highlighted controls and recommendations across all the expected business processes.

b. Detailed Observations: Yes—the work was very detailed to support the conclusion.

c. Note: Students may identify the missing security work, which would be a great catch. Those results are too complicated to provide, so they are not included. See if the students connect the fact that the report has numerous concerns over security, yet they do not receive those results.

6. What actions should management take to address the report observations?

Suggested Solutions

a. Implement as many of the recommendations prior to the implementation. For those instances where they cannot, they need to have a manual process to review and correct any errors.

b. After implementing the controls, including the manual controls, BFAC and/or Internal Audit should test the controls to ensure they are operating effectively.

7. Who do you feel is accountable for the issues identified by the professional services firm?

Suggested Solutions

a. With any system implementation, the process starts with solid business requirements that are provided by the company's business users. Therefore, it is the company's responsibility to have provided control requirements upfront to the IT implementation team.

8. How do the deliverables of BFAC, the detailed findings, and the final report show a thorough understanding and application of accounting and information technology knowledge?

Suggested Solutions

a. There is no right answer here. Possible responses, annotated according to accounting or IT responsibility, are provided below. Allow for student creativity.

i. Determined which business processes were in scope (accounting), which link to appropriate modules within the system (IT)

ii. Documented the ERP internal automated controls in place (IT) for the various business processes (accounting)

iii. Tested key configuration settings in the ERP (IT) as related to the automated controls for the business processes (accounting)

iv. Based on the testing results of the automated controls (IT), provided recommendations for both automated controls/configuration changes (IT) and manual controls (accounting) to be put in place to address unmitigated risk

v. Identified other pre-implementation and post-implementation risks (IT and accounting) that, although not fully documented in the deliverable, were probably elaborated on during closing discussions for what the risks mean to the business

APPENDIX C: CLIENTCO PHARMACEUTICAL, INC. CASE COMPETITION RULES AND PROCEDURES

Table C1: Case Competition Rules and Procedures
1. Teams will consist of 3–5 students who are at the freshman or sophomore levels.
2. Teams will be asked to register by March 31, 2010.
3. Teams will submit a written response to the case questions by May 1, 2010. Each team must sign a statement indicating that their report is their own work and they have followed the University Academic Integrity policy.
4. Teams will be advised by an Associate at a Big Four firm. Advisors will be able to direct students to resources to help them understand the case, but cannot give students direct advice on the answers to case questions or directly assist in the preparation of the written report. If advisors are unsure about guidance, they should contact their supervising Manager.
5. The Associate will be supervised by a Manager at a Big Four firm. If the Manager is unsure about an advising issue, they should contact the Steering Committee, made up of 4 Big Four partners and 4 faculty members.
6. Four Partners from Big Four firms will judge the quality of the cases based on both content and presentation quality. Judges will have access to the suggested answers to the case questions to help them evaluate content. Finalists will be announced in mid-May 2010.
7. Finalists will make an oral presentation using PowerPoint to the panel of judges in September 2010 during Parents' Weekend.
8. A celebration for the winners will be held in October 2010.

APPENDIX D: CLIENTCO PHARMACEUTICAL, INC. CASE REPORT ASSESSMENT FORM

Table D1: Case Report Assessment Form Used by the Judges

Name of Judge	Name of Team

Please place a check mark (X) in an appropriate box for each assessment item.

Assessment Item	Score [1 = lowest, 10 = highest]									
	1	2	3	4	5	6	7	8	9	10
(1) Organization of the report										
(2) Presentation (professionalism in writing style, grammar, vocabulary, etc.)										
(3) Quality of answer to Question #1										
(4) Quality of answer to Question #2										
(5) Quality of answer to Question #3										
(6) Quality of answer to Question #4										
(7) Quality of answer to Question #5										
(8) Quality of answer to Question #6										
(9) Quality of answer to Question #7										
(10) Quality of answer to Question #8										
(11) Comprehensive understanding of issues, as reflected in the report										
(12) Thoroughness and level of effort evident in the report										

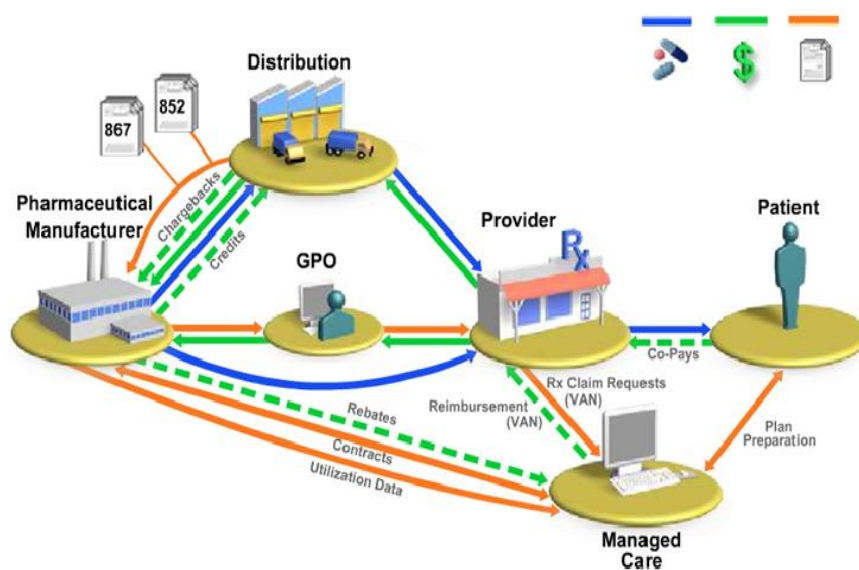| Please provide a brief comment in the given space. |
|---|
| (13) Is there anything that stands out as commendable and noteworthy? |
| |

APPENDIX E: WRITTEN REPORT OF THE WINNING TEAM

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Potential Reasons for Proposal

ClientCo Pharmaceuticals, Inc. is undergoing a significant change within its company. The corporation is in the process of implementing an Enterprise Resource Planning (ERP) System—a system that will manage assets, financial resources, materials in inventory and distribution, and human resources. The system encompasses a wide array of functions within the company in an automated, organized, and integrated interface.

