Preparing Graphical Representations of Business Processes and Making Inferences from Them

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ABSTRACT: In this case, students (1) listen to (or read a transcript of) conversations among managers of a convenience store company about current and contemplated supply chain processes, (2) prepare a system flowchart and a business process diagram (BPD) to represent the processes, and (3) use these graphical representations to make inferences about system effectiveness. The case contrasts the emerging practice of business process modeling with the more traditional practice of system flowcharting. Instructors can use the case to help students develop advanced skills in documenting business processes and to assess their ability to represent business processes and make inferences about process effectiveness. The case is appropriate for accounting information systems and business courses in which business process modeling skills are developed or applied. Students should have a general knowledge of sales, order entry, and purchasing processes and be able to prepare simple flowcharts and BPDs.

Keywords: business process diagram; business process effectiveness; business process evaluation; business process modeling; flowcharting.

THE CASE
The Business Situation: Convenience Store Merchandising at 24-Seven Company

Scene: Corporate and store managers of the convenience store chain 24-Seven Company are mulling over moving from their current batch-era system, to a more customer-driven model for merchandise in the stores as a way to increase same-store sales over time.

Kris (corporate logistics manager): “Let’s see if I get this. You want us to ditch a working system in favor of bleeding-edge technology that would let just any mom-and-pop outfit supply just a single store.”

Gerry (a store manager): “Yep! For example, my store gets tourist traffic, which wants locally crafted souvenirs. I’ve located several potential makers, but there’s no way they’re going to implement our current system. For small volumes, it’s too expensive because of the leased line...
from each vendor to Corporate and proprietary software on dedicated terminals. When I described
what would be required, one of the artisans said ‘Forget it! A dedicated system is so Neanderthal.
Let me know when I can use a web browser to get orders from you.’”

Kris: “But what about security on a web-based system. Couldn’t just anybody get into the
system?”

Jean (corporate information technology (IT) manager): “Well, no. Suppliers would only see
the orders meant for them because each one would have a unique user ID and password for
accessing its view of our order database. Small local vendors would use a web browser while large
vendors would do it programmatically each day.”

Gerry: “Kris, you just don’t want to think about having to tell high-volume suppliers like
those for drinks and snacks that they’d no longer be in charge of deciding how much product to
put in stores.”

Kris: “You’re right about that—they wouldn’t like it! They also wouldn’t like giving up their
ability to arrange product on shelves, which lets them monopolize the shelf space with their stuff.”

Izumi (corporate sales manager): “Kris, instead of pitching this to suppliers as taking away
privileges, do it as increasing sales.”

Kris: “I don’t understand. Explain it to me.”

Izumi: “Here’s the model. Store managers know their customers better than Corporate be-
cause they see them every day. They also know what’s happening in their areas, e.g., local athletic
events that would drive demand for branded merchandise and sports drinks. Instead of every store
getting the average delivery, store managers would order to fit their circumstances. At other
retailers where this has been tried, it’s led to increased same-store sales.”

Jean: “Even when big brands get less shelf space?”

Izumi: “Incredibly, yes! There’s another advantage. We wouldn’t have several hundred ven-
dors delivering to stores whenever they pleased, inevitably during busy times, making it hard for
store clerks to receive shipments, replenish shelves, and put the excess in the back room.”

Kris: “Umph! We’ll see. Would this work differently for the vendors that we send purchase
orders to and the high-volume vendors that essentially write their own orders as they replenish
shelf quantities?”

Jean: “Think of it as collapsing two parallel processes into one. Now, the commonality
between the two types of vendors is that we accept their invoices electronically over leased lines,
typically monthly. Instead of route drivers for high-volume vendors writing delivery tickets that
they return to their local offices, which drives the preparation of monthly invoices to us, high-
volume vendors would retrieve orders from the Corporate website.

Later, after everybody had a chance to think about possibilities

Kris: “I’m ready for more. How would stores get their stuff?”

