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SPECIAL ISSUE: TEACHING CASES

In this issue:

TEACHING CASES SPECIAL ISSUE EDITORS

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INFORMATION SYSTEMS EDUCATION JOURNAL

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Teaching Case

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Abstract

Atrium Limited Liability Partnership (LLP), an architectural company with over 3,000 partners, addresses the business need to collect and organize signed tax forms to assist its international partners. This case discusses the challenges associated with the current manual process, the pursuit of a solution to automate and simplify this process and the risky decision to implement an in-house automated solution using an electronic signature. As is the case with many projects, time is of the essence and the company is taking a risk with committing resources to this project instead of following the cumbersome and inefficient tried-and-true way.

Keywords: Process Improvement, Custom Development vs Off-the-Shelf, Project Management, Electronic Signatures

1. INTRODUCTION

The sun was setting over the Gulf of Mexico on a late June afternoon and the tourists had started packing up for the day. A cool breeze was softly blowing and was rocking the few people who were still floating in the warm water. "There must be a better way to do this! I know it! There must be! Why am I thinking about work again?" Anna's vacation was coming to an end in a few days and thoughts about work had started sneaking back into her mind. She knew when she got back, it was time to start on the long, manual and very labor-intensive project of collecting forms from the partners. "I need to enjoy these last few rays of sunshine," Anna thought.

Anna was a Certified Public Accountant (CPA) who had joined the accounting department about a year and a half ago as a manager. She was still learning the job and trying to find the elusive work-life balance after returning from a maternity leave. The new position – a promotion, was definitely challenging and different from the one-way communication pattern typical for a compliance group. The need to collect information

from a large group of people, far beyond the capabilities of Excel, required Anna to learn Structured Query Language (SQL). Soon she found out the field was interesting, and she enjoyed the collaboration with the IT team; they were happy someone who understood accounting was trying to speak "tech" and were willing to answer questions and help Anna.

2. THE FIRM

Atrium LLP is a large architectural partnership with over 3,000 partners – all dedicated professionals and masters of their craft. Over the years, the firm has grown and earned a reputation as one of the best in the U.S. Atrium's typical clients are Fortune 500 companies and Atrium took pride in providing full-cycle services - from acquisition support for the perfect plot of land, through detail drawings and working with municipalities codes' departments, to interior design and construction project management. "We are easy to work with," is one of Atrium's core values.

Over the years, Atrium has expanded their business beyond the borders of the United States. While good for business, this expansion had some tax consequences. Working outside the U.S. borders meant that the Atrium's partners had to pay taxes in those foreign countries. Atrium's clients needed to withhold those taxes and remit them to their own governments; then report the withholding to Atrium and remit the remainder of the invoiced price for the project. This was placing an administrative burden on Atrium's international clients and was not in line with their own, "We are easy to work with" core value. In short – that was not an acceptable answer.

The only way to eliminate the withholding requirement was to provide a Tax Residency Certificate (TRC) to each client, which would allow the client to claim a tax treaty with the U.S. and thus, not be required to withhold tax from Atrium's invoices. This was better for the client because it reduced the administrative burden of collecting, remitting and reporting withholding tax payments from Atrium's invoices. It was also in Atrium's interest, because it meant serving their international clients better by truly being easy to work with and provided a means for faster invoice payments and increase in cash flow. But this was not better for Anna.

3. THE PROCESS

Many U.S. treaty partners require the IRS to certify that the person claiming treaty benefits is a resident of the United States for federal tax purposes. The IRS provides this residency certification on Form 6166, a letter of U.S. residency certification. The Internal Revenue Service (IRS) procedure for requesting a certificate of residency (Form 6166) from the Philadelphia Accounts Management Center is the submission of Form 8802, Application for United States Residency Certification.

Atrium had a problem - Partners were not considered U.S. residents within the meaning of the residence article of U.S. income tax treaties. Treaty benefits are only available to a partner who is a U.S. resident whose distributive share of partnership income (the percentage of income allocated to a partner from the total net income for all partners) includes the item of income paid to the partnership. Therefore, in order to obtain the certificate, Atrium had to provide:

1. The name and tax identification number (TIN) of each partner for which certification is requested and any additional information that would be required if certification were being requested for each of those partners.

2. Authorization (for example, Form 8821-see Appendix A) from each partner, including all partners listed within tiered partnerships. Each authorization must explicitly allow the third-party requester to receive the partner's tax information and must not address matters other than federal tax matters.

