**CHAPTER 22**

**SYSTEMS DESIGN, IMPLEMENTATION, AND OPERATION**

**SUGGESTED ANSWERS TO DISCUSSION QUESTIONS**

**22.1** **Prism Glass is converting to a new information system. To expedite and speed up implementation, the CEO asked your consulting team to postpone establishing standards and controls until after the system is fully operational. How should you respond to the CEO’s request?**

The consulting team should strongly advise the CEO that postponing standards and controls is not advisable. Rather than save time and money, the company will probably lose time in the future when unanticipated problems and weaknesses arise due to the lack of standards and controls. The following are reasons why performance standards and control procedures should be established before the system becomes operational:

* Internal control considerations must be taken into account when assigning job responsibilities.
* Job descriptions and work schedules must include the various control procedures.
* Performance standards associated with each position must be considered when selecting personnel to operate the system.
* Documentation standards and data security provisions must be formulated before the system can be operational.
* Error checks must be built into all computer software systems.
* Procedures for guiding users and operators through the system and the various error conditions must be established before the users and operators begin working with the new system.
* If the information system is not properly controlled, the information it produces will be of little value. Controls must be built into the system to ensure its effectiveness, efficiency, and accuracy.

**22.2** **When a company converts from one system to another, many areas within the organization are affected. Explain how conversion to a new system will affect the following groups, both individually and collectively.**

The following are possible responses to each of the five areas:

1. **Personnel**: Employees will be affected in at least two important ways.
   1. They may be reluctant to accept the new system. They may fear for their jobs, feel as if they are no longer vital components of the organization, or they may completely reject the new system, and refuse to utilize it.

* 1. They will have to learn new policies and procedures to work with the new system. Initially, this may cause a slight reduction of overall productivity until they learn the system.

**b. Data Storage**: One of the primary logistical concerns of implementing a new system is making the required data accessible to the new system. This often requires that files be converted to new formats and that the company's databases are restructured to accommodate the new system's information requirements. In addition, new sources of input may be required which will increase the need for employee instruction and training.

**c. Operations**: New personnel may have to be hired or current employees may need to be trained to run the new system. Users will have to adjust to new system inputs and outputs. The company as a whole will be affected by changes in employee morale and productivity until the personnel are accustomed to and proficient with the system.

**d. Policies and Procedures**: A new information system usually requires new operating policies and procedures, including those for data security and control, error checking, documentation, backup and recovery procedures, and file maintenance. These new policies and procedures should be disseminated to the employees before the actual conversion takes place to ensure that the employees are aware of the new requirements and to facilitate the system conversion.

**e. Physical Facilities**: The effect on the physical facilities will be largely determined by the size and nature of the system being installed. For example, a server will only require a corner or perhaps a small room, whereas a mainframe may require a large facility. In any event, the company will need to be concerned about physical access to the system; off-site backup and recovery procedures; protection from fire, flooding, and other disasters; office space for programmers and operators; lighting, air conditioning, and humidity control; and data communications facilities.

**22.3** **The following notice was posted in the employee cafeteria on Monday morning:</para><opening>**

**<para><emphasis>*To:* </emphasis>All Accounting and Clerical Employees</para>**

**<para><emphasis>*From:* </emphasis>I.M. Krewel, President</para>**

**<para><emphasis>*Subject:* </emphasis>Termination of Employee Positions</para></opening>**

**<extract><para>*Effective this Friday, all accounting and clerical employees not otherwise contacted will be terminated. Our new computer system eliminates the need for most of these jobs. We’re grateful for the loyal service you’ve rendered as employees and wish you success. You may wish to pick up your final checks on Friday before you go.*</para></extract>**

**<para>Discuss the president’s approach to human resource management.**

</para></question><question id="ch20ques14" label="20.4">

This approach is clearly unproductive and it would not work.

**What are the possible repercussions of this episode?**

* Sabotage of the new system by disgruntled employees.
* Employees not released will probably harbor ill feelings towards the company. Employees may reflect these feelings through poor work performance, lower productivity, higher absentee rates, and resentment towards the new system.

**Assuming that job termination is the best alternative available, how should management approach the situation?**

* Management should discuss the situation in person with each employee.
* The changes that are being made should be clearly communicated to each employee.
* Every effort should be made to relocate employees within the company and offer early retirement incentives where possible.
* Terminated employees should be told in person.
* Giving employees a week's notice that they are "being replaced by a computer" may well result in the system being sabotaged.
* Employees should be terminated on Friday afternoon and given the appropriate severance pay.
* The termination should not come as a complete surprise to the employees. The employees should have already known that every effort was made to relocate them within the company and that termination was a last resort.

**22.4 In which phase of the systems development life cycle would each of the following positions be most actively involved? Justify your answers.**

**a. Managerial accountant** - The managerial accountant is usually involved in the analysis phase as designers assess their needs as users. The project development team may also ask the accountant to help with an economic feasibility analysis. In addition, the accountant may also assist in the design phases, helping design reports.