Jean: “Each store would get one delivery before 5 am each day from one of the new distri-
bution centers. Store managers would work out delivery schedules with their local vendors, e.g.,
one supplying souvenirs. There wouldn’t be many of these for any one store.”

Kris: “How would the distribution centers get supplied?”

Jean: “By vendors retrieving orders from our order database at 3 pm each day, loading them
into their order entry systems, and preparing and delivering orders to distribution centers.”

Gerry: “The distribution centers would assemble shipments for each store. Store managers
like me would take inventory with a handheld computer, synch up inventory with the in-store
computer, predict what we need for the next day, and order it.”

Kris: “How early?”
Jean: “If store managers signed off on orders by 2 pm, Corporate could poll stores electronically for sales, inventory, and orders and analyze scanner data by store, region, and overall.”

Izumi: “Based on the sales analyses, Corporate would enhance store orders and post them for vendors.”

Kris: “Would store clerks’ work change?”

Gerry: “Just like now, they’d scan items for customers at the cash register and enter payments, which would update store inventory and sales on the store computer. In the future, they’d shelve ALL inventory.”

Kris: “You make it sound like the most natural thing in the world.”

Gerry: “Not only natural but less work! I can’t wait to quit manually counting shelf inventory daily and updating store inventory and preparing and sending a weekly sales report on paper to Corporate. It can’t be any fun to be the clerk at Corporate that key-enters the data from the reports, which update Corporate inventory and sales.”

Jean: “And the updated files become the basis for orders by store and a weekly analysis of overall sales.”

Kris: “I can see how the prospect of less routine work appeals to you. Why do I think it won’t work smoothly at first?”

Izumi: “You’re just pessimistic to the core! I remember you predicting years ago that 24-hour a day operation would fail. You made it work though.”

Kris: “I was younger then—had a lot more energy! I’m glad you remember the success part too! Just thinking about this makes me tired. I know how hard it is to learn new procedures!”

Required

Part 1: Preparing Graphical Representations of Business Processes

For 24-Seven’s supply chain as represented in the conversation above:

1. Prepare a one-page system flowchart representing the processes in the current system.
2. Prepare a one-page business process diagram (BPD) for the processes in the contemplated system.

Part 2: Diagram Construction Questions

Questions for assessing students’ skill in constructing the diagrams appear in the teaching notes to this case. The questions, keyed to diagrams seeded with errors, prompt students to distinguish between errors and correct representations. Each question calls attention to a specific aspect of a diagram and requires students to determine whether it is correct or incorrect and why.

Part 3: Practice and Assessment Questions

Practice questions. Select the best response for each question based on 24-Seven’s situation. The questions are independent of each other.

P1. In the current system, stores are likely to receive orders:
   a. Once every few days;
   b. Once a day;
   c. From one to a few times a day; or
   d. More than a few times a day.

P2. Compared to the contemplated system, the current system likely experiences:
   a. More stockouts because of less precision in ordering with the current system;
   b. About the same frequency of stockouts across categories of inventory items;
   c. About the same number of stockouts but clustered in different inventory items; or
   d. Fewer stockouts because of more precision in ordering with the current system.
P3. The most likely pair of reasons for why sales reports are prepared weekly in the current system is that:
1. There is no need for more frequent sales reports in the system;
2. The reports require human effort that is expensive and scarce;
3. Sales reports cannot be transmitted over leased lines to Corporate; or
4. The frequency was sufficient when the system was designed.
   a. 1 and 2;
   b. 1 and 3;
   c. 2 and 4; or
   d. 3 and 4.

P4. Store employees are likely to view their jobs as more interesting with the:
   a. Contemplated system because they would have more input into product selection;
   b. Contemplated system because they would oversee route drivers’ shelf replenishment;
   c. Current system because they can minimize stockouts by restocking shelves from the back room; or
   d. Current system because they have inventory in the back room to arrange and manage.