3. Unless the requester is a partner in the partnership during the tax year for which certification is requested, authorization from the partnership must explicitly allow the third-party requester to receive the partnership's tax information.

If certification is requested for purposes of claiming benefits under an income tax treaty for any period during the current calendar year or a year for which a tax return is not yet required to be filed with the IRS, a hand signed penalty of perjury statement (POP) is required from each applicant stating that such applicant is a U.S. resident and will continue to be so throughout the current tax year.

The IRS could not accept an early submission for a current year Form 6166 that had a postmark date before December 1 of the prior year. Atrium's submission consisted of 3,000 forms and counted as only one TRC, making the statistics of IRS team working on the request look very bad.

Aware of this fact, it was extremely important to Atrium's management to submit the forms as soon as the law allows to get in IRS's queue.

Due to the large volume of forms Atrium needed to submit, it took the IRS five to six months to produce the certificates. Any delays would risk the certificate process being delayed to the point the certificate is no longer useful.

4. THE ACCOUNTING DEPARTMENT

Since obtaining this form required dealing with the IRS, the accounting department was the default choice. The process depicted on the timeline diagram in Appendix B was what the department had followed to obtain the certificates.

When Anna transferred to this department, the process was mid-cycle. "Aren't you lucky you don't have to deal with this yet," she heard from her co-workers while they were gathering papers, binding forms and labeling report binders. "This is most of the forms, but not all. We tried to get them all the last time – it took us two years!!! By the time the IRS did their part, the certificates we received were three years old and nobody wanted them."

"We start by providing the forms to the partners via our secured portal," explained Haley. "The forms are prepopulated with each partner's data. The partners need to print them out, sign them, and return them to us by e-mail, fax or regular mail. Some of them take a picture of the form with their cell phones – I hope the IRS finds that acceptable. We have not heard back that it is not OK."

"When we receive the forms – that is two forms per partner- we need to print them, check them off the list and alphabetize the forms. It is hard keeping track of 6,000 forms, and they all contain Personally Identifiable Information (PII) – PII, such as Social Security Number (SSN) and full name, which require special handling and data safeguarding. Sometimes the partners send only one of the two forms, and they assume they are done. We send them reminder e-mails, but that only partially works, especially for those partners who think they got the e-mail in error. And this is all manual work, so our response is lagging as we must handle all the forms we have received before we can send a reminder."

"We have an assisting team to do some of the work, such as opening the e-mails and checking if the forms were signed, etc. They follow up with any partner whose form is incomplete or not properly completed…. But you can imagine that's hard for someone who faxes their form upside down – we get a two pages blank fax – how do we even know who sent it?!?"

"That is a really old inefficient process," Anna thought, "and so risk prone! All that PII just sitting in e-mail attachment – if we are lucky. Why can't we get this form submitted electronically?" she asked.

"The IRS will not accept anything other than a hand-written signature – nothing else! So electronic signatures are out, no DocuSign, no Adobe signature – IRS will not accept them. We need pen and paper."

"Back to square one," sighed Anna. "OK, if it is important to Atrium to provide this certificate to their international clients, and the IRS will not accept anything other than a ***handwritten*** signature, then it seems like we have no choice. "Why wouldn't the partners just sign the forms?!? It is not that difficult. Why does it take three months, two reminder e-mails and then a week of phone calls?" Anna asked James (her boss), half venting and half trying to figure it out.

"It is not that easy," said James. "The partners travel a lot to meet client needs. Most of the time they are at a client's location working from their field office. They do not have easy access to a printer and the documents have their full name and (SSN) – this is not something you want to print on just any printer. And say you do print it – then you need to figure out how to send it back. You need to ask for a scanner or a fax machine. This is not only inconvenient – it is not the image Atrium wants to have with our clients. The alternative is dealing with the forms when you are not serving clients or traveling for business – and who wants to do this rather than spend time with their family? There is no easy way! We just need to keep at it."

"Sounds like the required printing is causing the delay," replied Anna. "What exactly is the signature requirement? Does it have to be pen to paper?"

"Yes," replied James. "The IRS does not accept the electronic stamp Adobe places as a signature, and it doesn't matter how traceable it is – you can't argue with the IRS."