**b. Programmer** - Most of the programmer's involvement comes during the physical design and the implementation and conversion phases - coding, testing, and debugging computer programs. The programmer is also involved with the maintenance phase, making modifications to the system and fixing bugs.

**c. Systems analyst** - The analyst is usually involved in all phases of the SDLC.

**d. Financial vice president** - The financial vice-president is usually involved in the systems analysis phase. However, as a member of the steering committee the financial VP will oversee all phases of the SDLC.

**e. Information systems manager** – The IS manager is responsible for overseeing all information systems activities; she will be involved in all phases of the SDLC.

**f. Internal auditor** - The auditor is often consulted during the systems analysis phase when security requirements for the new system are determined. During the design phase, the auditor will often test controls to insure their adequacy. The operation and maintenance phase lasts indefinitely and it is during this phase that the auditor conducts his routine audit tests.

**22.5 During which of the five SDLC stages is each task, labeled (a) through (m), performed? More than one answer may apply for each activity.**

**a. Writing operating procedures manuals** - Physical (detailed) systems design phase and Implementation and conversion phase

**b. Developing program and process controls** - Physical (detailed) systems design phase and Implementation and conversion phase

**c. Identifying alternative systems designs** - Conceptual (general) systems design phase

**d. Developing a logical model of the system** - Conceptual (general) systems design phase

**e. Identifying external and administrative controls** - Conceptual (general) systems design phase

**f. Testing the system** - Implementation and conversion phase

**g. Training personnel** - Implementation and conversion phase and Operation and maintenance phase

**h. Evaluating the existing system** - Systems analysis

**i. Analyzing the achievement of systems benefits** - Operation and maintenance

**j. Modifying and altering programs** - Operation and maintenance

**k. Analyzing total quality management (TQM) performance measures** - This can be done in all phases, but is most likely in the first (systems analysis) and last (Operation and maintenance).

**l. Conducting a feasibility analysis** - Feasibility tests are conducted at all phases of the SDLC.

**m. Aligning AIS development plans with business objectives** - Systems analysis phase

**SUGGESTED ANSWERS TO THE PROBLEMS**

**22.1 You were hired to manage the accounting and control functions at the Glass Jewelry Company. During your introductory meeting, the president asked you to design and implement a new AIS within six months. Company sales for the past year were $10 million, and they are expected to double in the next 18 months.**

**Outline the procedures you would follow to complete the assigned project.**

a. You would perform the following steps to design and implement a new AIS:

* systems analysis (initial investigation, systems survey, feasibility study, and determining information needs and system requirements)
* conceptual design (evaluate design alternatives, prepare design specifications, prepare conceptual systems design report)
* physical design (output, file and database, input, program, procedures, and control design)
* implementation of the system (implementation planning, prepare site, select and train personnel, complete documentation, test system, and convert to the new system)
* operate and maintain the system

**Include a description of the following:</para>**

1. **Sources of Information**

* company documents (organization charts, job descriptions, and procedure manuals)
* current system outputs, reports, and documentation
* interview users and management
* observation of the current procedures

2. **Methods of Recording Information**

* prepare narrative descriptions and organization charts
* prepare data models
* prepare document, systems, and program flowcharts
* prepare data flow diagrams
* complete questionnaires

3. **Methods of Verifying the System Description**

* discussion with users
* transaction testing
* observation

**b.** **The accounts payable system will contain a number of programs, including Enter Invoices and Print Payable Checks. For each program, describe its purpose and outline application control considerations.**

1. Enter Invoices

This program permits operators to enter unpaid vendor invoices into the Accounts Payable system. The program should enable the distribution of the invoice to specific general ledger accounts. Controls include:

* check to ensure that the vendor number is on file, i.e., valid vendor number
* ensures that the invoice has not been previously entered, i.e., duplicate entry
* ensures that the invoice has been fully allocated to general ledger accounts
* ensures that the general ledger account numbers are valid
* ensures that items were ordered and received and that prices and other charges are ok

2. Print Payable Checks

This program generates supplier checks to pay outstanding invoices. Controls include:

* ensures that the vendor number on the invoice is valid (i.e., vendor is still on file)
* ensures that checks are used in sequential order
* ensures that only the outstanding invoice amount is paid
* lists the invoices and the amount paid by the check (i.e., the remittance list)
* ensures that negative checks are not printed
* ensures that checks do not exceed a predetermined amount
* ensures that there is an approved, unpaid invoice in the Accounts Payable file before making a payment

**22.2** **Wang Lab’s tremendous growth left the company with a serious problem. Customers would often wait months for Wang to fill orders and process invoices. Repeated attempts by Wang’s understaffed IS department to solve these problems met with failure. Finally, Wang hired a consulting firm to solve its revenue tracking problems and expedite prompt receipt of payments. The 18-month project turned into a doubly long nightmare. After three years and $10 million, the consultants were dismissed from the unfinished project.**