Prior to this ERP implementation, it is likely that ClientCo encountered numerous issues related to the lack of automation, such as security problems related to segregation of duties (SOD), data inaccuracies, inefficient use of time, and multiple sources of data.

> **Security and SOD:** An outdated system may be vulnerable to security breaches both externally and internally. Employees and managers with broad access privileges pose an internal threat to the integrity of collected data and overall security. Fraud is a serious threat that can expose the company's confidential reports and put all shareholders and management at serious financial and legal risk. In addition, system access issues presenting strong security threats need to be addressed to prevent sensitive data from being disclosed.

Human Error/Accuracy: Automation will allow for human errors to be minimized and records to be kept in a more accurate manner. The least amount of human interaction in data entry and calculation, the more accurate the bottom-line numbers will be.

Discrepancies: Without an integrated system and optimal controls, it is likely that data is not always handled properly and functions are not carried out the way management intends. When one mistake is made, it can be compounded as it circulates through various levels of management. For example, prices outside the scope range may not be addressed, accounts payable and accounts receivable may be unbalanced, credit memos may not go through with the sales orders, charge backs may not be organized properly, etc.

Internal cooperation: Conflicts between departments arise when information is not properly communicated. Internal tension between departments needs to be kept within reasonable limits. If data is readily available and system errors are kept to a minimum, it can ensure that tension is manageable and that the company produces the goods and services that consumers want at an economic price. The most efficient way of coming to a compromise would be through the most comprehensive and up-to-date results available. In addition, when all parts of a company are looking at the same information, it creates transparency for the management team, leaving little for the public to question.

Competitiveness: ClientCo should desire to be as competitive in the twenty-first century market as possible; there are issues that an ERP system would alleviate and allow for company growth in its current market and, possibly, another market in the future. They may have outgrown their prior system or maxed out user licenses. Any progress or improvement in the business cycle will provide improved and expedited service to wholesalers and any purchasing involved. In any scenario, the ERP system would allow for more users, enhanced business processes, and increased potential for future growth.

ClientCo's request for this proposal could be assigned to any of the reasons listed, with multiple possibilities not mentioned. The fact that they requested the review from BFAC simply informs us that there were internal issues that needed to be resolved before ERP implementation and prior to review where legal concerns could arise. By having a new and integrated ERP system, ClientCo will provide all departments and employees a single version of the company's actual business situation and environment.

VP of Finance Operations Perspective

The Vice President of North American Finance Operations would be deeply concerned about the success and cost-effectiveness of the ERP system implementation. As VP of Finance, he is responsible for the accuracy of the financial data his company dispenses. He would want to ensure that the system is configured properly to provide accurate financial data before he signs off on it. Furthermore, BFAC findings on data input, controls, and information technology could aid in developing an improved ERP system capable of greatly aiding his decision-making process. Increasing efficiency and providing accurate, up-to-date information would provide benefits throughout the company.

Engagement Assumptions

Another step to avoid legal matters is by stating any assumptions one makes during an agreement or contract. The "Engagement Assumptions" are provided by BFAC to make it clear what services they will be performing under specific conditions. They have expectations that they state, avoiding any conflicts in the future. The assumptions serve as an "umbrella" to cover many aspects within the contract.

Each of the nine individual Engagement Assumptions clarifies the scope of the study in a specific way, allowing deadlines to be met and issues to be handled promptly. More specifically:

1. Proper documentation ensures that a proper analysis of the proposed ERP system can be completed in a timely manner.
2. The proposed ERP system configuration is the one that is expected to be carried out on May 1, 2010, to ensure the accuracy and applicability of the BFAC report.
3. BFAC must be made aware of any modifications to the proposed ERP system configuration to ensure that BFAC can modify its analysis before the May 1, 2010, deadline.
4. ClientCo management and employees must cooperate adequately to ensure BFAC can conduct an accurate analysis in a timely manner.
5. The scope of the report is clarified by identifying that the BFAC review is focused solely on the most recent proposed ERP system to be implemented at the U.S. headquarters and no other previous ERP systems or proposals.

6. ClientCo has already designated and documented roles/profiles to allow BFAC to conduct an accurate analysis of SOD conflicts.
7. The role design documentation is significantly completed and highly representative of the final expected system to be implemented to ensure that the BFAC analysis is as applicable as possible to the final ERP implementation.
8. BFAC must be made aware of any modifications to the proposed security roles to ensure that BFAC can modify its analysis by the May 1, 2010, deadline.
9. Roles must be completed in a timely manner to allow BFAC adequate time to conduct a thorough Phase 2 review.

ClientCo Management Interpretation and Response

The contract itself covers specifics. Individual scenarios and issues are pointed out according to what BFAC stated they would review. There are clearly issues with the current system concerning the tracking of credit. If orders are not tracked properly, this will lead to problems for the accountants. Management must make sure that the ERP system contains automated controls that are more detailed concerning credit. The ERP system should include a cycle count system that more effectively keeps track of inventory. BFAC may be able to help in providing this. Asset classes also have to be controlled uniformly to avoid price discrepancies among goods in the same class. There are also sensitive access and SOD issues that need to be addressed. Out of thirty Sensitive Access tests, twenty-six found violations. This shows that the ERP system must contain tighter security for some people.