P5. Commenting about the contemplated system, one manager said “We want to go from having no idea what customers bought to predicting what customers want even before they know it.” The most productive strategy for working toward this goal would be:
   a. Asking customers to reveal what products they would like to buy;
   b. Perfecting the logistics of delivering small volumes of new items;
   c. Improving the accuracy of orders to vendors and staging them online; or
   d. Analyzing store scanner data and monitoring trends in popular culture.

Assessment questions. Objective questions for assessing students’ learning appear in the teaching notes to this case. This placement maximizes instructor flexibility by giving instructors control over the conditions under which they are viewed and used. The questions could be used at the completion of the case to assess learning or during the period students are preparing their flowcharts and BPDs to prompt deeper engagement with the business situation.
CASE LEARNING OBJECTIVES AND IMPLEMENTATION GUIDANCE

Motivation for Representing Business Processes Graphically

Since the mid-1990s, business process modeling has emerged as a way to accelerate the redesign of business processes and create reference models for reuse in subsequent redesigns of processes (Kalpic and Bernus 2002). The need for faster redesign of business processes emerged with business use of the internet, propelled by management’s belief in the competitive advantages afforded by deploying technology-enabled business processes (Osterwalder et al. 2005). In the same time frame, the passage of the Sarbanes-Oxley Act (U.S. Congress 2002) renewed interest in system diagrams for “depicting internal controls, data flows, and information flows related to key processes that support an organization” (Bradford et al. 2007). Bierstaker et al. (2009) found that auditors identified significantly more missing controls when they used a business process flowchart with no client-prepared control matrix than when they used a flowchart with a client-prepared control matrix or used no business process flowchart with or without a client-prepared control matrix. Not only are audit clients using business process flowcharts, but auditors can benefit from using them in their identification of internal control weaknesses.

The growth of business process modeling (Smith and Fingar 2003; Carnaghan 2006) signals a commensurate need for business and accounting educators to help students develop knowledge of and expertise in business process modeling (David et al. 2003; Peslak 2005). Although process mapping is common in industry (Bradford et al. 2008), few AIS texts cover the topic (Bradford et al. 2007). This case responds to the growing need for graduates to understand business processes, participate in their design and development, and use them to make inferences about process behavior. In Borthick’s (1996) categorization of learning objectives for the AIS course, the case pertains to the documentation objective comprising (1) understand symbolic representations of processes and (2) modify and create symbolic representations. This case affords hands-on learning in the documentation of systems using business process maps, an emerging topic that is beginning to appear in AIS textbooks, e.g., (Bagranoff et al. 2008; Turner and Weickgenannt 2008).

Learning Objectives

The high-level learning objectives for the case are to learn to prepare graphical representations of business processes and use them to make inferences about business process behavior. The case achieves the objectives through the sub-objectives of:

1. Prepare graphical representations of business processes from conversations about them:
   a. Prepare a system flowchart representing the current business situation;
   b. Prepare a business process diagram (BPD) representing the contemplated business situation.

2. Use process representations to make inferences about business process behavior:
   a. Characterize likely outcomes from a process;
   b. Compare behavior of processes;
   c. Infer reasons for system design;
   d. Evaluate business strategy;
   e. Identify dysfunctional aspects; and
   f. Design system improvements.

In part 1 of the case, learners prepare a system flowchart and a business process diagram (BPD). In part 2, learners respond to a small set of multiple-choice questions to practice for answering the questions in part 3. Learning objectives for the questions in parts 2 and 3 appear in Table 1.

Although the case is authentic in offering conversations among company managers, including in audio form, a limitation of this case is that it does not include a learning objective for observing the operation of the current system and integrating those observations into the diagram for it. We
point this out as an opportunity for future case writers to use video technology to overcome this limitation. Of course, observation would not be possible for the contemplated system.