**The project failed for many reasons. The systems development process was so dynamic that the failure to complete the project quickly became self-defeating as modifications took over the original design. Second, management did not have a clear vision of the new AIS and lacked a strong support staff. As a result, a number of incompatible tracking systems sprang from the company’s distributed computer system. Third, the project was too large and complex for the consulting firm, who had little experience with the complex database at the heart of the new system. Finally, the project had too many applications. Interdependencies among subprograms left consultants with few completed programs. Every program was linked to several subprograms, which in turn were linked to several other programs. Programmers eventually found themselves lost in a morass of subroutines with no completed program.**

**The IS department finally developed a system to solve the problem, but their revenue tracking system suffered quality problems for years.<para>**

**Wang Labs asked you, a member of the IS staff, to write a memo explaining the failure of the systems development project.</para>**

**a. Why did the development project fail? What role did the consultants play in the failure?**

* **Dynamic requirements.** The development process was so dynamic that the failure to complete the project quickly was self-defeating as modifications took over the original design. System requirements were never “frozen” so the project could be completed.
* **Management did not have a clear vision of the new system.** As a result, incompatible tracking systems sprung up throughout the company's distributed processing system.
* **Management lacked a strong IS staff.** A qualified IS staff could have planned and managed the development project better, improving the chances for success.
* **The project was too large and too complex and the consulting firm had little experience.** The firm had little understanding of the desired technology: a complex database that represented the heart of the new system.
* **The project had too many applications**. Interdependencies among subprograms and subroutines left consultants with few completed programs.

**b. Identify the organizational issues that management must address in the future.**

* **Management should develop a unified strategic information plan.** Organizations should reinforce their business strategy with a complementary information strategy.
* **Wang should establish an IS steering committee to govern the development process and support the strategic plan.** A steering committee monitors systems development activities and could have provided management oversight to the consulting team.
* **Wang should support the strategy with an expanded, qualified IS staff.** A company's reputation is tarnished when it develops an inadequate and unreliable system. Management should hire a larger IS staff, adding more qualified employees – ones that have the necessary skills to support the information strategy.
* **Wang should set policies governing systems development.** Well-established procedures governing the planning, scheduling, design, implementation, and documentation of a new information system can minimize the risk of runaway projects. Management must also set standards governing the selection of consultants, if necessary.

**c. Recommend steps the company could take to guarantee consulting service quality.**

* **Wang should improve existing development policies.** Wang must first establish its internal development policies that govern the systems development process. For example, a more effective internal MIS staff can provide the consultants with necessary support.
* **Wang should establish consulting services evaluation criteria.** Management must view consultants as vendors and evaluate which consulting firm provides the best service at a fair price. This may include closed bidding, background checks, credential checks, and probing meetings to determine if the firm has the skills to complete the project.
* **Wang should use an IS steering committee and project development teams to monitor consultants.** An oversight body can reinforce the information strategy and hold the consulting team accountable for the development process.

**22.3** **Tiny Toddlers, a manufacturer of children’s toys and furniture, is designing and implementing a distributed system to assist its sales force. Each of the 10 sales offices in Canada and 20 in the United States maintains its own customers and is responsible for granting credit and collecting receivables. Reports used by each sales office to maintain the customer master file and to enter the daily sales orders are shown in Figures 22-4 and 22-5.**

**<para>Evaluate the reports shown in <link linkend="ch20fig04" preference="0">Figures 22-4<xref linkend="ch20fig04" label="20-4"/></link> and<link linkend="ch20fig05" preference="0"> 22-5<xref linkend="ch20fig05" label="20-5"/></link> using the following format:**

**Weakness</para></entry> <entry valign="top"><para>Explanation</para></entry> <entry valign="top"><para>Recommendation(s)</para><link linkend="informaltable0" preference="1" role="generated"/>**

**Customer Maintenance Form**

| Weakness | Explanation | Recommendation(s) |
| --- | --- | --- |
| No fields for recording a new customer’s phone number, email address, or website. | Tiny Toddlers cannot call or email the customer or visit their website without this data. | The form should have fields for this information after the address information. |
| The form is not pre-numbered. | There is no way to ensure that all maintenance forms are processed and accounted for. | The form should have a preprinted number in the upper right or left corner. |
| No indication that information has been entered into the computer system. | The person entering the data does not initial the form after the data is entered into the system. A form may be missed or entered twice. | The report should have a space to record the initials of the person entering the data and the date it is entered. |
| There is no space provided for recording date the form is created (or the effective date of the change). | The company would not know the effective date of the change nor when the form was created. | An effective change date should be added to this report. If the effective change date can be different from the date the form is created, a field for that date should also be included. |
| The form does not have a place where the person who fills out the form can sign or initial. | If the data entry clerk could not read or understand the information on the form, she would not know who filled out the form. | A place should be provided for the person who fills out the form to sign or initial it. |