In response to BFAC's detailed results, ClientCo management should recognize that significant additional configuration and fine-tuning are necessary in order for the ERP system to perform as expected. Most likely, the different levels of management will respond to the BFAC results in different manners. The Vice President of Finance Operations will aggressively push for the CIO to carry out the control recommendations advised to ensure that the system has operational integrity and turns out accurate data before he signs off on it. The HIA will want to ensure that the BFAC recommendations are carried out and addressed effectively. This may include bringing in application specialists and technical experts to train, assist, and consult staff on how to use and configure the new ERP system application properly. This will especially help the CIO to address SOD violations and to help his subordinates configure the system in accordance with business process specifications from Finance and other departments. The CIO will then be able to respond to the instructions coming from Finance and Internal Audit more effectively to follow through on the BFAC recommendations.

From the point of view of ClientCo management, the BFAC report contains several detailed observations and recommendations for optimal ERP system configuration. These recommendations will help to increase the accuracy and accountability in several ways:

Order to Cash—Price Overrides: Generating a report to track ERP Price Overrides will allow for more accurate accounting and financial reporting as well as help sales representatives offer more consistent quality customer service. Price override reports will help ensure that proper discounts are granted to appropriate group purchasing organizations (GPOs). Furthermore, reports designed to track changes in price will ensure that they are properly accounted for.

Order to Cash—Linking Credit Memos/Sales Orders: Due to the involvement of GPO's and distribution wholesalers as middlemen, it will be difficult to directly associate credit memos with sales orders. However, ClientCo should definitely seek to put in place controls which will compare sales order quantities billed to wholesalers/distributors with the amount of chargebacks being requested from the distributor's end customers. This will to help to ensure that appropriate credit is granted and prevent fraud from occurring.

Procure to Pay—PO/GR/IR Indicator: Strengthening the PO/GR/IR indicator within the ERP system to "binding" will ensure that accounts are balanced. A stronger 3-way match setting will prevent human error and ensure that purchase orders match the goods receipt/invoice receipt account. Once all goods and invoices are accounted for, ClientCo can be assured that it is providing quality customer service by delivering the proper goods to its customers, as well as be confident that the company is not being defrauded of inventory.

Inventory Management and Warehouse Management—Manual Account Assignment: Defining General Ledger accounts to prevent manual account assignment will ensure that the appropriate accounts are designated for given revenues or expenditures. Although it is recommended that the standard system defined settings be used for this assignment and new movement types not be created, if additional accounts are needed to support the business model, higher management approval and signoff should be required. This will prevent human error from occurring.

Inventory Management and Warehouse Management—Cycle Count Frequency: Increasing the cycle count frequency will allow for inventory data to be accumulated rapidly. While the adjustment is not very drastic (six times a year for 100 percent of population vs. twelve times a year for 50 percent of population), it will allow at least partial data to be made available at least a month ahead of time. This will allow decisions to be made with the most up-to-date inventory data.

Fixed Assets—Useful Life: Restricting useful life will prevent unauthorized modification of the value of fixed assets. Tampering with the useful life would affect calculation of the value of fixed assets and of asset depreciation. This would affect expenditures for replacement of assets as well as accounting for depreciation for tax purposes.

BFAC Report Objectives

The BFAC report overall does a good job of addressing the problems facing the implementation of the ERP system. The Executive Summary highlights the benefits an ERP system can provide through automation of processes, but also specifically outlines the scope in which BFAC conducted their study of the ERP system. The report scope and specifications adequately matched the ones identified in the initial proposal and serve to lay the groundwork for the rest of the report.

In the detailed reports, the BFAC covers cash flow, inventory, and sensitive access violation problems. BFAC claims that it is the job of management to handle some of these SOD matters. While this is true, the initial proposal highlighted that not only would a review be conducted, but specific recommendations would also be given. However, the BFAC detailed report exclude any recommendations regarding how to address SOD violations and conflicts. There were numerous SOD Conflicts Function Violations accounted for, but no specific suggestions or recommendations were made.

The number of tests versus the amount of violations can be seen in the following graphs:

Graph (a) Sensitive Access
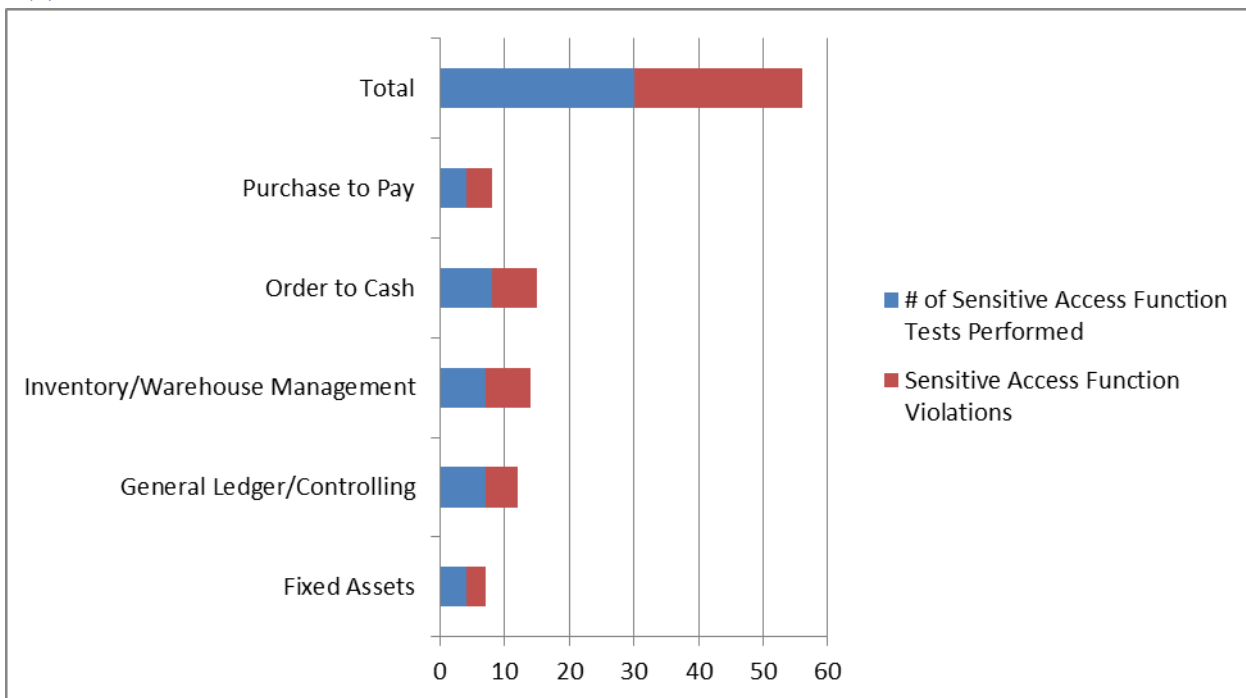
Graph (b) Segregation of Duties (SOD)
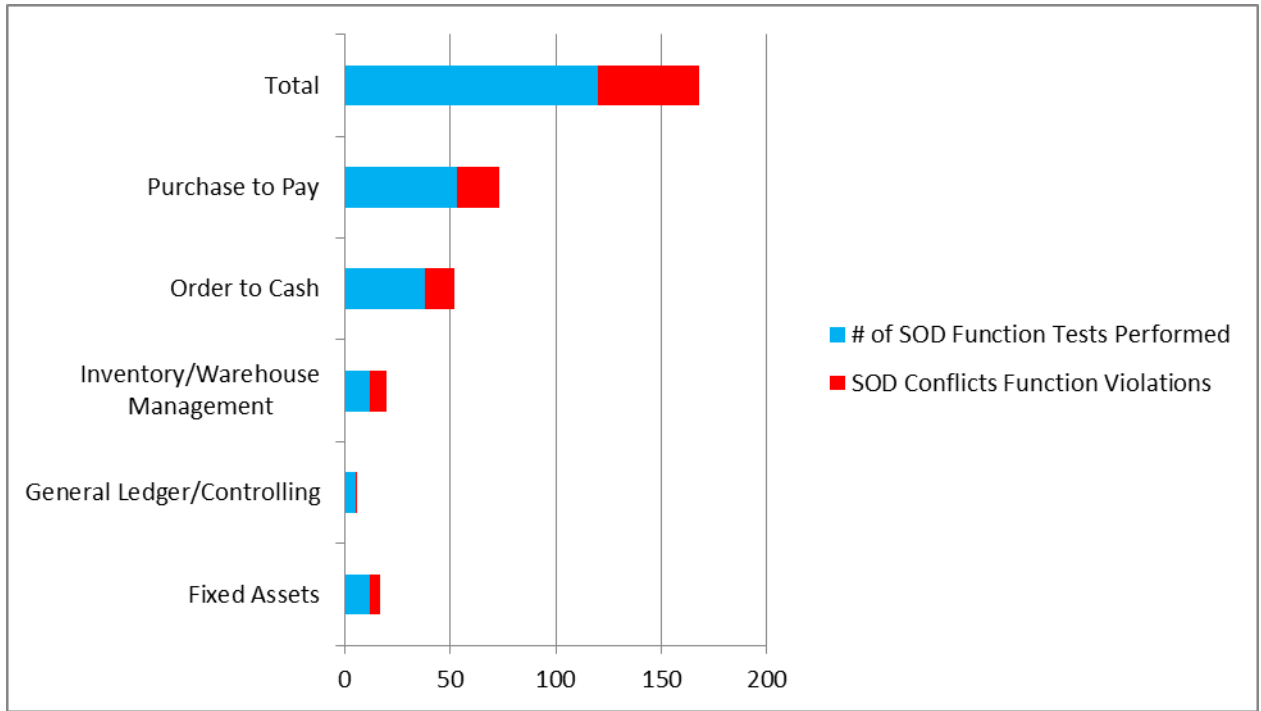
In addition, the listing of pre-implementation and post-implementation risks help to inform ClientCo management of potential challenges which may not be immediately identifiable until the ERP system begins go-live. While identification of some specific problems and solutions may not have been possible from the data provided for the BFAC report, listing additional potential risks allows ClientCo management to monitor these areas to prevent them from holding up the implementation or undermining the effectiveness of the ERP system.

Recommendations for Addressing Report Observations

Given the prevalence of the SOD violations (twenty-six Sensitive Access violations and forty-eight SOD Conflict Function violations) and the importance of SOD to the integrity of ClientCo's data, recommendations ought to be made for ClientCo management to act on. The BFAC report should have included recommendations on how to address the SOD issues identified. Possible solutions for such issues could have included:

Role-based Matrix: Advise ClientCo to alter its existing role matrix to respond to the SOD Violations, possibly introducing an organization chart with roles. This may include redefining current roles to restrict permissions or creating new specific roles to better suit various positions throughout the company. While keeping the number of roles low would be optimal for management purposes (the fewer the number of roles, the easier they are to manage), adequate roles must be created to allow for a proper SOD.

Support Module: Develop a support module that describes a chain of individuals/outlets to seek out for assistance. This module should include a RACI model which will determine who should be *R*esponsible, *A*ccountable, *C*onsulted, and *I*nformed to respond to various support issues.

