

## *SPECIAL ISSUE: TEACHING CASES*

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## Teaching Case

# System Development and Data Modeling for Stevens' Wholesale Health Supplies

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## Abstract

The case provides a realistic scenario that can be used in a systems analysis and design, accounting information systems or graduate level management information systems course. The case details the steps in the revenue and expense cycle processes of a health supply wholesale company providing students with the opportunity to map the business process data flows. Multiple assignment options are provided allowing instructors to select an assignment based upon course material coverage. Suggested assignments include the development of data flow diagrams, swimlane diagrams, a request for proposal and a response to the request for proposal, and database design and development artifacts. Instructor materials are available.

**Keywords:** Teaching Case, Process Design, Request for Proposal, Database Development

## 1. INTRODUCTION

Josh Stevens, a recent Accounting graduate of Midwest University, stared out his office window on the ground floor of Stevens' Wholesale Health Supplies (SWHS). He had a big task ahead and he wasn't sure where to begin. He reflected back to when he was six years old and used to play in cardboard boxes outside that very window. Those were much simpler times and Stevens' Wholesale Health Supplies was a lot smaller then. He wondered, however, how much the company would have grown if they had not relied so much on pencil and paper.

His parents, Robert and Sarah Stevens, had known for some time that they needed to move more of their office processes to an electronic

format. However, finding the time to do all of the research necessary to purchase, or hire someone to build, a new system while running daily operations was nearly impossible for them to do. Josh knew the moment that he graduated from his parents' alma mater that his first project at the family business would be to start researching their inventory supply process in hopes of moving it from an Excel workbook to a more robust system.

## 2. BACKGROUND

In the early 1990's, Robert Stevens was a health conscience marketing major taking classes at Midwest University. He was a regular at the University's gym where he met the love of his life, Sarah Smith, an exercise science and nutrition

major. After graduation, Robert took a job as a pharmaceutical representative and Sarah was employed by a local hospital as a registered dietitian. About a year later, Robert and Sarah got married and eventually started their own family with the addition of a precious baby boy they named Joshua, or "Josh" for short.

Robert had the gift of gab and was very good at selling pharmaceuticals. He was rewarded by a widening sales territory and growing customer list. With Robert's added responsibilities came a generous paycheck as well as more days away from home for sales calls. Sarah quit her job at the hospital to be a stay at home mom. Life seemed close to perfect except for Robert's phone calls home when Sarah would report on Josh's latest development milestone. Those things broke his heart. He was missing so much of Josh's life that they decided he should quit his traveling job and find something closer to home.

Robert hated the thought of losing the friendships he had developed with his longtime customers and the independence that he enjoyed as a sales representative. He also wasn't very fond of the spare tire he had developed around his midsection as a result of long hours in the car eating fast food. He was, however, looking forward to being with his family, joining a local gym and eating his wife's healthy home cooking.

As Robert started down the path for finding a new career and, now that he had the time, a healthier lifestyle, he realized that losing weight and gaining muscle were not as easy as they once were for him. He and Sarah also started running low on some of the health-related products he used to pick up for Sarah when he was in bigger cities on sales calls. These realizations made Robert start thinking if there might be a connection between the two and his future career.

### **3. STEVENS' WHOLESALE HEALTH SUPPLIES**

Robert discussed his thoughts with Sarah. With Robert's connections and Sarah's interest in diet and health, they came up with a plan for bringing vitamin supplements and health supplies to smaller markets. Robert busied himself working with the local small business development center to draw up a business plan. They quickly laid the foundation for their new company and applied for a small business loan. Stevens' Wholesale Health Supplies (SWHS) was born. What started out as a two person operation in the spare bedroom of their home had, in twenty years, grown into a

multi-state business employing fifteen sales people, three warehouse staff, five office workers and a recent new hire, their son Josh. Josh had grown up with the business. He went from playing with the boxes that had contained inventory shipments to breaking down boxes and taking out trash during summer vacations to now preparing to help design and oversee a system to monitor and order those boxes containing products to be shipped to clients around the country.