"OK, hand written. Does it have to be in ink? We don't currently collect original forms, right? If we can get a handwritten signature on the form, does

it matter how it got there? For example, whether we get a faxed/scanned form, or a form that is hand signed on screen, what we send to the IRS will look the same and will be signed by the same person."

"Yes," agreed James, "but how do you do it?" Inefficiency was one of Anna's biggest pet peeves – "There must be a better way to do this. OK, we need a hand-written signature on the form – how do we do this?" She had put this thought in the back of her mind, but with the end of June approaching it was time to start thinking about the forms again.

5. THE PROJECT

"If I can sign for my credit card on an iPad when I get a burger from a food truck, why can't I get these forms signed on a touch screen," thought Anna - "We all have touch screen laptops." The accounting department had some shared IT resources, but not much – just a couple of team members assisting with the database. "It is still worth asking." Due to the small scope of her IT request, there was no need for Anna to submit a formal proposal through the company's governance process, which was specifically in place for larger projects. This was a relief to Anna, since not having to go through a formal process to ask questions and discuss her idea with IT would save valuable time and expedite implementing a possible solution for signing and collecting the documents. Therefore, Anna promptly set up a call to discuss her suggestion with the team.

The first response was, "No, there is a huge difference between how an iPad and laptops work," she was told – it is different technology. She got the same answer for the comparison with a Point of Sale (POS) terminal in a grocery store.

Anna kept researching how to make this work – what was out there? Somebody surely had a solution that she could use. Adobe Sign seemed to be a product that would work. However, that required a costly paid subscription fee and trusting PII in Adobe's database. Anna brought that suggestion up in a conversation with James, but the subscription fees made it a non-viable option financially. Trusting PII to an external cloud was also not permitted by Atrium's IT department.

"How did Adobe do it for a laptop? The technology must exist," Anna thought. She called back the IT team and showed them what she had found Adobe Sign offers. This time she got, "We have never done this before. I guess we can give it a try."

The end of July was approaching, and the forms had not gone out to the partners yet. Anna scheduled a meeting with James to explain her plan. "Let me tell you why we have not distributed the prepopulated form yet," she started. "I am working with the IT team on having the ability to sign the forms on the screen with a stylus or finger – this way the partners no longer need to print the form, sign it, scan or fax it back to us and then destroy the physical copy. It will all be done via our secure portal, and we will have the signed form saved in our database. When we are ready to send reminders, we will have real time data on submitted forms. When it is time to print, they will already be alphabetized."

"We are talking about handwritten signatures, right?" asked James. "The IRS will not accept anything else. And… I am not sure this is a good idea – you will have every partner's signature in the database – what is preventing anyone from placing it on any document they want?"

"I understand your concern," said Anna, "and I see where it is coming from. Think about it – can I not copy your signature from any document you have signed? How is that different? To put your mind at ease, we are saving the whole document, and not just the signature, as the file. We should have the prototype ready soon."

"The whole document, right?" said James reluctantly. "I see the benefit, but it sounds risky. Do you think the partners will be OK with signing on screen?"

Anna was excited when she heard the IT team wanted to show her a prototype, and eager to get on the call. "We can't get it to work for a signature in the exact right place on the form, and that space is way too small for on screen signing," said Vijay, the lead developer. "That is why we created a signature box here on top – is that OK?"
"I would think so," replied Anna, "but display 'Please sign here' above it to make the required task clearer to the partner."

Vijay demonstrated how the signature box worked using a touchscreen or a mouse as a back-up option. Anna wanted to try herself, but…
"If you like what you see, we will need to place a ticket to move the build to the staging environment," explained Vijay. "Then we will let you know when it is ready for you to test. We do need you to verify a successful deployment – can you be on a call at 9pm?"

Anna was thrilled and more than willing to make the 9pm deployment call – her vision was finally starting to take shape. "I will be there," she replied.

Deployment to staging was a success and Anna was on a mission. "For deployment to production, our next step, we will need couple of partners to be on the 9pm call and test in production" explained Vijay. "Well," said Anna, "I can't give you a couple, but let me go talk with the partner I work with and see if he could do it. Partners are really busy, and it is not reasonable to expect them to be available for testing."

It was time for a status update, and Anna had scheduled one with James. She went into his office beaming – "Let me show you what we can do now!" She quickly pulled the form and demonstrated how the signature box captured the hand-written signature, with a finger, then with a stylus, and then with a mouse. "With only one click, the partners are able to see the Form 8821 and upon completion are routed to sign the POP form. When the form is released back to the accounting department, each partner received a confirmation e-mail with a link of the signed forms for his/her records."