SOD Cost-benefit Analysis: Advise ClientCo to conduct a cost-benefit analysis to consider which SOD conflicts are worth fixing. While some SOD violations are critical to the security of ClientCo's data and functionality, some SOD issues may be minor and have little-to-no bearing on the competiveness or profitability of the company. ClientCo should analyze these SOD conflicts to consider which ones are worth addressing and take action accordingly. ClientCo must consider such issues concerning whether current employees are performing at optimal efficiency or whether hiring/firing/transferring employees will alleviate the SOD conflicts at hand. Depending on the level of risk associated with SOD conflicts and the costs of hiring new employees, this may affect the way ClientCo approaches SOD concerns.

ClientCo Management Accountability

The Vice President of North American Finance Operations has a responsibility to oversee the financial reports, as well as to provide different sectors of the company with inter-departmental information and reports. These reports will be based on the accuracy of the data generated by the proposed ERP system. A system that aids his employees to create less room for error means there will be fewer mistakes compounded and sent to him. He will then be able to transfer more accurate information to others and form better decisions. As the VP of Finance, it is his

responsibility to ensure that that the ERP is configured optimally to conform to the financing process requirements and that its functions are cost-beneficial. It is then his responsibility to communicate with the CIO so that the proper adjustments to ERP configurations can be made.

The Chief Information Officer is important in making strategic goal decisions, as well as directing the company's technology department. He is in charge of any MIS systems and ERP systems and their maintenance. The ERP implementation, therefore, would fall under his department's concerns. He would look at the execution of its integration into the company and how to make the new system fit in the most efficient way possible, as well as training his employees to use it efficiently. It would be his duty to address in that training the segregation of duties (SOD) involved. He would assist management with assignment of roles within the ERP system's implementation and oversee the proper execution of its functions, according to what the other departments require.

The Head of Internal Audit will closely examine the wide array of business processes to ensure they are performing as expected. The HIA will audit all systems and monitor SOD for potential conflicts and violations. Specifically regarding the ERP system, when the HIA observes processes or configurations that are not functioning properly, it is his job to communicate those to the CIO so that the proper adjustments can be made.

As a result, all three members of management are accountable, to a certain degree, for the ERP implementation and oversight. While at this point ClientCo is taking a proactive approach to ensure that the ERP system is implemented properly by retaining BFAC, future optimization and fine-tuning must occur through open communication between department heads to allow the CIO to keep the ERP system optimally configured.

However, while all department heads are indeed accountable to a certain extent, the primary accountability falls on the shoulders of the VP of Finance. The VP of Finance ultimately signs off on the business process requirements which determine the ERP system configuration. He should be held accountable for the financial controls, regardless of whether they are manual or automated through an ERP system. Furthermore, as the VP of Finance, he is ultimately responsible for the quality of the financial data the ERP system dispenses. While the HIA is responsible to verify that risks are mitigated in the development and maintenance of the ERP system, the VP of Finance should be accountable to ensure that those systems were configured properly in the first place.

BFAC Report Application of Accounting and IT

The deliverables of the BFAC, detailed findings, and the final report combine to present a detailed review of the technological and accounting issues faced by ClientCo management. The BFAC report examines specific ERP configurations and provides quality recommendations (as have been previously reviewed in this study) to optimize the system's ability to provide accurate financial data for accounting purposes. This demonstrates a thorough understanding of IT systems and accounting procedures, especially as it relates to the pharmaceutical industry. However, despite the quality, informed recommendations provided by BFAC, there are still additional problems ClientCo must address, particularly in the realm of SOD. While following the BFAC recommendations will definitely improve the quality of ClientCo's ERP system and the data it dispenses, additional modifications are needed.
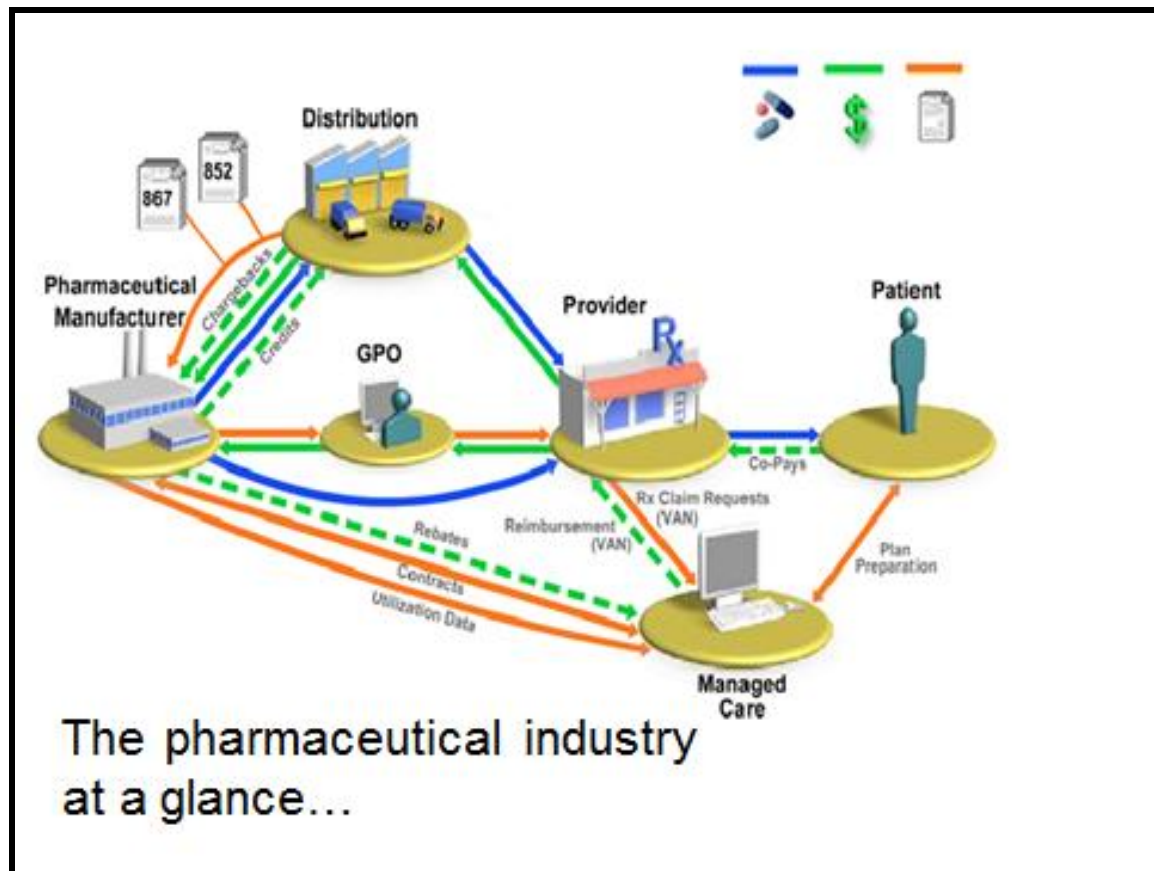
Agenda