Learning Theory: Situation Model Building

*Ambiguity and Complexity in Situation Model Building*

Business process modeling maps directly onto the theory of situation model building (Zwaan and Radvansky 1998; Barsalou 1999), in which one prepares for future action by constructing one’s own mental situation models in analogous prior situations. When documenting systems, auditors and system designers use a mental situation model that they have developed by documenting other systems previously. AIS textbooks often include exercises to help learners gain experience and thus form mental situation models that will help them document systems in their future careers. These exercises typically include a narrative that reveals specific procedural steps in temporal sequences. Learners read these narratives and translate them into graphical representations. A correctly prepared graphical depiction shows the procedural steps from the narrative in the same temporal order in which they appeared in the narrative. The learner’s task is, therefore, straightforward: convert a narrative that describes procedural steps in temporal order into a diagram that displays those procedural steps in the same temporal order. The task requires only a simple mental model because the structure of the prompt and the outcome are so similar (Stout et al. 1997; Wyman and Randel 1998; Davis and Yi 2004).

Creating system documentation in such straightforward situations, however, does not prompt learners to make the inferences and elaborations they need to develop robust situation models that are useful in subsequent situations. Instead of straightforward situations, learners need situations with ambiguities and conflicts. As learners resolve the ambiguities and conflicts, they make the inferences and elaborations required to develop robust situation models that are useful later (Johnson-Laird 1983; van Dijk and Kintsch 1983; Gernsbacher 1997; Graesser et al. 1997; Zwaan and Radvansky 1998). An important feature of the case is its presentation of cues in the form of a conversation rather than as a temporally ordered narrative. The conversation format provides ambiguities and conflicts that learners must resolve to create a diagram of the system. As learners

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do this, they make the inferences and elaborations needed to create robust situation models (Myers et al. 1987) to use when they encounter similarly complex tasks in their future careers.

**Constructing System Diagrams: An Application of Situation Model Building**

In the case, learners explicitly model two generations of processes associated with a convenience store company’s supply chain. As portrayed in conversations among company managers, the current and contemplated situations are sufficiently complex and ambiguous to require learners to make inferences and elaborations as they encounter successive bits of information about the situations. The information is presented out of temporal sequence as managers alternate between discussing the current situation and the contemplated situation. The discussion occurs in a natural way with one manager’s thoughts prompting related thoughts or questions from other managers.

To demonstrate their comprehension of the situations, learners prepare a system flowchart and a business process diagram (BPD). In the terminology of the theory of situation model building, the flowchart and BPD are manifestations of learners’ comprehension of the situations revealed in the conversations, indicating the extent to which learners have achieved coherent situation models (Johnson-Laird 1983; van Dijk and Kintsch 1983; Gernsbacher 1997; Graesser et al. 1997; Zwaan and Radvansky 1998).

Unlike documentation cases that are organized in narratives that reveal procedural steps in temporal sequences, this case reveals process elements in no particular order. Switching back and forth in the conversations between the current and contemplated systems makes the case more authentic because it reflects the way managers talk about their businesses (Orr 1996). The authenticity of the conversations and the temporally unsequenced presentation of the business process elements prompt learners to make the inferences and elaborations they need to construct robust situation models. A narrative in temporal sequence would not prompt nearly as many inferences and elaborations (Myers et al. 1987), which gives the authentic conversations more learning value than a sequential narrative (Gernsbacher 1997; Zwaan and Radvansky 1998).

**Prerequisite Skills**

To work the case, students need to have a general understanding of sales, order entry, and purchasing processes. Before beginning the case, students need to be able to prepare system flowcharts and business process diagrams (BPDs) at the level of difficulty of exercises that typically appear in documentation chapters in AIS textbooks or in systems analysis and design textbooks. We assume students have no prior experience using graphical software. We introduce the use of graphical software for preparing diagrams at the level of textbook exercises to enable students to have some experience with it before beginning the case. Instead of a textbook exercise, a case that could be used before this one to give students practice preparing a less complex BPD is Bradford et al.’s (2008) Beta Auto Dealers.