Although Josh was familiar with the company's operations, he didn't really know how everything worked. From his business classes, Josh realized that he needed to have a better grasp of the business processes. He wasn't getting any closer to that knowledge by staring out the window and thinking about boxes, so he decided that the best place to get started was where those boxes came into the picture, the warehouse.

### **4. WAREHOUSE**

Josh shook hands with Jerry in front of the warehouse manager's office. "Come on in Josh and have a seat. How can I help you?" Josh explained his first big project for the company and how he thought he should become familiar with the inventory process.

Jerry leaned back in his chair to get comfortable. "Well Josh, let's start even before the boxes get to the warehouse. SWHS has a list of approved vendors with whom we do business. Each one sells us a different product or set of inventory at an agreed upon price. When we get low on particular inventory, we send a purchase request listing the items and the quantity that we need to Sue in the main office. She has the office right next to yours. Sue usually orders inventory on Tuesdays and Thursdays; however, we fill out the purchase request form every morning at the start of the day based upon which items have reached their reorder point so that we can keep track of the requests being made. Most of our customers have standing orders which we fill each week. We also get special orders in, but we keep enough extra inventory on hand that we usually do not have to ask Sue to place a special order for us."

"I guess I should know this," Josh started, "but to make sure I understand, who are your customers and vendors?"

"That's actually a great question Josh," Jerry smiled. "Our name can kind of throw you off. We started out providing supplies to doctors' offices, health food stores, and vitamin supplement

stores. Once the inventory management system is developed, I think your parents are going to start trying to sell their products to individual people online. Our vendors are product manufacturers such as "Vital Health" for vitamins and minerals, "Herb's Herbs" for herbal supplements, "Personal Health Products" for personal care products such as Vitamin C and Retinol creams to reduce the signs of aging, and "Warrior Foods" who makes muscle building supplements and Paleo diet foods."

"How do you place the orders?" Josh asked.

"Our purchase request is a word processed form that we complete, save, and email each day to Sue. If there is an unexpected order, we usually receive an email from someone on the warehouse floor, asking us to place a special order. If the order needs immediate attention, we complete the purchase request form on the spot. However, most of the time the requested item is just added to the next mornings' purchase request. If Sue has to send a special purchase order to a vendor for a rush job, she will, but that is pretty rare."

"How does Sue contact the vendors?" Josh wondered.

"Sue has a word processed purchase order form that she emails to each vendor for the products that we purchase from that vendor. Sue saves a copy of each purchase order on her computer so that she can keep track of all of the orders that she has made. If we have a special order, Sue will call the vendor to give them a heads up on the order."

"What happens when you get the inventory?"

"Mike, our loading dock worker, usually gets at least one delivery every day. The deliveries usually come through UPS who also handles the shipments to our customers. Once he has checked the purchase orders and the shipping documents, he will unload the pallets of inventory from the truck and verify that the inventory matches the shipping documents. If everything matches, the purchase order and shipping documents are then sent to Wendy in the main office. She handles the accounts payable duties and pays each of our vendors. If the shipment does not match the shipping documents, then Mike notifies Sue of the discrepancy, sends her the documents and she contacts the vendor to get the situation straightened out."

"How do they get everything 'straightened out'?" Josh asked.

"That's something you'll have to take up with Sue when you visit with her. She handles working with the vendors. However, once the inventory is approved, unpacked and stocked, it's available for us to ship to our customers. Every morning, we receive picking lists for each of our customers. Sue prints the picking lists at the end of the day for the next day's work and leaves them in our mailbox at the main office. The picking lists are used to pull the items off the shelf that are used to fulfill the customers' orders. Once the items are picked off the shelf, they are packed inside a box for shipping along with a packing slip and the box is sealed. The bill of lading is affixed to the outside of the box and placed in the package waiting area to be shipped. Mike arranges the boxes by customer and location and works with the shippers to get the trucks loaded at the end of the day."

"What about product returns from our customers?"