"This will completely change how we collect forms," exclaimed James, happy with the prototype. "You understood the problem, and this is a solution that should work and get us back on track for the time we had fallen behind on this cycle. May I try it now?"

"That is why I wanted to have this status update in person," replied Anna. "We need your help. Could you please join us for a deployment call at 9pm? I don't have the same rights in the production environment that you have, and I don't think it will be appropriate to ask anyone else to test this process – it is new, and I think we should be careful." James was happy to help, and the production deployment was blissfully uneventful.

The accounting department sent the form to all Atrium partners with instructions of how they could sign on a touch screen or could still print, sign and email or fax the forms back. Although they started the process almost two months behind, the efficiency gained from the change of the process resulted in much faster collection of the forms. Very few partners, who most likely preferred the traditional method because it was familiar, chose the print/sign/scan/e-mail option. Others e-mailed back just to say, "This was so easy! Thank you!"

The year the process was changed had record compliance – the most forms that were collected before the deadline to send to the IRS. As Anna reflected on the lessons learned from the success of this project she noted that key benefits included saving time, improving customer satisfaction by simplifying a cumbersome task, and improving compliance. Her question now is how to apply this technology to provide such benefits to other document processes at Atrium?

6. CONCLUSION

Taking the risk on this project paid off for Atrium – it was easy for the partners to comply and despite the shortened timeframe, record percentage of forms completed was submitted. The forms collected from the partners were turned to the IRS on time and the TRC received earlier than any prior year.

7. DISCUSSION QUESTIONS

1. Do you think Atrium made the right decision to hold off on the "traditional" way they were collecting forms and risk getting behind schedule if this project failed?

2. Would you have gone through a different decision process?

3. Should other alternatives have been considered before choosing an in house solution?

4. Was any change management needed in this case? Why/why not?

5. Was any contingency plan mentioned/ available? What should the team do/have done if the implementation was not possible or timely? What should Atrium do looking forward to next year's tax cycle?

8. REFERENCES

IRS.gov, 2017, https://www.irs.gov/individuals/international-taxpayers/form-6166-certification-of-us-tax-residency n.d.

IRS.gov, Oct 2017 https://www.irs.gov/pub/irs-pdf/i8802.pdf n.d.

Adobe.com, 2018, https://www.irs.gov/pub/irs-pdf/f8821.pdf
https://acrobat.adobe.com/us/en/sign.html n.d.

Editor's Note:

This paper was selected for inclusion in the journal as the EDSIGCON 2018 Best Teaching Case. The acceptance rate is typically 2% for this category of paper based on blind reviews from six or more peers including three or more former best papers authors who did not submit a paper in 2018.

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Appendix A

Form **8821**
(Rev. January 2018)
Department of the Treasury
Internal Revenue Service

Tax Information Authorization

▶ Go to *www.irs.gov/Form8821* for instructions and the latest information.
▶ Don't sign this form unless all applicable lines have been completed.
▶ Don't use Form 8821 to request copies of your tax returns or to authorize someone to represent you.

OMB No. 1545-1165
For IRS Use Only
Received by:
Name
Telephone
Function
Date

1 Taxpayer information. Taxpayer must sign and date this form on line 7.

Taxpayer name and address	Taxpayer identification number(s)	
	Daytime telephone number	Plan number (if applicable)

2 Appointee. If you wish to name more than one appointee, attach a list to this form. **Check here if a list of additional appointees is attached** ▶ ☐

Name and address	CAF No.
	PTIN
	Telephone No.
	Fax No.
	Check if new: Address ☐ Telephone No. ☐ Fax No. ☐

3 Tax Information. Appointee is authorized to inspect and/or receive confidential tax information for the type of tax, forms, periods, and specific matters you list below. See the line 3 instructions.

☐ By checking here, I authorize access to my IRS records via an Intermediate Service Provider.