**Course Use**

The case is suitable for courses in AIS and IS in which students learn to prepare graphical representations of information systems. The case can be used as an individual or as a team assignment in the latter part of an introductory undergraduate AIS course or anywhere in an advanced undergraduate or graduate AIS course. If students complete the multiple-choice questions in part 3 individually as an in-class assessment of proficiency, the questions in part 3 could serve as a control on freeloading by team members on the preparation of the system flowchart and BPD in part 1.

**Graphical Software Choice**

We recommend Microsoft Visio® or equivalent diagramming software for student preparation of the flowchart and BPD. Informally, accounting firm staff members report growing use of
Microsoft Visio® for preparing system documentation. Microsoft Excel® and Microsoft Word® can also be used. Microsoft Excel® has no page size limits but defaults to resizing diagrams; Microsoft Word® has fixed page sizes but does not resize diagrams. A good, short tutorial on using Microsoft Excel® for flowcharting is Lehman (2000).

**Business Process Modeling Choice**

We use the Business Process Modeling Initiative (2004; hereafter BPMI) Notation Working Group’s Business Process Modeling Notation (BPMN; BPMI 2004) for the business process diagram because BPMN was specifically designed to enable business users, business analysts, technical developers, and business managers to obtain the benefits of a common format for representing business process models. The documentation in White’s (2004) introduction, available at no cost from the BPMI website, has been sufficient guidance for students for preparing the process diagram for this case. The reason we believe White’s (2004) introduction has been sufficient is due to the simplicity of the basic symbol set, comprised of the following elements: events (start and end), activity, gateway, flow (sequence, message, and association), and labeled swim lane. After developing both flowcharts and BPDs, students uniformly prefer BPDs for ease of preparation and use.

Because of BPMN’s newness, resources for helping students learn to develop BPDs are not plentiful. Some useful ones are Damelio (1996) and Bradford et al. (2001). Bradford et al.’s (2008) Beta Auto Dealers case, which has students prepare a simple BPD from a temporally ordered narrative, could be used before this case to introduce students to business process modeling. Other cases with BPD requirements exist, but those would be best used after students gain BPD experience with this case, e.g., Borthick and Jones (Borthick and Jones 2007) wireless billing case and Borthick et al.’s (2008) RFID data analysis case.

**Flowcharting versus BPDs**

We suggest that students prepare a flowchart to represent the current system, which was developed before BPDs were conceived, and a BPD to represent the contemplated system. This approach matches business practice with respect to graphical documentation of systems at the time they were developed. Organizations are on the cusp of a change in the predominant approach. Before a business process diagramming standard was developed (BPMI 2004; White 2004), the predominant approach was flowcharting. Increasingly, organizations are adopting BPDs as a common graphical format to enable business users, business analysts, technical developers, and business managers to communicate more readily. Eventually, BPDs (or their successors) are likely to drive automated coding systems that maintain consistency between the graphical representation and the system itself (Kalpic and Bernus 2002).

Regardless of practice authenticity, we offer flowcharts and BPDs for the current and contemplated systems in the teaching notes so that instructors can choose the formats they want their students to prepare. For example, if they want to emphasize preparing BPDs, instructors could give students the flowchart or the BPD for the current system and ask them to prepare the BPD for the contemplated system.