- Introduction and Overview
- Reason for Proposal
- VP of Finance Operations Perspective
- Engagement Assumptions
- DrugCo Management Interpretation and Response
- BFAC Report Objectives
- Recommendations for Addressing Report Observations
- DrugCo Management Accountability
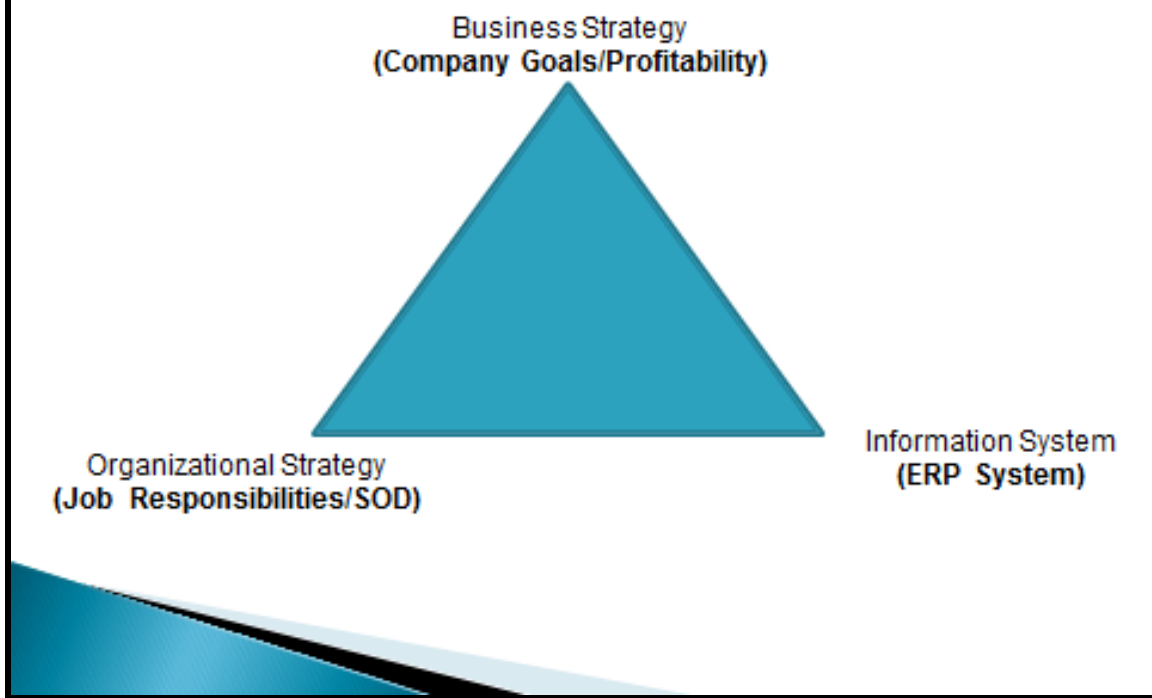- BFAC Report Application of Accounting & IT

Introduction

- ▶ DrugCo, Inc is a pharmaceutical company looking to implement an ERP (Enterprise Resource Planning) System
- ▶ BFAC (Big Four Accounting & Consulting) was hired to evaluate the proposed system implementation
- ▶ Our team's task was to evaluate the recommendation summary by the BFAC

What is an ERP System?

- ▶ Computer-based system that organizes and manages a company's resources
- ▶ Combines multiple aspects of a business into one system
- ▶ Integrates and automates all business functions

The pharmaceutical industry at a glance...

Information Systems Strategy

Business Strategy
(Company Goals/Profitability)

Organizational Strategy
(Job Responsibilities/SOD)

Information System
(ERP System)

Reasons for Proposal

Security and SOD
- Security breaches
- Data integrity
- Access privelages

Human Error/Accuracy
- Organization of records
- Minimal room for calculation errors

Discrepancies
- Issues between management and other levels of operation can be addressed

Internal Cooperation
- Easier interdepartmental communication
- Transparency

Competitiveness
- ERP system facilitates future growth in a globalized world

- Eliminate concerns over maxed-out user licenses
- Allow for more users

VP of Finance Perspective

Primary Goal
- Properly configured ERP system to ensure consistent accuracy of financial data

Strategy & Implementation
- BFAC findings would aid in decision making regarding data input controls and information technology

Ultimate Impact
- Efficient and accurate ERP system through well-devised implementation would provide benefits throughout all departments

