Teaching Case

Consulting at the Laser ISP (LISP) Company: Using Excel™ Metrics Capabilities to Solve Semi-structured Management Problems

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ABSTRACT

Introductory Information System (IS) courses commonly focus too heavily on teaching application features, as opposed to teaching unstructured problem-solving skills. In response to this pedagogical gap, professors at Brigham Young University have developed integrated cases that improve the instruction for their introductory IS course. In this paper, we overview a case that provides a realistic and compelling problem-solving experience for teaching Microsoft Excel™ measurement capabilities. This case describes the customer service issues and installation problems faced by an Internet service provider, along with pertinent cost and service data. The case requires the student to play the role of a management consultant who is asked to make business recommendations using Excel™. To effectively work with this case, students need exposure to Excel™ lookups, date/time capabilities, and countif / sumif functions, as well as other basic Excel™ features. To help the instructor implement this case, we have provided teaching notes that overview the history of the case, teaching suggestions, and a highly detailed grading and discussion template.

Keywords: Excel, metrics, management consulting, internet service providers, help desk, Information Systems, customer service

1. CASE SUMMARY

The student works as a management consultant at Laser ISP (LISP), a company that is having problems with its installation and customer service process. Three different installation approaches are being used, for which data is given that the consultant needs to analyze to make improvement recommendations: (1) onsite technician install; (2) do-it-yourself install with No CD; and (3) do-it-yourself-install with the installation support tutorial CD.

The consultants (students) are asked to do several tasks: First, they are to finish an incomplete costs table, where each of the different installation types has different cost structures. Second, they are to analyze the customer-service effects of the various installation approaches. Customer service generally occurs on two levels at LISP: phone calls to the LISP help desk from customers having problems, and actual visits by LISP technicians to the home of customers that have problems. Clearly, the fewer customer-service incidents the better, and help desk calls are preferable to home visits because calls take less time and are much less costly. Third, the consultants need to summarize and compare the data to make recommendations on which installation approach is the most effective in terms of cost and customer-service.

2. INTRODUCTION

You are a highly paid management consultant from Big IV Consulting who has been asked to help LASER ISP (LISP), an Internet Service Provider (ISP), improve its installation capabilities and customer service. You have been assigned to consult on this engagement because you have an IS degree and experience using Excel™ to solve unstructured managerial problems. Because you have an Information Systems degree, you not only have strong business acumen but also the ability to understand and use technology to solve complex business issues. You have been given a team of staff consultants who have conducted

some preliminary analysis and interviews for you, which you will use to complete deliverables that will help LISP's managers solve their pressing issues.

Laser ISP focuses solely on providing Digital Subscriber Line (DSL) service for residential customers. LISP provides service to residential customers in Silicon Valley. LISP exists within a highly competitive market place and has been under increasing pressure lately because of competition from multiple sources. The majority of local phone companies, long-distance phone companies, satellite providers, and cable companies are trying to enter the broadband Internet service provision market. Thus, there is strong market pressure to keep ISP prices competitive and to provide excellent customer service. What further complicates LISP's competitive situation is that it does not own any of the phone lines through which it provides DSL service. These phone lines are leased directly from LISP's biggest DSL competitor, Baby Bell, which owns 70% of the local phone lines in Silicon Valley. Thus, LISP struggles to compete with Baby Bell on price, so it must compete by providing better customer service including faster installations and superior service when customers experience problems. The next section describes some of the particular issues that LISP has faced in installing and servicing its DSL service.

3. BACKGROUND

The specific division of LISP you have been asked to work with is its Customer Support Division, which is responsible for all DSL installation and post-installation support. Based on your preliminary interviews and analysis with executive management at LISP, your consulting team has prepared a summary of the key problems that are being experienced at LISP. As the lead consultant, you are responsible for analyzing these problems and to make recommendations that help solve LISP's installation and customer support problems.