"Those come to Wendy in the main office. You can talk with her when you go up to talk to Sue. I hope I was able clear up the warehouse process for you. I'll call Sue and let her know that you are coming."

## 5. PURCHASING

As Josh walked towards the main office, he wondered what the company might do if its data was more readily accessible. Sue was on the phone with a vendor when he arrived; but she waved him to a seat by her desk. When Sue set the phone back in its cradle, she said, "So I hear you're learning about our inventory management process. What do you want to know?"

"Well..." Josh started, "I would like to know about your role in the process of buying and selling inventory. I heard about the process from the warehouse perspective, but I'm not sure what goes on in this office."

"I work with the vendors," Sue began. "In fact, that was a vendor on the phone when you came in. I am renegotiating our contract with that vendor to try to get a lower price. Our sales of their products have been growing steadily and I had hoped to get a larger discount. They're thinking about it, so I'll talk with them later. However, back to your question. "I order products from a selected group of vendors. On Mondays, Wednesdays and Fridays, I work with the salespeople to collect new orders as well as handle returns. We don't have a lot of issues with our inventory, neither from our vendors nor from

our customers, but occasionally an issue arises. When there is a discrepancy in the items we receive or goods are damaged between the vendors' warehouse and ours, I work with your mom in Accounts Payable and with the vendors to get our bill adjusted or the items returned. When a customer's order is incorrect, I work with Wendy in Accounts Receivable and the customer to correct the situation. We may reduce the customers' bill, offer a discount, or ship another product depending upon the problem. Speaking of Wendy, she just walked by."

## 6. ACCOUNTS RECEIVABLE

"Wendy!" Sue exclaimed. "Could you come in here a moment? Josh wants to know about your role in the inventory management process."

"Hi Josh!" Wendy said. "I collect customer payments. A lot of our customers have blanket orders that we fill on a regular basis. We send the invoice electronically and they usually pay within the ten day 1% discount window. Occasionally we get a one and done customer, but most are repeats. Our long standing customers are usually prompt to pay their bills, but occasionally a payment doesn't make it through. In those situations, we contact the customer and they usually get the situation corrected immediately. If a customer returns an item, we usually try to replace the item with inventory on hand, but if the customer does not want a replacement, we will first suggest putting the funds towards a future purchase. We will also refund the customer for their purchase, but we push the other options first."

## 7. ACCOUNTS PAYABLE

"How do you pay your vendors for their products?"

"Your mom usually handles Accounts Payable," Wendy started. Most of our payments are electronic and just require a confirmation for payment, but she always checks the purchase order, packing slip and invoice to make sure that we are paying for what we received. If there's a discrepancy, she works with Sue and the vendor to figure out exactly what we need to pay. She always tries to take advantage of payment discounts. "

"What happens when the company needs to return something to a vendor?" Josh asked.

"That sometimes happens, but not very often. When a product has to be returned, she usually

contacts the vendor and returns the product. She then processes a debit memo to record the transaction so that we don't overpay for inventory we do not have."

"How do you collect payments from customers and handle returns?"

"Most of our customers have standing orders and are in the habit of paying for their products on a set day to take advantage of payment discounts. Our salespeople contact each customer on a regular basis to provide a more personal touch and confirm the sales quantity before the order is filled. Sometimes the customers need to order more of our products and sometimes less, it often depends upon the time of the year. People tend to think about their health at the beginning of the year when they make New Year's resolutions or are planning for a summer swimsuit and less about their health as the Thanksgiving and Christmas holiday parties arrive.

If a customer returns a product and wants their account credited rather than replacement items sent, we process a credit memo for that customer and their account is credited for the amount of the returned item. Since our customers can pay within ten days for a discount or 30 days with no penalty, we normally do not have to provide a refund. However, once we get our new systems in place and start selling to retail customers, I have a feeling that we will need to develop a process for handling refunds. Speaking of new systems, how are you going to get started?" Wendy asked.