**Case Staging**

**Preparing and Publishing the Diagrams**

We make the case assignment available to students from a password-protected course website. We have staged the conversation in two ways: as an audio Macromedia Flash™ file and in text form in an HTML page. In either case, we give students a week to prepare the flowchart and BPD and publish them in their individual university-provided web spaces. All students publish the diagrams even if they work in teams.
For web publishing, we specify the filenames, e.g., 24-SevenFlowchart.htm and 24-SevenBPD.htm, which allows us to prepare a linking page to make every student’s work viewable on the web. For example, directions to students for preparing the flowchart in Microsoft Excel® are:

1. Prepare the flowchart in Microsoft Excel®
2. Save the file as web page (*.htm, *.html) named 24-SevenFlowchart.htm
3. In your university web space in the …/Acctxxxx/folder:
   a. Publish the subfolder 24-SevenFlowchart_files, which will publish the folder and all the *.gif files that Microsoft Excel® creates when you save 24-SevenFlowchart.htm
   b. Publish 24-SevenFlowchart.htm in the …/Acctxxxx/folder

Directions for preparing the flowchart in Microsoft Visio® or some other graphical representation program are:

1. Prepare the flowchart in Microsoft Visio® or some other graphical representation program
2. Generate a *.gif file containing the flowchart named 24-SevenFlowchart.gif
3. Insert the *.gif file into a blank HTML file named 24-SevenFlowchart.htm:
   a. In the subdirectory with the *.gif file, open Microsoft Word® and save a blank file as web page (*.htm, *.html) named 24-SevenFlowchart.htm
   b. Insert the *.gif file: Insert | Picture | From File | Select 24-SevenFlowchart.gif
   c. Save the file as web page (*.htm, *.html) named 24-SevenFlowchart.htm
4. In your university web space in the …/Acctxxxx/folder, publish the files:
   a. 24-SevenFlowchart.htm
   b. 24-SevenFlowchart.gif

Discussing the Diagrams in Class

In the class session in which the flowcharts and BPDs are due, we have used two different strategies in class discussion. For classes of students that have already developed proficiency in preparing flowcharts and BPDs, we invite students to ask the class to examine specific portions of their work for the purpose of untangling confusing aspects. Typically, there will be enough volunteers to show a variety of interpretations, which allows students and the instructor to comment on the work. This approach has the advantage of turning students’ attention away from an instructor version to students’ work, which reinforces a classroom atmosphere of “We are working together to develop our skills. Furthermore, it is the process of learning how to construct the diagrams that matters rather than the instructor’s solution per se.” In classes in which every student has a PC with web publishing privileges, students have updated their diagrams in the class session, republished them, and asked the class to examine them again to verify that they successfully modified their diagrams in response to the comments they received. If they are reluctant to comment in class on others’ work, students can be asked to comment on a specific number of other students’ work before a class session.

In our experience, entirely outside-of-class preparation of the diagrams works better with graduate students than with undergraduate students. In undergraduate classes, some students have been unable to prepare the diagrams until they have an interactive experience in class to get them started. For these students and for students with no initial diagramming proficiency, we open Microsoft Visio® or Excel® (projected for the whole class to view) and ask the class to tell us what to do. If the response is “We don’t know where to start,” we lead the class in thinking through a series of questions. For the system flowchart, the questions are:

1. What column headings, corresponding to participants, do we need?
2. How should they be arranged, left to right, to minimize crossed flow lines?
3. What event initiates the process?
4. What events happen first in the process in what order?
After the class has worked through these questions, we begin by entering column headings and the first process symbol. In classrooms with a PC for every student, we ask students to prepare their own flowcharts with us. We pause after every symbol set so students can tell us what to do next. This approach paces the generation of the flowchart so that students can keep up with constructing their own flowcharts.

Our strategy for preparing the BPD is similar although instead of asking for column headings, the first question is “What swim lanes do we need for what participants and how should they be ordered, top to bottom, to minimize crossed flow lines?” At the end of the session, the instructor and students publish their flowcharts and BPDs on the web. Preparing the BPD for the contemplated system typically takes less time than preparing the flowchart for the current system because students are already familiar with the current situation and use it as a reference point, which affords some time economy in working through the contemplated business process.

Answering the Practice and Assessment Questions

We release the practice questions to students after they have prepared their flowcharts and BPDs so that they can assess their readiness to answer the multiple-choice questions. The questions are delivered in a learning management system (LMS) that scores the questions and returns feedback for each question. A week later, students answer the multiple-choice questions in class. In classes in which every student has a PC on the university network, students answer the multiple-choice questions in the LMS, which scores the questions and returns feedback.