**22.3 (continued)**

**Sales Order Form**

| Weakness | Explanation | Recommendation(s) |
| --- | --- | --- |
| There is no indication that the customer approves of the order. | Where possible, all orders should be signed by the customer to ensure that the customer is responsible for requesting the order. | Provision should be provided on the form for the customer's order approval. |
| The form is not pre-numbered. | There is no way to ensure that all sales orders are processed and accounted for. | The form should have a preprinted number in the upper right corner. |
| There is no space to enter a ship to address or shipping instructions | The goods cannot be shipped to a different address than the customer’s office address, as there is no ship to address. Nor is there any want to know a customer’s special shipping instructions. | Add a ship to address to the sales order form as well as a space to record special shipping instructions. |
| There is no space for the customer’s purchase order number | There is no way for the company to reference back to purchase order from the customer | Add as space on the form for the customer purchase order number |
| There is no room for the unit price or extended amounts on the sales order form | There is no way to know if the customer was given a special price, a sale price, or a standard price. | Include columns for Unit Price and Extended Amount. |

Some students may refer to the sales order form shown in the Revenue Cycle chapter.

**22.4** **Mickie Louderman is the new assistant controller of Pickens Publishers. She was the controller of a company in a similar industry, where she was in charge of accounting and had considerable influence over computer center operations. Pickens wants to revamp its information system, placing increased emphasis on decentralized data access and online systems. John Richards, the controller, is near retirement. He has put Mickie in charge of developing a new system that integrates the company’s accounting-related functions. Her promotion to controller will depend on the success of the new AIS.**

**Mickie uses the same design characteristics and reporting format she used at her former company. She sends details of the new AIS to the departments that interface with accounting, including inventory control, purchasing, human resources, production control, and marketing. If they do not respond with suggestions by a prescribed date, she will continue the development process. Mickie and John have established a new schedule for many of the reports, changing the frequency from weekly to monthly. After a meeting with the director of IS, Mickie selects a programmer to help her with the details of the new reporting formats.**

**Most control features of the old system are maintained to decrease the installation time, with a few new ones added for unusual situations. The procedures for maintaining the controls are substantially changed. Mickie makes all the AIS control change and program-testing decisions, including screening the control features related to payroll, inventory control, accounts receivable, cash deposits, and accounts payable.**

**As each module is completed, Mickie has the corresponding department implement the change immediately to take advantage of the labor savings. Incomplete instructions accompany these changes, and specific implementation responsibility is not assigned to departmental personnel. Mickie believes operations people should learn as they go, reporting errors as they occur.**

**Accounts payable and inventory control are implemented first, and several problems arise. The semimonthly payroll runs, which had been weekly under the old system, have abundant errors, requiring numerous manual paychecks. Payroll run control totals take hours to reconcile with the computer printout. To expedite matters, Mickie authorizes the payroll clerk to prepare payroll journal entries.**

**The new inventory control system fails to improve the carrying level of many stock items. This causes critical stock outs of raw material that result in expensive rush orders. The new system’s primary control procedure is the availability of ordering and user information. The information is available to both inventory control and purchasing personnel so that both departments can issue timely purchase orders. Because the inventory levels are updated daily, Mickie discontinues the previous weekly report.**

**Because of these problems, system documentation is behind schedule, and proper backup procedures have not been implemented. Mickie has requested budget approval to hire two systems analysts, an accountant, and an administrative assistant to help her implement the new system. John is disturbed by her request because her predecessor had only one part-time assistant.** Adapted from the CMA Exam.

**a.** **List the steps Mickie should have taken during while designing the AIS to ensure that end-user needs were satisfied.**

* Interviews should have been conducted with users affected by the changes to understand existing system and business processes, what organizational units are affected by the changes, procedures used to provide information, decision users make and the information needed to make them, current problems users face, needed improvements, and future information needs
* The capabilities of the new system should have been explained so users can determine how the capabilities can be used to improve the system – ways the developers may not have thought of. In other words, employees in the individual departments should have been encouraged to make suggestions for changes and improvements.
* Mickie should not have automatically assumed that the things that worked for her previous employer would work at Pickens. While they can be used as a starting point, Mickie needs to make sure that the human aspect of systems development is not ignored. That is, Pickens employees have to buy into the new system.
* As the different parts of the system are developed, the changes should be reviewed with the affected users to ensure that their needs are met. Mickie should have been more proactive in this process. It is not acceptable to give them a date to respond and then proceed with development if she does not hear from them. The users should have been actively involved in the development process all during development. This would endure that all affected users approve of the changes and buy into the change.
* Mickie and John should not take upon themselves the responsibility of determining what information users need or when they need it. They should not have established a new schedule for many of the reports, changing the frequency from weekly to monthly.
* Mickie should not have <para>assumed that the control features of the old system were sufficient in the new system. While this may save time, it does not ensure adequate controls. Mickie should not change the procedures for maintaining the controls without user input and approval. In fact, all controls issues should be approved by the users.
* Mickie cannot possibly understand the system and user needs well enough to made all the control change and program testing decisions. The departments affected by the changes should have been consulted.
* <para>While having departments implement changes immediately might produce labor savings, there are more important things to consider when deciding when to implement the system. These include whether it has been completely tested and how it interfaces with the rest of the changes. This is evidenced by the problems that surfaced when the changes were introduced too soon.
* Incomplete instructions accompanied the changes, and specific implementation responsibility was not assigned to departmental personnel. That, and Mickie’s belief that operations people should learn as they go and report errors as they occur, is very bad development policy.</para>
* Documentation should be complete and back up procedures should be in place before a systems conversion takes place.