## 8. GETTING STARTED

"I think I have a better idea now of the processes that will use the new system," Josh reflected as he finished writing his notes. "You've been a great help! The first thing that I will do is to create some diagrams to illustrate what I understand the processes to be. Once I have the processes and data flow diagrams designed, I think I'll starting thinking about the data that will need to be collected in order to run the queries and process the reports that will need to be generated. I'll use those fields to design an ER diagram to give to the developers. I think I will also create a small database prototype to give to the developers as well. That way, I can run the system by everyone who will have to use it to see if that is what they need before we invest a lot of money into having a professional system built that can interface with an online storefront."

"Would it be okay if I sent the diagrams to you to see if I am understanding the processes correctly?" Josh asked Wendy.

"I'll be glad to take a look at them, but I may not interpret the diagrams the same way you do. Why don't you write up an explanation to accompany each diagram and send that as well? I can take a look at them, make comments on them and forward them on to the other folks in the process. Let me give you some examples of the forms that we use in the buying and selling processes. That should help too," Wendy suggested. (Appendix)

"That's a great idea Wendy. I'll get started when I get back to my office." Josh said as he shook Wendy's hand and headed down the hall."

## 9. ASSIGNMENTS

Students should assume the role of either Josh or a systems analyst consultant hired to assist Josh. The systems analysts' roles and responsibilities will vary depending upon the course and assignment. Examples of possible assignments are provided. Possible answers for some of the assignments are provided in the teaching notes.

### Request for Proposal

**Courses:** Systems Analysis and Design, Process Modeling, graduate level MIS course

Assume that Josh is ready to move from the paper-based system to a computerized system. He is wanting to solicit vendor bids to purchase the technical infrastructure that will be used to support the new system.

1. From SWHS perspective, develop the functional and technical requirements that would be included in a request for proposal (RFP).
2. From a potential vendor's perspective, develop the vendor's response to the RFP for the technical requirements. Essentially, you are proposing the hardware, software, networking, installation, documentation and training that will be required to implement the infrastructure.

### Process Modeling

**Courses:** Systems Analysis and Design, Process Modeling, Accounting information systems, graduate level MIS course

Josh would like to draw the functional processes out on paper and send them to the various departments to verify that he understood their business processes correctly.

1. Create swimlane diagrams modeling each of the processes. Write short narratives to accompany your diagrams to verify and support your interpretation of the processes.
2. Create data flow diagrams (DFD) to model each of the processes. Write short narratives to accompany your diagrams to verify and support your interpretation of the processes.

### Systems Analysis Design and Database Development

**Courses:** Systems Analysis and Design, Database Development, graduate level MIS course

Assume that Josh would like to develop a prototype of the system to be developed. He wants to develop the:

1. System development diagrams
2. Data dictionary
3. Database forms for data entry
4. Database navigation switchboard
5. Database queries to generate purchase orders, inventory reports, and customer invoices.
6. Database reports including purchase orders, inventory reports, and customer invoices.

**APPENDICES**

**Stevens' Wholesale Supply Purchase Requisition Example**

**Purchase Requisition**  
 Stevens' Wholesale Health Supply  
 Submit to : Inventory Office, Attn: Sue

PR #: 170901200  
 PR Date: 08/27/2017

Requesting Department: Wholesale Sales  
 Office: Sales – Region 1  
 Requisitioner Name: Thomas Adams  
 Phone: 555-1111

	Item ID #	Description	Quantity	Unit Price	Amount
1	SWSVC250100	Vitamin C, 250 mg – 100 count (box of 50)	2	\$45	\$450
2	SWSVC500200	Vitamin C, 500 mg – 250 count (box of 50)	2	60	600
3	SWSVC21K500	Vitamin C, 1000 mg – 500 count (box of 50)	3	70	1400
4	SWSVD500500	Vitamin D, 500 mg – 500 count (box of 50)	2	50	100
5	SWSMMCH001	Muscle Milk Chocolate (gallon jugs)	5	\$40	200
...					
...					
...					
	<b>Total</b>				<b>\$4650</b>