(a) Type of Tax Information (Income, Employment, Payroll, Excise, Estate, Gift, Civil Penalty, Sec. 4980H Payments, etc.)	(b) Tax Form Number (1040, 941, 720, etc.)	(c) Year(s) or Period(s)	(d) Specific Tax Matters

4 Specific use not recorded on Centralized Authorization File (CAF). If the tax information authorization is for a specific use not recorded on CAF, check this box. See the instructions. If you check this box, skip lines 5 and 6 . . . . . ▶ ☐

5 Disclosure of tax information (you **must** check a box on line 5a or 5b unless the box on line 4 is checked):

a If you want copies of tax information, notices, and other written communications sent to the appointee on an ongoing basis, check this box . . . . . ▶ ☐
Note. Appointees will no longer receive forms, publications, and other related materials with the notices.

b If you don't want any copies of notices or communications sent to your appointee, check this box . . . . . ▶ ☐

6 Retention/revocation of prior tax information authorizations. If the line 4 box is checked, skip this line. If the line 4 box isn't checked, the IRS will automatically revoke all prior Tax Information Authorizations on file unless you check the line 6 box and attach a copy of the Tax Information Authorization(s) that you want to retain. . . . . ▶ ☐

To revoke a prior tax information authorization(s) without submitting a new authorization, see the line 6 instructions.

7 Signature of taxpayer. If signed by a corporate officer, partner, guardian, partnership representative, executor, receiver, administrator, trustee, or party other than the taxpayer, I certify that I have the authority to execute this form with respect to the tax matters and tax periods shown on line 3 above.

▶ **IF NOT COMPLETE, SIGNED, AND DATED, THIS TAX INFORMATION AUTHORIZATION WILL BE RETURNED.**

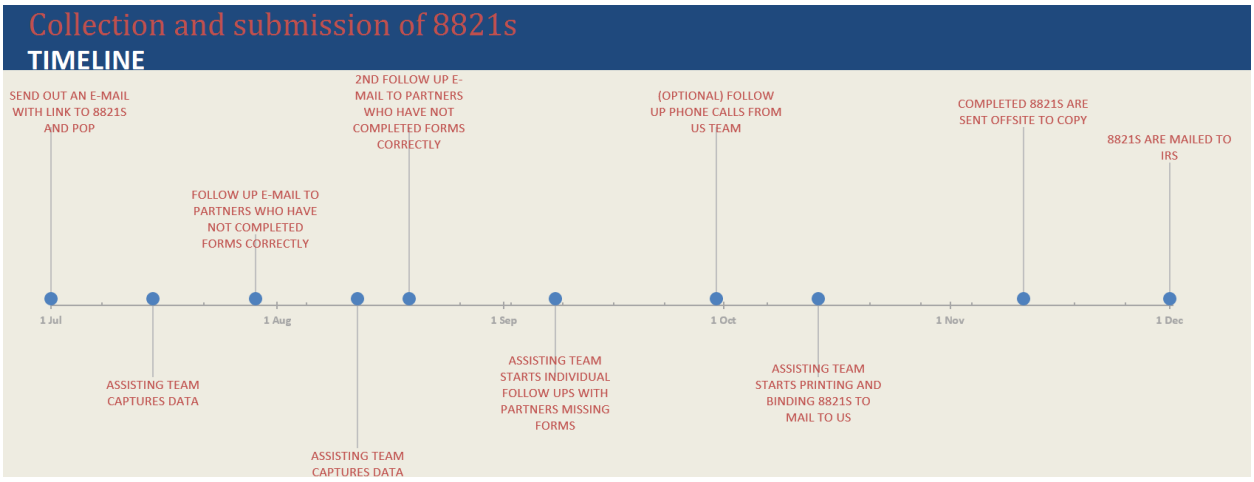
▶ **DON'T SIGN THIS FORM IF IT IS BLANK OR INCOMPLETE.**

Signature | Date

Print Name | Title (if applicable)

For Privacy Act and Paperwork Reduction Act Notice, see instructions. Cat. No. 11596P Form **8821** (Rev. 1-2018)

Appendix B – Pre-system Timeline



Teaching Case

Closing the Deal Amidst Falling Customer Satisfaction

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Abstract

The board of Fiserv (an investment management company) has already decided to close the business no matter what. Agile Financials has agreed to buyout Fiserv and retain part of the Fiserv staff if the purchase deal closes. However, if too many of Fiserv's clients left with their accounts or if the customer satisfaction index (CSI) continued to fall, the sale of Fiserv to Agile Financials would break apart. Should the deal break apart, everyone at Fiserv would be out of a job and clients would be left high and dry. Could a new CRM system be the answer to retain clients and raise customer satisfaction during the interim period as the buyout deal closes? This case places the reader in the shoes of the Fiserv's CIO, Mark Bennett, who has to decide and justify, if a new CRM system is necessary to address falling customer satisfaction. After this decision, the next challenge is to implement the CRM (or any alternative system) to help Fiserv retain the maximum number of its clients and achieve the stipulated level of customer satisfaction as the acquisition is completed. Business process reengineering and employee training are crucial when companies implement new mission critical enterprise systems like CRM. If the implementation forces a third order of change, then major challenges could be faced. Fiserv's resources are very limited before the acquisition deal is completed and it might be better in the short term to limit the project scope to a first order change.