Although the questions can be administered on paper, we prefer online administration for several reasons. We avoid using and handling paper, including mark-sense forms for student responses. LMS-administered questions allow instructors to be strategic in the information revealed to students about their performance. We set the exam so that students see “Correct” if they made the best choice for a question. Regardless of their choices, students see an explanation of how to think through each question to arrive at the best choice. This means that students have, in viewing their attempts, an opportunity to think through the questions they missed without the best response being prominently identified. Students get practice in taking exams online, which helps them get ready for computer-administered professional exams. The LMS affords flexible grading, including regrading if necessary, and offers reports of exam outcomes including means, standard deviations, and discrimination indices (Brennan 1972) by question. Together, these metrics help the instructor identify questions that are too hard or too easy and that fail to discriminate between students making correct choices because they have applied the needed skill and students making correct choices because they guessed correctly. In the early terms of using the questions, the discrimination indices were instrumental in guiding revisions to the questions and the case conversation. In our opinion, starting with paper exams would make obtaining these metrics untenable because of the associated data entry and labor requirements.

Evidence of Efficacy

From Faculty

Two instructors have used the case in multiple sections of a required AIS course for senior accounting majors across five years at a large urban, public university with a diverse student population. A third instructor has used the case in multiple sections of a required AIS course taken by junior and senior accounting majors at a small, private university with a traditional student population. The faculty comments below are based on this use.

Faculty members using the case noted that the process of describing a business process from a conversation among managers corresponds well to real-world system development and business process auditing practices in which staff accountants and auditors interview business personnel in order to understand and document a business process. Further, having students create their own
flowcharts and business process diagrams taught students how nuanced and difficult business process documentation can be. Students may not gain this same depth of experience if they prepare diagrams from narratives that are already in temporal sequences corresponding to transaction flows. Although our observations coincide with the anticipated increase in difficulty associated with extracting processes from free-flowing conversation rather than temporally sequenced narrative, we have not tested the differences formally.

Faculty members have found discussing the diagram work of a volunteer student in class to be very useful. This approach was more interesting to students because it showed the class an interpretation of the business process that was different from the instructor’s. Then, the class was engaged in a discussion of the relative merits and advantages of each person’s interpretation. Through discussion, students realized that different versions of the diagrams could be considered good representations of the systems. Discussion of different diagrams deepened students’ understanding of the business processes through critical analysis of alternative approaches.

A useful diagramming technique was to capture (in writing) phrases representing each action and the actor on sticky notes and arrange them in temporal sequences by actor before starting to use graphical software. Another useful technique was to read/listen to the conversation after preparing the flowchart/BPD to verify that each action was represented in the flowchart/BPD.

The volunteers asking for comments on their work tended to be students that had tried to prepare the flowcharts and BPDs completely and accurately. Seeing this work-in-process is a good experience for other students because (1) a specific student’s work is apt to be somewhat different from other students’ equally good work and (2) students that are not as far along in their work get a reality check on what constitutes complete and accurate work.

With respect to the strategy of students developing the flowchart/BPD in class with instructor prompting, it is important for the instructor to observe what students are doing at regular intervals in order to pace the class at a speed that is slow enough for students to develop their flowcharts/BPDs but fast enough to deter their losing interest. Going too fast engenders the risk of some students not keeping up, with the result that they cease being engaged in the class session. If there is insufficient time to develop the whole flowchart or BPD in a class session, it is important for students to leave the class session with an understanding of what remains to be done to complete it. If the incomplete aspects are not made explicit, some students are likely to think they are done when they are not. Having incomplete flowcharts and BPDs is almost sure to degrade performance on the multiple-choice questions.