**b.** **Identify and describe three ways Mickie violated internal control principles during the AIS implementation.**

* Most of the control features of the "old" system were retained in the "new" system; however, the procedures for maintaining controls were substantially changed. The procedures and controls were not coordinated. More importantly, controls appropriate for the "new" systems were not properly developed and evaluated.
* Proper backup procedures were not implemented in many areas. This put the system and overall operations in a vulnerable position.
* Systems, programming, and operating documentation were behind schedule. Documentation should be complete before a systems conversion takes place.
* Separation of duties was violated by allowing
  + both inventory control and purchasing personnel to issue purchase orders
  + payroll clerks to prepare journal entries for payroll processing

**c. Identify and describe the weaknesses in Mickie’s approach to implementing the new AIS. How could you improve the development process for the remaining parts of the AIS?**

**</para></listitem></orderedlist></listitem></orderedlist>**

|  |  |
| --- | --- |
| **</pWeaknesses** | **Recommendations** |
| No systems analysis or feasibility study. | Perform a thorough systems analysis that includes a feasibility study. |
| Poor planning | Prepare a development plan, a budget, and a schedule for project completion. An accepted implementation plan for each module must be formalized and followed |
| Systems testing and reviews were not conducted prior to implementation. | All modules should be properly tested for processing, informational, and control effectiveness. . |
| Little or no user involvement | Users must participate in the development of the systems plan, the tests of information content and controls, and final implementation acceptance. |
| System modules implemented without adequate training, documentation, or instructions. | New modules should not be implemented until adequate documentation is prepared and all affected organizations and personnel have been appropriately trained. |

**22.5** **Ryon Pulsipher, manager of Columbia’s property accounting division, has had difficulty responding to the following departmental requests for information about fixed assets.**

1. **The controller has requested individual fixed assets schedules to support the general ledger balance. Although Ryon has furnished the information, it is late. The way the records are organized makes it difficult to obtain information easily.**
2. **The maintenance manager wants to verify the existence of a punch press that he thinks was repaired twice. He has asked Ryon to confirm the asset number and the location of the press.**
3. **The insurance department wants data on the cost and book values of assets to include in its review of current insurance coverage.**
4. **The tax department has requested data to determine whether Columbia should switch depreciation methods for tax purposes.**
5. **The internal auditors have spent significant time in the property accounting division to confirm the annual depreciation expense.**

**Ryon’s property account records, kept in an Excel spreadsheet, show the asset acquisition date, its account number, the dollar amount capitalized, and its estimated useful life for depreciation purposes. After many frustrations, Ryon realizes his records are inadequate and that he cannot supply data easily when requested. He discusses his problems with the controller, Gig Griffith.**

**RYON: Gig, something has to give. My people are working overtime and can’t keep up. You worked in property accounting before you became controller. You know I can’t tell the tax, insurance, and maintenance people everything they need to know from my records. Internal auditing is living in my area, and that slows down the work. The requests of these people are reasonable, and we should be able to answer their questions and provide the needed data. I think we need an automated property accounting system. I want to talk with the AIS people to see if they can help me.**

**GIG: I think that’s a great idea. Just be sure you are personally involved in the design of any system so you get all the info you need. Keep me posted on the project’s progress.** Adapted from the CMA Exam.

1. **Identify and justify four major objectives Columbia’s automated property accounting system should possess to respond to departmental requests for information.**

Chapter 1 lists the following seven characteristics of useful information

* *Relevant*. Information is relevant if it reduces uncertainty, improves decision-making, or confirms or corrects prior expectations.
* *Reliable.* Information is reliable if it is free from error or bias and accurately represents organization events or activities.
* *Complete.* Information is complete if it does not omit important aspects of the events or activities it measures.
* *Timely.* Information is timely if it is provided in time for decision makers to make decisions.
* *Understandable.* Information is understandable if it is presented in a useful and intelligible format.
* *Verifiable.*  Information is verifiable if two independent, knowledgeable people produce the same information.
* *Accessible.* Information is accessible if it is available to users when they need it and in a format, they can use.

The CMA exam answer included a characteristic not on the above list:

* *Flexibility.* Flexibility ensures that the computer will adapt to changing business needs without a complete redesign.