3.1 Initial Installation Approaches

Your consulting team has discovered that LISP conducts the following three types of installations:

Install Type	Description	Cost of Initial Installation
1	Onsite technician install	$90 per hour
2	Do-it-yourself install (No CD)	$20
3	Do-it-yourself-install (with the installation support tutorial CD)	$35

Traditionally, LISP has sent a technician to each new customer's home to perform the initial installation (installation type 1). However, in an attempt to find ways to reduce installation costs, LISP has recently been conducting a pilot program where they send a do-it-yourself installation kit directly to the customers instead of

sending a technician to the house (installation type 2). These kits have the necessary hardware and basic instructions on how to install the hardware and setup the customer's computer. During the first few weeks of the program, the customer-service help desk received a high volume of calls related to the do-it-yourself kits because some customers encountered problems that were not adequately addressed in the installation instructions. In an effort to solve this problem, the LISP customer service staff created a CD that includes a step-by-step tutorial of the installation process and some tips to troubleshoot some common installation problems. These CDs are now included with the do-it-yourself kits (installation type 3).

The key question now for LISP is how much initial time and expense they should put into installations. Clearly, do-it-yourself installs are the least expensive initial approach. However, management needs to ensure that this approach is not causing more expensive post-installation problems and/or poor customer satisfaction. All three of these installation approaches have direct ramifications on held desk calls and post-installation support, both of which directly affect perceptions of customer service.

3.2 Introduction to Table 1

To aid your analysis, your consulting team tracked all the installations that occurred during the month of August, which are summarized in Table 1. The Customer ID in Table 1 uniquely identifies each customer. Installation type corresponds to the installation approach taken (or type), as shown in the table above. In Table 1, the Initial Install ID is a unique number assigned each time an installation is performed regardless of the installation type. The Initial Installation ID is also important in linking the initial installation record in Table 1 to related records in Table 2. Table 2 represents subsequent help desk calls that pertain to each installation. At this point in the engagement, your consulting team has not figured out the total time for each on-site installation in Table 1, nor have they determined the associated total cost based on the hourly cost to send a technician to perform the initial onsite installation.

To help you complete the time and cost information in Table 1, your team has gathered some key information. For example, if a technician did the installation, a start time and end time was recorded so that LISP managers could determine the length of time for a technician to complete each installation. This time includes both the travel time and the actual time spent at the customer's home to complete the installation. LISP must pay $90 per hour to have a technician go to a house and complete an installation. This cost includes the technicians' hourly rate, cost of the vehicle, and other overhead.[1] Therefore,

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[1] This rate combines fixed and variable costs without concern for customer demand level or technician productivity. This was done for purposes of simplifying the case analysis.

the initial cost of an onsite installation can be calculated, for a given customer, by multiplying the hours required to complete the installation by the rate per hour. The costs of cables, the DSL modem, and other hardware are excluded from this analysis, because all three types of installations require exactly the same hardware.

Since no technician initially visits the house with install types 2 and 3, no labor is charged in Table 1. However, for the do-it-yourself installation kit (installation type 2) a cost of $20 is incurred to package these materials into a kit and mail it to a customer. For self-installation with the additional self-help tutorial CD (installation type 3), the cost is $35, which includes the $20 the packaging and mailing cost as well as $15, which covers the initial developmental costs and duplication of the CD tutorial. Thus, the last column in Table 1 should contain one of the following costs: a cost based on labor time spent for installation type 1, $20 for installation type 2, or $35 for installation type 3.

3.3 Customer Service
In addition to collecting data about the various installation types, your consulting team has also collected in-depth data so that you can analyze the customer service at LISP. This data has been categorized into two primary sources: (1) help desk calls to LISP customer support from customers having problems, and (2) actual home visits by technicians to solve customer problems after the initial installation.

The help desk at LISP helps customers who call with technical problems during and after installations. When customers call with problems, help desk personnel try to diagnose the problem and walk the customer through a series of steps in attempt to discover and resolve the problem. If help desk personnel are unable to resolve the problem over the phone, a technician is sent to the customer's house to further troubleshoot the problem. The help desk data from August has been summarized by your team in Table 2; the trouble-ticket data is summarized in Table 3.