Engagement Assumptions

1) Proper Documentation

2) No changes in ERP configuration before 5/1

3) BFAC must be notified of any ERP modifications

4) Cooperation and communication between management and employees

5) Focused is solely on the current ERP system

6) DrugCo has designated and documented roles/profiles

7) Role design documentation is completed and represents final system

8) BFAC must be made aware of any changes to security roles

9) Roles must be completed in a timely manner

DrugCo Management Interpretation & Response

Management Concerns

- Management must make sure all data is accurate and up to date
- Current system has problems in tracking credit
- New ERP system should include a cycle count function for inventory tracking
- Uniformly control asset classes
- Address sensitive access and SOD

Management Response

Vice President of North American Finance Operations	Chief Information Officer	Head of Internal Audit
•Primarily concerned with accuracy of financial data	•Oversee ERP system implementation	•Ensure BFAC recommendations carried out and ERP within legal guidelines
•Work with CIO to follow control reccomendations	•Respond to input from Finance and Internal Audit	•Use technical experts to train staff on new ERP

Detailed Observations

Order to Cash

Track Price Overrides
- Aids Customer Service
- Consistency with customers
- Proper discounts for GPOs (Group Purchasing Organizations)

Link Credit Memos and Sales Orders
- Make ERP system able to track sales orders to wholesalers/distributers with chargebacks from end customers

Detailed Observations

Procure to Pay

PO/GR/IR Indicator
- Ensure purchase orders (PO) match the goods received (GR) and invoice received (IR) accounts
- Use indicator to account for all steps of the business cycle

Detailed Observations

Inventory Management & Warehouse Management

Manual Account Assignment
- Restrict certain changes on account and movement types

Cycle Count Frequency
- Change cycle counts from 6 times a year for 100% of population to 12 times a year for 50% of population
- Allow most up-to date inventory data

Detailed Observations

Fixed Assets

Useful Life
- Restricting the modification of the value of the fixed assets
- Accounts for depreciation for tax purposes
- Affects expenditures for replacement of assets

BFAC Report Objectives

Assess available controls supporting internal control (i.e. automated business process controls and ERP security)

Identify control options based on technical & industry experience (by BFAC)

Identify areas where efficiences can be gained within internal control environment and support SOX efforts

BFAC Report–PROS

BFAC covers cash flow, inventory, and sensitive access violations

Specifically outlines the scope for BFAC

Post-implementation risks identified to help DrugCo management

BFAC Report–CONS

No recommendations on how to address SOD violations and conflicts

The number of tests conducted versus the amount of violations were unsatisfactory