1. **Identify the data that should be included in the database for each asset.**

* Asset name
* Manufacturer
* Model
* Serial number
* Asset class code
* Company assigned asset number
* General ledger account number
* Location data (plant, department, building)
* Acquisition date
* Original cost
* Data for book depreciation and tax depreciation
* Maintenance record: cycle, date, amount
* Estimated salvage value

**22.6** **A credit union is developing a new AIS. The internal auditors suggest planning the systems development process in accordance with the SDLC concept. The following nine items are identified as major systems development activities that will have to be completed.**

1. **System test**
2. **User specifications**
3. **Conversion**
4. **Systems survey**
5. **Technical specifications**
6. **Post-implementation planning**
7. **Implementation planning**
8. **User procedures and training**
9. **Programming**

Adapted from the CIA Exam.

1. **Arrange the nine items in the sequence in which they should logically occur.**

The logical sequence of occurrence is as follows:

1. Systems Survey

2. User Specifications

3. Technical Specifications

4. Implementation Planning

5. Programming

6. User Procedures and Training

7. System Test

8. Conversion

9. Postimplementation Planning

1. **One major activity is converting data files from the old system to the new one. List three types of file conversion documentation that would be of particular interest to an auditor.</para></listitem></orderedlist>**

1. Conversion completion documentation indicating that all previously existing files have been converted at a satisfactory level of quality.

2. Operating test documentation indicating that the converted files are able to support the volume of work in the application.

3. Application approval documentation indicating that the implemented system had proper user and EDP management approval.

**22.7** **MetLife, an insurance company, spent $11 billion to acquire Travelers Life and Annuity from Citicorp in one of the largest insurance company acquisitions of all time. The Metlife CIO estimated it would take three years to integrate the two systems. Because the integration project was especially critical, he figured he could accomplish the integration in 18 months if he pulled out all the stops. The MetLife CEO gave him nine months to complete the task. To pull off the integration in nine months, he had to:**

* **Integrate over 600 IS applications, all with their own infrastructure and business processes. The new systems had to comply with “One MetLife,” a company policy that all information systems had to have a common look and feel companywide and be able to function seamlessly with other MetLife systems.**
* **Work with over 4,000 employees located in 88 offices scattered all over the globe.**
* **Supervise an oversight team and 50 integration teams in seven project management offices.**
* **Work with hostile, uncooperative Travelers employees for the six months it took to get regulatory approval and close the deal. The systems had to be integrated three months after the deal closed.**
* **Identify integration deliverables (144 in total) and manage the process to deliver them.**
* **Negotiate with Citicorp for hundreds of transition services that would not be immediately converted to MetLife’s systems.**

**a. What tasks do you think MetLife would have to perform to successfully integrate the Traveler systems into MetLife’s?**

* Separate Travelers’ IS operations and assets from Citicorp’s so MetLife could begin the systems integration process.
* Determine what systems had to be integrated before the deadline and which could be outsourced to Citicorp until they could be integrated into MetLife’s system.
* Develop a critical path for the integration process so delays in critical path activities did not delay the whole process.
* Train large numbers of employees in project planning activities and tools.
* Identify and freeze systems requirements as soon as possible. The project management team should establish early deadlines for systems requirements and hold users to them.
* Increase system capacity to handle all of the new data from the Travelers’ systems.
* Develop/modify transaction-processing systems to handle all of Travelers’ transaction data.
* Perform a security and privacy analysis of all of Travelers’ systems and determine needed upgrades to comply with MetLife’s security policies.
* Change Travelers’ laptop and desktop infrastructure so that it matched that of MetLife.
* Enlarge MetLife’s distribution system by integrating over 150 annuity and life insurance wholesalers and giving them appropriate access to MetLife’s systems.
* Add all 4000 plus Travelers’ employees to MetLife’s Human Resources and Payroll systems and to their email system.
* Move Travelers’ 6 life insurance and 2 annuity product lines to MetLife’s systems. Travelers’ investment portfolio had to be made accessible to MetLife managers before the deal closed. Both projects required MetLife and Travelers employees to analyze the differences between the ways data were stored in the two companies. They then had to map all data elements in each system so they could convert Travelers data to the MetLife data storage format. This was one of the most difficult acquisition tasks.
* Integrate the two company’s data centers. This required some data centers to be combined and others to be expanded.
* Determine system test capacities, build test environments, and lock down testing procedures and capabilities. Stress and user acceptance testing had to be performed at least 3 months prior to the integration date.
* Travel to every country and every major Travelers office to train former Travelers employees on the MetLife systems.

**b. Search the Internet for articles that describe the integration process. Write a two-page summary of the problems and successes that MetLife experienced while integrating the two systems</para></listitem></orderedlist></problem>.**

A number of articles describe MetLife’s experience. A particularly good article is “Nine Months to Merge” found in the February 20, 2006 issue of Information Week.