Because your staff consultants lack business and Excel™ experience they were not able to complete all the information on these tables, but they were able to collect some useful information for you that will help you complete these tables. For example, in Table 2 the Call ID column contains a unique identifier for each call. The Installation ID in this table refers back to the Installation ID in Table 1. This makes it possible to track exactly which installations had problems that subsequently resulted in a help desk call. Table 2 includes one column that describes the problem and another column that can be used to calculate the length of each help desk call, based on the difference between the ending and beginning time. The call length should be multiplied by the rate of $60/hour to determine the cost of the call to the company. Finally, if the problem is resolved a "Y" is placed in the last column. If the problem is not resolved, an "N" is

placed in the last column and a trouble ticket is opened (in Table 3) so that an onsite service technician can be sent to the customer's home to troubleshoot the problem.

Table 3 (trouble tickets) has an important relationship with Table 2 (help desk calls). When a trouble ticket is opened, it is assigned a unique identifier and is linked back to the Help Desk Data table through the Call ID (note that Call ID in Table 2 is not the same as the Initial Install ID in Table 1). When the onsite service technician completes the call at the customer's house, the technician records a brief comment describing the source of the problem in Table 3. The cost to perform the visit should be determined as previously noted. The costs to send a technician on a trouble ticket call is $90 per hour—the same hourly rate as when LISP sends a technician to the customer's home to do an initial onsite installation.

A few specific examples should help clarify the relationship among the three tables. For example, in looking at the actual data from August you will notice the following: Installation number 1 (Customer 589) was install type 1, which resulted in one help desk call (Call ID 2 in Table 2) but no home visit trouble tickets (Table 3); and the entire cost of the installation for this customer includes the costs related to both records. You may also notice that installation number 3 (Customer 591) was of install type 2; it required one help desk call (Call ID 3 in Table 2) and one home visit trouble ticket (Trouble Ticket ID 1 in Table 3); and the entire cost of the installation for this specific customer includes the costs related to all three tables.

4. PART A: EXCEL™ LOOKUPS AND METRICS

For your first consulting deliverable, LISP executive management has asked you to combine all of their current data on installations, help desk, and home visits so that it is all related and linked in the tables.

Once you have coordinated this data, they also want you to create a summary of the data, so that you can pinpoint where LISP is having troubles and where they are doing well. Thankfully, you are well on your way with the Excel™ tables your consulting team has already completed—your task is to create the appropriate formulas and data for completing the tables and creating the summary information.

4.1 Guidelines for Completing Tables 1 through 3.
In discussing this project with your engagement partner she has given you some tips on how to approach this deliverable, including a firm reminder of the methodologies and standards you need to follow so that you represent Big IV consulting well. Thus, you are expected to use Excel™ according to the firm's guidelines, so that your spreadsheets can be easily reused and modified in the future. For example, you should not hand calculate or manually enter any data—everything should be derived using Excel™ functions. To complete the

Table 1: Initial Installation Data from August

Initial Install ID	Customer ID	Install Date	Install Type	On-Site Installation		Install Time (minutes)	Installation Cost
				Start	End		
1	589	8/01	1	8:00	9:15		
2	590	8/01	2				
3	591	8/02	2				
4	592	8/03	2				
5	593	8/04	1	10:00	10:45		
6	594	8/05	2				
7	595	8/07	1	8:45	9:40		
8	596	8/09	2				
9	597	8/10	1	10:00	10:50		
10	598	8/10	2				
11	599	8/11	3				
12	600	8/11	2				
13	601	8/12	3				
14	602	8/15	3				
15	603	8/17	3				
16	604	8/18	1	16:20	17:55		
17	605	8/19	3				
18	606	8/20	1	12:00	12:55		
19	607	8/22	3				
20	608	8/26	1	14:00	15:30		
21	609	8/26	3				
22	610	8/27	3				
23	611	8/29	3				
24	612	8/30	1	14:30	15:05		
25	613	8/31	3				

tables, you need to collect all three cost components from the three tables and aggregate them for each installation type. You are to analyze the data to evaluate the cost and economy of the three different installation approaches. You should also create functions/ formulas to calculate times and costs in tables 2, 3, and 4 in the columns shown. You will also need to use a function to populate the "Install Type" columns in Tables 2 and 3. Use the data in the three tables and other facts disclosed in the case to complete the assignment. The following summarizes your meeting notes with your engagement partner that can help you complete tables 1 through 3:

1) In Tables 1, 2, and 3, in the Excel™ data set provided, compute the installation times, call times, and visit times (in minutes) respectively. You should use a formula to calculate the minutes. Remember that when subtracting times, the default answer in Excel™ will be in day units; thus, you will need to create an

appropriate conversion so the answers will be displayed in minutes.