**Date Needed:** 09/05/17

**Special Instructions:**

Ordered by: \_\_\_\_\_ Authorized by: \_\_\_\_\_ Date: \_\_\_\_\_

**Stevens' Wholesale Supply Purchase Order Example**

**Stevens' Wholesale Health Supply Purchase Order**

100 North Main Street  
 Midwest Town, IL 62901  
 (618) 555-1212

PO #: 170901200

<b>Vendor Name:</b>	Personal Health Products
<b>Vendor Street:</b>	Warehouse Street
<b>Vendor City, State Zip</b>	St. Louis, MO 63101

P.O. Date	Requisitioner	Shipped Via	F.O.B.	Terms
9/1/2017		UPS		1% in 10 Net 30

	SKU/Item ID #	Description	Quantity	Unit Price	Amount
1	PHPVC250100	Vitamin C, 250 mg – 100 count (box of 50)	10	\$45	\$450
2	PHPVC250200	Vitamin C, 250 mg – 250 count (box of 50)	10	60	600
3	PHPVC250500	Vitamin C, 250 mg – 500 count (box of 50)	20	70	1400
4	PHPVC500100	Vitamin C, 500 mg – 100 count (box of 50)	10	60	600
5	PHPVC500500	Vitamin C, 500 mg – 500 count (box of 50)	20	80	1600
6					
...					
...					
	<b>Total</b>				<b>\$4650</b>

<b>Delivery address:</b>  Stevens' Wholesale Health Supply Warehouse 101 North Main Street Midwest Town, IL 62901	<b>Delivery Date:</b> 9/08/2017
---	---------------------------------

Authorized by: \_\_\_\_\_

Date: \_\_\_\_\_

**Stevens' Wholesale Health Supply Invoice Example**

**9/1/2017**

**Invoice No. 1234**

To  
 Vitamin See Optical Shop  
 229 Broadway  
 St. Louis, MO 63101

**Ship To**  
 Vitamin See Optical Shop  
 229 Broadway  
 Springfield, MO 63101

Salesperson	P.O. Number	Requisitioner	Shipped Via	F.O.B. Point	Terms
Tom Adams	VSO201708200	Dr. Isaacs	UPS	Destination, Freight prepaid	1% in 10 Net 30

	Quantity	Description	Unit Price	Total
1	50	Healthy Vision Vitamin Supplement	5.00	\$250
2	25	Lutein	2.00	50
3	50	Vision Essentials Vitamin Supplement	7.00	350
4	25	Vitamin C, 250 mg - 500 count	2.00	50
...				
...				
		Subtotal		\$700
		Sales Tax		
		Shipping & Handling		45
		<b>Total Due</b>		<b>\$745</b>

Total due in 30 days from invoice date or within 10 days for 1% discount.

Thank you for your order!

We accept checks, cash and all major credit cards.

For questions about your order, please contact Wendy at (618) 555-1112.

**Stevens' Wholesale Supply**

Tel (618) 555-1111      100 North Main Street  
 Fax Fax (618) 555-1112      Midwest Town, IL 61901

**Stevens' Wholesale Health Supply Inventory Report Example**

**Inventory Report**  
**Stevens' Wholesale Health Supply**  
**Date: 8/31/2017**

	Item ID #	Description	Quantity	Unit Price	Amount
1	SWSVC250100	Vitamin C, 250 mg – 100 count (box of 50)	20	\$45	\$900
2	SWSVC500200	Vitamin C, 500 mg – 250 count (box of 50)	18	60	1080
3	SWSVC21K500	Vitamin C, 1000 mg – 500 count (box of 50)	8	70	560
4	SWSVD500500	Vitamin D, 500 mg – 500 count (box of 50)	19	50	950
5	SWSMMCH001	Muscle Milk Chocolate (gallon jugs)	15	40	600
6	SWSHVV00001	Healthy Vision Vitamin Supplement (box of 50)	12	60	720
7	SWSL0000001	Lutein (box of 50)	14	50	700
8	SWSVEVS0001	Vision Essentials Vitamin Supplement(box of 50)	15	70	1050