**22.8** **During final testing, just before launching a new payroll system, the project manager at Reutzel Legal Services found that the purchased payroll system was doing the following:**

* **Writing checks for negative amounts**
* **Printing checks with names and employee numbers that did not match**
* **Making errors; for example, $8 per hour became $800 per hour if a decimal point was not entered**
* **Writing checks for amounts greater than a full year’s salary**

**Fortunately, payroll was still installed on time, and only 1.5% of the checks had to be manually reissued every payday until the problem was solved.**

**Other problems were that no one had made sure the new system was compatible with the existing payroll database, and there appeared to be no formal transition between the development of the project and the implementation of the project. The system was never run in parallel.**

**Although the programming manager lost his job, the payroll problems helped raise awareness of the company’s growing dependence on IT. Lacking a major problem, there was a perception that the information system did not affect operations.**

**a. What does “the system was never run in parallel” mean?</para></listitem>**

Running in parallel refers to operating the old and new systems simultaneously for a period. A company processes all transactions with both systems, compares the output, reconciles the differences, and corrects problems. The old and new systems are run in parallel until the new system proves itself and the organization is certain that the new system is functioning properly.

**b. If the company had run the system in parallel, what should have occurred?**

Parallel processing protects companies from errors, but it is costly and stressful because the same set of transactions and activities must be processed twice. This places a significant burden on the company, a burden many companies are not willing to undertake. However, because companies often experience problems during conversion, parallel processing has gained widespread popularity.

If the company had operated the new and old systems in parallel, they should have been able to use the paychecks produced by the old system until all errors were detected and corrected.

1. **What other testing methodologies could have been used by the firm?**

The company could have implemented a pilot conversion where one office or branch of the company could have implemented, tested, and corrected any errors before releasing the system to the rest of the organization.

Alternatively, the company could have performed a phased conversion where a new system is implemented, tested, and modified one phase or module at a time.

1. **What other types of problems are evident from reading the case?**

There does not appear to be proper management or leadership of the system development, implementation, or testing processes involved in this system. For example

* Final testing should have been attempted prior to just before launching the payroll system.
* Management should have made sure the new system was compatible with the existing payroll database and the new system should have been tested using the existing database.
* There should have been a formal transition between the development of the project and the implementation of the project.

**22.9 A new program at Jones and Carter Corporation (JCC) was supposed to track customer calls. Unfortunately, the program took 20 minutes to load on a PC, and it crashed frequently. The project did not have a traditional reporting structure, and it appeared that no one was actually in charge. The lead project manager quit halfway through the project, the in-house programmers were reassigned to other projects or let go, and two layers of management loosely supervised the systems analyst.**

**Management hired consultants to fix the application, but after three months and $200,000, the project was discontinued. JCC did not check the references of the consulting firm it hired to create the new system. The consultants, who were located two states away, made many programming errors. Although the systems analyst caught some of the consultant’s mistakes, they grew increasingly distant and difficult to work with. They would not even furnish the source code to the project managers, most likely because they were afraid of revealing their incompetence.**

**a. Identify potential causes for the system implementation failure.**

• Leadership and managerial oversight is clearly lacking at Jones and Carter Corp (JCC). When the project was managed internally, the following problems existed:

* + There was no evident reporting structure to support and manage the project. It appeared that no one was actually in charge
  + The lead project manager quit halfway through the project
  + The in-house programmers who were familiar with the project were reassigned to other projects or let go.
  + Two layers of management loosely supervised the systems analyst.</para>

• Management falsely assumed that the problems could be solved by hiring a consultant. In truth, the problem with the project was internal and caused by poor management, supervision, and project management.

* When a consulting firm was hired, it does not appear that anyone checked out their competence, obtained referrals, or did any other due diligence with regard to the consulting firm.

**b. What steps should JCC have taken to successfully design and implement the call tracking system?**

* + - Start and end the process with a clearly designated manager over the project and with clearly defined lines of authority.
    - Institute a formal review process for hiring consultants.
    - Require change control documentation so managers can see what changes were made during development.
    - Assign a central manager for the project team who is the conduit for communication and decisions.

In summary, JCC should have followed the systems development processes explained in chapters 20-22.

**SUGGESTED ANSWERS TO THE CASES**

**22.1** **Citizen’s Gas Company (CGC) provides natural gas service to 200,000 customers. The customer base is divided into the following three revenue classes:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Class** | **Customers** | **Sales in Cubic Feet** | **Revenues** |
| **Residential** | **160,000** | **80 billion** | **$160 million** |
| **Commercial** | **38,000** | **15 billion** | **$ 25 million** |
| **Industrial** | **2,000** | **50 billion** | **$ 65 million** |
| **Totals** |  | **145 billion** | **$250 million** |

**Residential customer gas usage is highly correlated with the weather. Commercial customer usage is partially weather dependent. Industrial customer usage is governed almost entirely by business factors.**

**The company buys natural gas from 10 pipeline companies in the amounts specified in contracts that run for 5 to 15 years. For some contracts, the supply is in equal monthly increments; for other contracts, the supply varies according to the heating season. Supply over the contract amounts is not available, and some contracts contain take-or-pay clauses. That is, the company must pay for the gas volume specified in the contract, regardless of the amount used.**