2) Using an Excel™ function, compute the installation cost in Table 1 for each customer (Install ID). Also calculate how much each Help desk Call costs for each Call ID in Table 2. Calculate how much each Trouble Ticket visit costs for each Trouble Ticket ID in Table 3. Make sure you use the appropriate formulas to make the computations.

3) Installation type is shown in Table 1 for each Install ID, but is not yet filled in for the related records shown in Tables 2 and 3; hence, you need to write a function in Table 2 to obtain the right installation type from Table 1 for each help desk call in Table 2. Once the Installation Type has been filled in Table 2, you can use a similar function to fill in the Installation Type in Table 3.

4) Finally, your engagement partner kindly reminded you that correctly completing Tables 1 through 3 is critical in being able to create correct summary data.

Table 2: Help desk call data from August

Initial Install ID	Call ID	Call Date	Installation Type	Call Problem	Start	End	Call Time (minutes)	Call Cost	Resolution (Y/N)
2	1	8/1		DSL Configuration	10:20	11:45			Y
1	2	8/2		Disconnected cable	9:44	10:03			Y
3	3	8/3		Unknown	15:00	16:12			N
4	4	8/4		DSL Configuration	11:03	12:16			Y
6	5	8/6		Computer Configuration	12:16	13:46			Y
8	6	8/9		Network Configuration	12:16	12:48			Y
10	7	8/11		DSL Configuration	16:21	17:19			Y
2	8	8/11		Unknown	7:45	7:52			N
12	9	8/12		Unknown	10:11	11:24			N
13	10	8/13		Unknown	15:23	15:38			N
16	11	8/19		Unknown	15:20	15:33			N
15	12	8/25		Unknown	8:00	8:21			N
22	13	8/27		DSL Configuration	9:23	9:37			Y

Table 3. Trouble-ticket data from August

Call ID	Trouble Ticket ID	Date	Installation Type	Problem Description	Start	End	Visit Time (minutes)	Cost
3	1	8/5		Computer config.	8:25	9:10		
8	2	8/12		Bad Modem	10:18	11:16		
9	3	8/12		Computer config.	7:59	8:49		
10	4	8/14		Bad Modem	15:45	16:25		
11	5	8/21		Bad Cables	14:27	14:53		
12	6	8/21		Bad Cables	8:00	8:24		

Table 4. Summarized Cost Information

	1. Technician Install			2. Do-it-yourself (No CD)			3. Do-it-yourself (CD)		
	Count	Total cost	Average occurrence cost	Count	Total cost	Average occurrence cost	Count	Total cost	Average occurrence cost
Initial Installations									
Help Desk Calls									
Trouble Ticket Visits									
Total Cost All Customers									
Average Cost Per Customer									

4.2 Guidelines for Completing Table 4

Based on your meeting with your engagement partner, you created a skeleton draft of the Excel™ table (see Table 4) you think would effectively summarize Tables 1-3.

In a follow up conversation she has reminded you that you need to complete your Excel™ solution in a way so that the answers calculated by you for Table 4 can be completed with functions that do not require the data in Tables 2, 3, and 4 to be sorted. Other specific guidelines for completing Table 4 include the following:

1) For each installation approach, use an Excel™ function to count the number of installations, help desk calls, and trouble ticket visits.
2) For each installation approach aggregate the total cost. For example, for Install Type 1, determine the total initial installation costs, the help desk support costs, and the trouble ticket visit costs. Include all of these three cost components to compute the total cost for all customers that received Install Type 1. Follow the same steps to calculate the total costs for all customers that received Install Type 2 and Install Type 3.
3) Next, for each of the installation approaches, calculate the average cost per occurrence of an initial installation, help desk call, and trouble ticket visit. Also, taking into account all costs from the three tables, compute the total average cost per customer for each install type.