Sensitive Access Tests

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Segregation of Duties
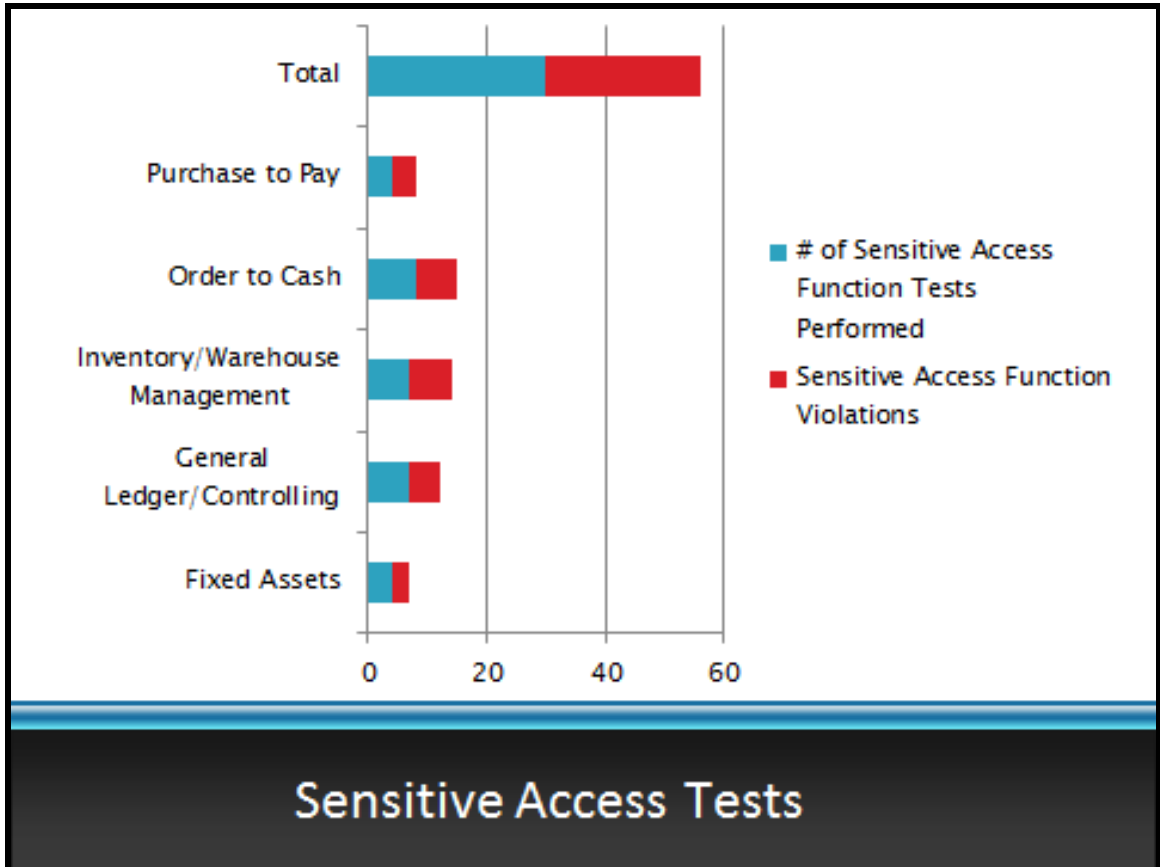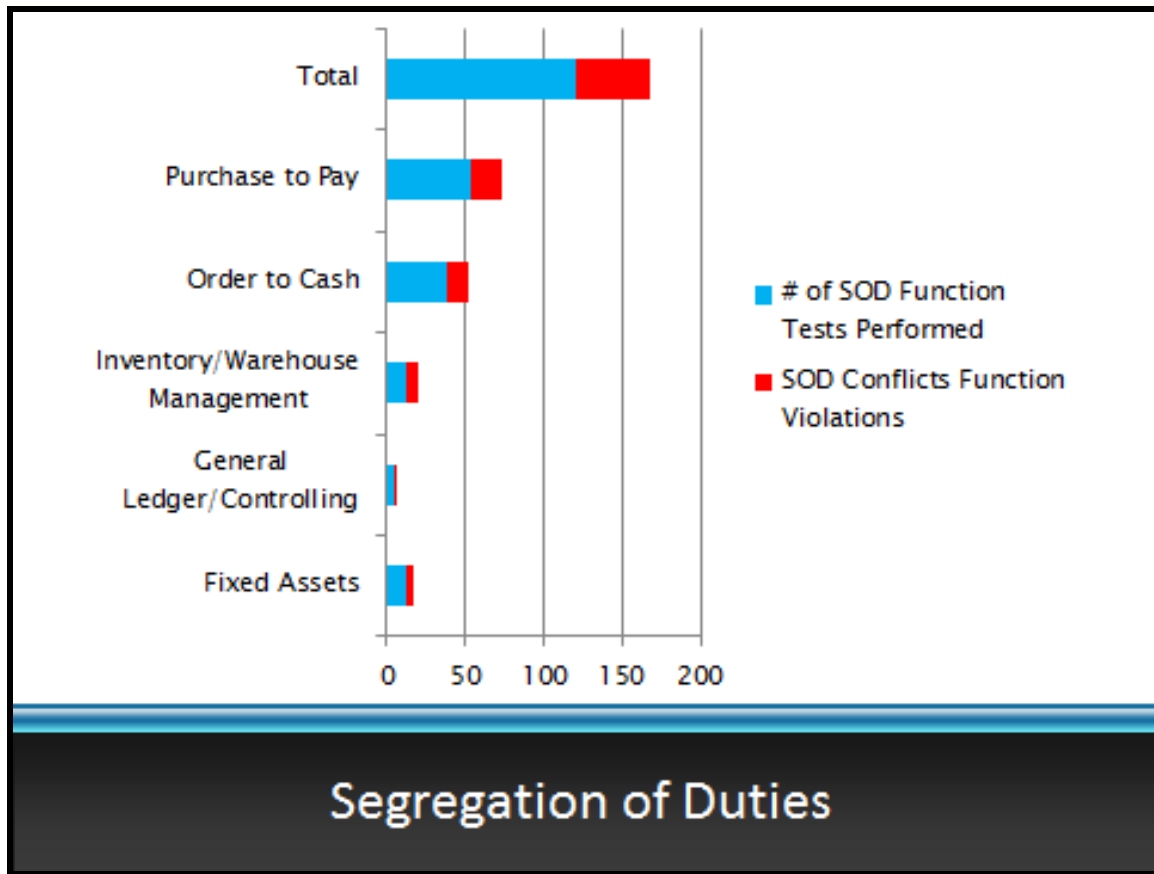
Our Additional Recommendations and Report Shortcomings

Role Based Matrix
- Alter existing role matrix to respond to SOD violations
- Redefine current roles to restrict permissions or create new specific roles

Support Module
- Chain of individuals that creates outlets for assistance
- RACI model: Who is **R**esponsible, **A**ccountable, **C**onsulted and **I**nformed to respond to support issues

Cost–Benefit
- Analyze which SOD conflicts are worth fixing
- Some are critical; others are too minor
- Consider removal/hiring new employees

Management Accountability

Vice President of North American Finance Operations	Chief Information Officer	Head of Internal Audit
•Responsible for overseeing the dispensing of accurate financial data	•Make strategic goal decisions •Oversee IT during ERP implementation	•Audit the departments & monitor SOD for violations and conflicts
•ERP configured to conform to financing process requirements	•Assignment of roles within the ERP system's implementation	•Communicates ERP problems to the CIO for adjustment

Who is Responsible?

▸ All three members of management are accountable to a certain degree for the ERP implementation and oversight.

▸ However, the VP of Finance has primary accountability
  ◦ Signs off on business process requirements
  ◦ Ensure systems configured properly

Application of Accounting and IT Knowledge

Accounting and IT Knowledge

Detailed findings
- Successful inventory management affects the integrity of financial reports
- Connection between fixed assets and depreciation

Final Report
- DrugCo, Inc. is in compliance with Sarbanes-Oxley Section 404
    - SOX 404 states that a company must report on internal control over financial reporting
    - Compliance can be expensive for companies (document and test financial & automated controls)

Deliverables of BFAC
- Using IT assets (ERP System) to improve SOD and sensitive access
- Displays understanding of capabilities of IT
- Alleviate organizational issues

SWOT ANALYSIS of ERP Review
Conclusion

Strengths
- Emphasizes SOX 404 compliance
- Streamlines information sharing
- Automates and organizes company

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Weaknesses
- Some SOD and Sensitive access violations are not accounted for

Opportunities
- Provides opportunity for increased efficiency within internal control environment

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Threats
- Poor implementation could slow down business processes

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