**To match customer demand with supply, gas is pumped into a storage field when supply exceeds customer demand. Gas is withdrawn when demand exceeds supply. There are no restrictions on the gas storage field except that the field must be full at the beginning of each gas year (September 1). Consequently, when the contractual supply for the remain- der of the gas year is less than that required to satisfy projected demand and fill the storage field, CGC curtails service to industrial customers (except for heating quantities). The curtailments must be carefully controlled to prevent either an oversupply at year-end or a curtailing of commercial or residential customers so the storage field can be filled at year-end.**

**In recent years, CGC’s planning efforts have not been able to control the supply during the gas year or provide the information needed to establish long-term contracts. Customer demand has been projected only as a function of the total number of customers. Commercial and industrial customers’ demand for gas has been curtailed. This has resulted in lost sales and caused an excess of supply at the end of the gas year.**

**To correct the problems, CGC has hired a director of corporate planning. She is presented with a conceptual design for an information system that will help analyze gas supply and demand. The system will provide a monthly gas plan for the next five years, with particular emphasis on the first year. The plan will provide detailed reports that assist in the decision- making process. The system will use actual data during the year to project demand for the year. The president has indicated that she will base her decisions on the effect alternative plans have on operating income.** Adapted from the CMA Exam.

**1. Discuss the criteria to consider in specifying the structure and features of CGC’s new system.**

* Need for market information The factors that affect the demand and supply for gas must be isolated, their relative importance determined, and their effect quantified.
* Need for accuracy The level of accuracy required of the system determines the required level of detail, quality of the input data, and sophistication of the system logic. While the system must be designed to provide the accuracy that matches the need, care must be taken to ensure that excessive effort is not spent in being overly accurate in specific areas when the overall accuracy is inherently less due to the planning environment.
* Frequency of use The frequency of system use provides direction as to the level of automation and sophistication needed. If the system will be used only once each month to project the effect of the most recent actual data, it may be sufficient to develop a less sophisticated system. If it is likely that a variety of alternatives will be evaluated each month, a sophisticated, on-line system will be more desirable.
* Turnaround required The need for timely reporting at month end provides guidance as to the degree of automation and the level of complexity that will be appropriate. Because the system is to be used for both multi-year planning and monthly tactical planning, the system should be designed to provide for quick turnaround of results at month end. Accordingly, consideration must be given to minimizing data input requirements.
* Cost/benefit analysis The new system must be justified on a cost/benefit basis.
* Data processing environment Typically, planning systems require a significant amount of computer resources, both in terms of processing time and data storage.
* Supportability Company personnel must be able to support the system on an ongoing basis. This includes collecting and entering data as well as updating the system. If the support burden is excessive, the system will suffer from lack of timely reporting or will be run using simplifying assumptions that affect the degree of accuracy and credibility of the system. If the system cannot be readily modified and maintained, it will quickly fall into a state of disrepair and will no longer be used.

**2. Identify the data that should be incorporated into CGC’s new system to provide adequate planning capability. Explain why each data item it is important and the level of detail needed for the data to be useful.**

* Number of customers The customer count should be projected by month, unless customer growth is regular, in which case a base customer count can be used in conjunction with a growth factor. The customer count should be broken into categories based upon use which will facilitate estimating demand, [i.e., residential, commercial heating, commercial nonheating, industrial heating, industrial non-heating].
* Weather data The weather data needed to project heating requirements should be entered as needed. For the first year, meteorological trends may indicate an unusually warm or cold year. For the following years, average monthly weather data may be used. As the year progresses, more accurate short-term forecasts should be entered to improve the predictive ability of the panning system
* Heating factors Heating factors are data that convert weather data to customers' demand. They should be provided for each type of customer which uses heating, i.e., residential, commercial heating, and industrial heating. The heating factors need not vary by month unless it is determined that a seasonal relationship exists or that trends such as conservation are likely.
* Customer unit demand The average monthly consumption for each commercial and industrial nonheating customer must be provided, either as a constant or as varying over time, to reflect both seasonal fluctuations and longer term trends. This data would also be used to project the nonheating portion of commercial and industrial customer demand.
* Sales forecasts The sales to the top industrial accounts should be forecast individually by month for the first year of the five-year plan; future years may make use of annual growth rates. Heating and non-heating sales for all other customers will be projected by revenue class.
* Customer rate structure The customer rate structure should provide monthly rate information at the revenue class level, i.e., residential, commercial, and industrial. Data must be monthly to provide for periodic rate changes by revenue class.
* Supplier contract terms For each supply contract, the contract term (beginning and end dates), monthly volumes, unit costs, and take-or-pay conditions must be maintained.
* Storage field capacity The capacity of the gas storage field is required in order to determine if gas remains in storage that can be withdrawn to supplement pipeline supply.
* Priority system A priority system needs to be established in case the company needs to curtail service to its customers due to an inadequate supply of gas.

The first six factors are necessary in order to determine the demand for gas. The next two items are necessary to determine supply. The last item is necessary to give direction whenever the supply is not adequate to meet demand. Data must be considered on a monthly basis because of the implied monthly variations of demand and supply.