5. PART B: MANAGEMENT RECOMMENDATIONS

At this point in the project, you have met with LISP executive management and presented the detail data from Tables 1-3 and the summary data from Table 4. They are impressed by the work you have performed, but this has opened up a new round of questions that they want you to answer in a written report that is to comprise your second deliverable. According to your firm's standards such a report must be written in Word™, it should be highly professional in appearance, and it must directly reference the questions the executives have given you. Your staff has organized the questions from the meeting, and has numbered them, so that you can easily respond to and directly reference each question number, as follows:

1) Calculate the percent increase or decrease in the average cost per customer of going from Installation approach 1 to Installation approach 2. Calculate the percent increase or decrease of going from installation approach 1 to installation approach 3.
2) Provide a comparative analysis across the three installation approaches in a way that will provide a clear picture of differences across the three installation approaches; specifically, differences in the frequency of help desk calls and trouble ticket

visits that are incurred by each installation type. This analysis should allow for a valid comparison across each installation approach by adjusting for the variable number of installations; so for example, using ratios and percentages would be helpful. After designing and calculating the appropriate measures, provide an interpretation of what the measures communicate.
3) Look at the reasons (types of problems) that required help desk calls and trouble ticket visits for each of the respective three installation types. Write a paragraph that interprets these trends/patterns of causes. What are these trends/patterns saying?
4) Based upon the above analysis, which installation approach should LISP continue to use? Why?

6. ACKNOWLEDGEMENTS

AUTHOR BIOGRAPHIES

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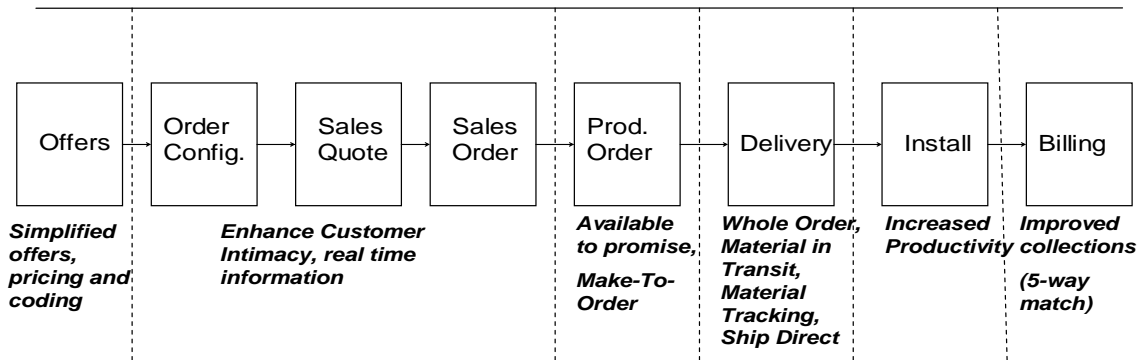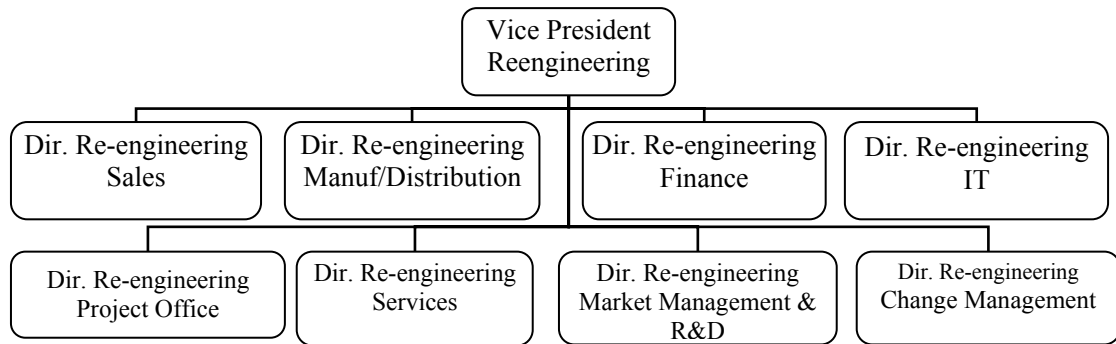