Finally, the in-class teaching approach helped students see the usefulness and practicality of the various symbols used in system flowcharts and BPDs. Students then used their knowledge of the various system flowchart and BPD symbols to answer the multiple-choice questions. Teaching these same techniques in less demanding settings may not encourage the same level of student learning.

From Students

When first introduced to the case, some students found the case to be somewhat nebulous because the conversations discussed process aspects in seemingly random order rather than in sequential narratives like the cases in textbooks. Students reported coping strategies they used to make sense of the non-temporal order of the information, e.g., some students rewrote the conversation in temporal order of the processes. Others went through the conversation after they had completed the diagrams and checked off statements in the conversation once they concluded that their diagrams included the statements.

Undergraduate AIS students had some difficulty creating the system flowchart on their own before it was discussed in class. After students discussed each others’ flowcharts in class, however, many students found the process of developing flowcharts to be more straightforward. We attribute
these students’ initial difficulty to several factors. First, these students had not thoroughly understood preparation of the earlier, simpler flowcharts and BPDs that were assigned. Second, they did not read/listen carefully enough to capture all the actions. Third, they did not begin their flowchart and BPD soon enough to put adequate time on the task.

Although students acknowledged that obtaining details from an audio recording was similar to actual work scenarios requiring interviewing skills, many students found the process to be more difficult than working with the conversations in text form. This was especially true for students for whom English was a second language. We believe second-language students found the audio version more difficult because it required instant recognition of what the speakers said while the text version allowed students to read at their own paces. If students saw an unfamiliar word in the text, they could look it up. Although students could start, stop, and replay the audio version as they wished, we believe that reading for content is easier than listening for content when the content is unfamiliar and the objective is to represent the content graphically.

Because students were already highly familiar with Microsoft Excel®, they were able to focus more on the details of the process rather than on learning a new software tool. Second, the diagramming capabilities of Excel® were sufficient for the case, reducing the complexity and learning curve that students might experience using a different diagramming tool (such as Microsoft Visio®). Even so, students with low computing experience still had difficulty keeping up with diagramming activities in class.

Students were eager to see other students’ flowcharts and BPDs, which set up an atmosphere of learning from each other. This sharing helped students learn from the work of their peers and to compare the relative merits of their own chosen approaches with those of others in the class.

During the last week of class work on the case, one student, already employed as a consultant for an accounting firm, was on assignment to gather information for audit planning about a system under development. The student interviewed client and development personnel to gather information because system documentation had not been created. At a meeting of management, users, and development staff, the chief financial officer (CFO) asked for a succinct overview of the new system. When no response was forthcoming from management, users, or development staff, the student offered the system diagram resulting from having interviewed everyone over the previous two days. After studying it, the CFO turned to the development staff and said “This is precisely what I hoped to learn in a readily understandable format. Why haven’t you prepared documentation like this from the beginning of the project? It’s understandable by all of us, and now we can focus on the system rather than our incomplete, differing interpretations of it.” The CFO followed up by calling the student’s manager to offer the student a job.

SUMMARY

This case, based on the context of a convenience store company’s transition from a traditional system to a more technology-enabled system for managing its supply chain, gives learners experience in modeling business situations graphically. Students (1) prepare a system flowchart and a business process diagram and (2) use the graphical representations of the business processes to make inferences about the behavior of the two approaches to managing the supply chain. The case, suitable for AIS courses, includes multiple-choice questions for assessing learners’ business modeling proficiency objectively. The case responds to the need for learning experiences that help students develop business process modeling skills.

The Teaching Notes for this case include the following items:
1. BPDs and flowcharts for both systems in all forms: Correct diagrams, error-seeded diagrams, and diagrams annotated by construction question
2. Links to the following files:
   a. A Microsoft Visio® vsd file containing the diagrams;
b. A Microsoft Word® doc file containing the construction, practice, and assessment questions with feedback; and

c. The conversation in text form and in audio form.

TEACHING NOTES

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REFERENCES