Figure 1: Targeted Enhancements

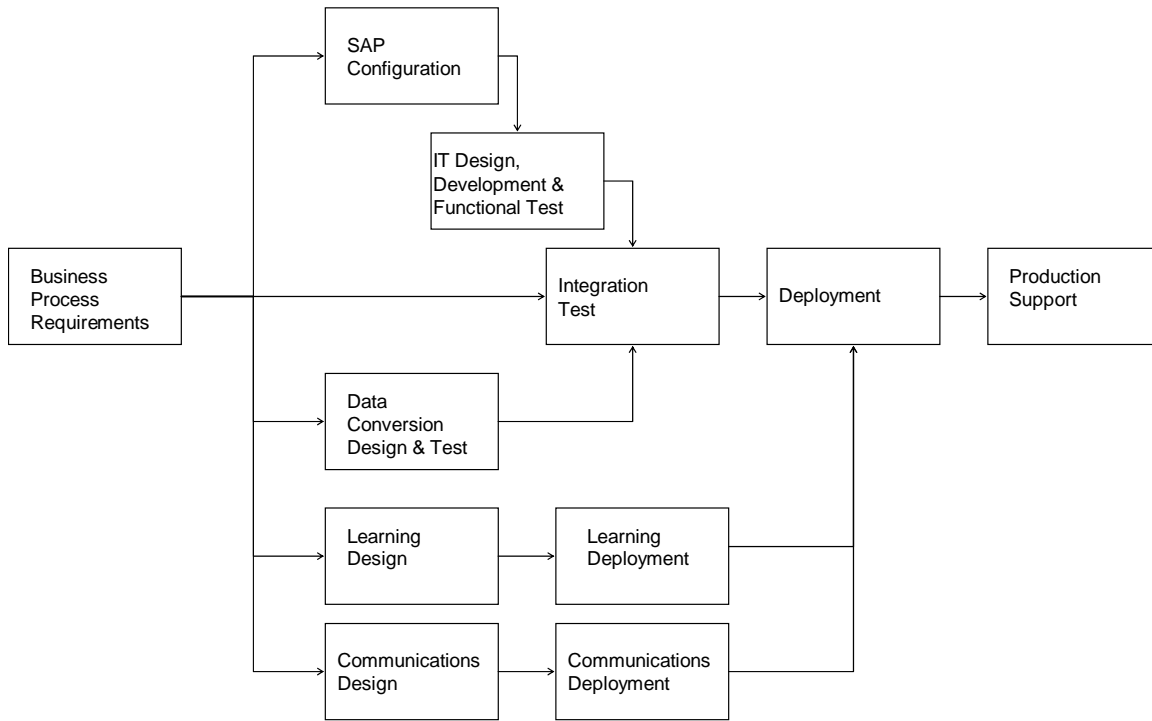**Figure 2: Reengineering Team Organization Chart: 1996-1999**
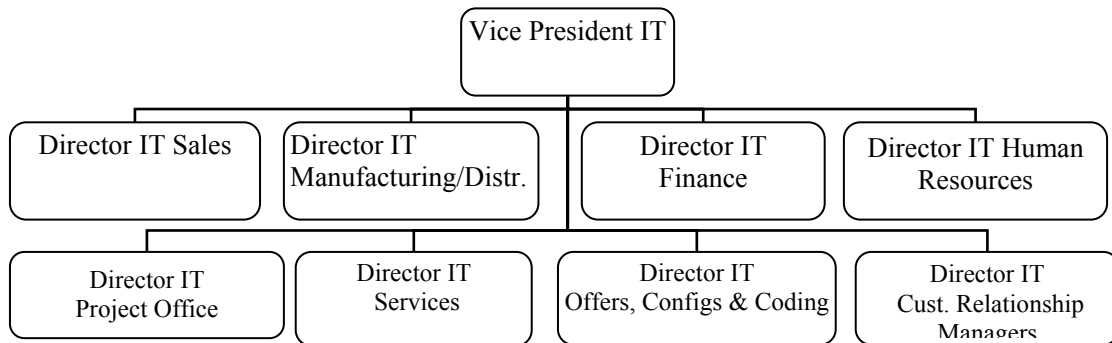
Figure 3: Integrated Release Process

Figure 4: IT Applications Team Organization Chart: 2000 – 2001