Keywords: IT Infrastructure, Change Management, Project Management, Merger and Acquisition, Customer Relationship Management

1. INTRODUCTION

Mark Bennett, CIO of Fiserv ISS, relived the conversation in his mind again. Mr. Rogers, the president of Fiserv ISS, had just informed him that the company had been sold. This information had not been announced yet so Mark was not able to tell anyone of this development. Being a publicly traded company, this information was of top secret. Mr. Rogers informed Mark that the deal had been in process for several years and the terms had finally been agreed upon. It was important that the clients of Fiserv continued to receive the same level of care and were satisfied with the service that they received and when surveyed with the Customer Satisfaction Index, continued to give 9s and 10s. Unfortunately, customer satisfaction had been slipping and was now at a 7 out of 10. Many clients had threatened to leave and few had left. On top of that employees had been leaving to pursue other opportunities and the company was short staffed. Now that the company had been sold, hiring replacements seemed less likely. Mr. Rogers told Mark, the impending deal could take up to a year to close and hinged on the retention and improved satisfaction of their current clients. The lower the satisfaction of the clients, the lower the price tag for the sale (See Table 1).

The situation was dire. If too many of the investment management company's clients left with their accounts or if the customer satisfaction index (CSI) continued to fall, the sale would break apart. The parent company, Fiserv, had decided to close the business no matter what. They felt

that Fiserv ISS was going to start costing more money than it was worth. The purchasing company, Agile Financials had reviewed the business practices and decided to keep part of the staff on after the deal had closed. Should the deal break apart, everyone would be out of a job. The realization washed over Mark. He was being charged with finding a way to bring customer satisfaction up without using a large amount of funds. If he failed, the deal would break apart, those clients that stayed would be left without a custodian and everyone he worked with would be out of a job.

CSI Score	Fiserv Company Valuation
10-9	$600,000,000
8-7	$475,000,000
6	$350,000,000
5 and under	Deal is broken

Table 1: Relationship between Customer Satisfaction and Valuation

2. BACKGROUND INFORMATION

Fiserv ISS had started in 2001 with the merger of four small trust companies. Each trust company offered different services and products, but all were focused on low cost custodian fees while providing high and specialized client service for those investing in the financial markets. The four companies that were brought together were Datalynx, specializing in individual advisor clientele, Trustlynx specializing in 401k third party administration accounts, Lincoln Trust and Resources Trust both focusing on retail client accounts.

IT Infrastructure Issues at Fiserv

While each of these four trust companies had brought their own specific software that helped to service their specific group of accounts, the goal was always to get all the different departments on one software system. However, even after seven years, the different departments were still on their own specific systems. All four different departments shared several common financial management functions such as nonstandard assets, stock clearing and compliance. To make the system cohesive to the processes/functions that interacted with all departments, a software developer had used the middleware Microsoft Access to allow data exchange between the four disparate systems. Users could create queries in Access to pull data from each needed system without having to go into each individual actual database.

Microsoft Access, while not a perfect system, was integrated in everyday use and several financial processes at Fiserv ISS. Each different department at Fiserv ISS needed to use Access in one way or another. Access inked the necessary rows and columns stored in Xcel spreadsheets in individual departments and allowed the creation of consolidated views across the four trust companies. It was also used to synchronize asset values and ownership. The Access database was used by most team members several times a day and for multiple reasons. Some of the reasons were to view data from outside of their department, while other reasons were to upload and organize client account statements as their accounts were brought into trust management. As Fiserv ISS continued to grow, the largest growth continued to be in Datalynx and Trustlynx. Unfortunately, those were the systems that were most dependent on the Access databases. They were also the departments that were most dependent on nonstandard assets, stock clearing and compliance. To make the situation more complicated, they were the departments that Agile Financials was interested in acquiring and whose customer satisfaction would make or break the sale of Fiserv.

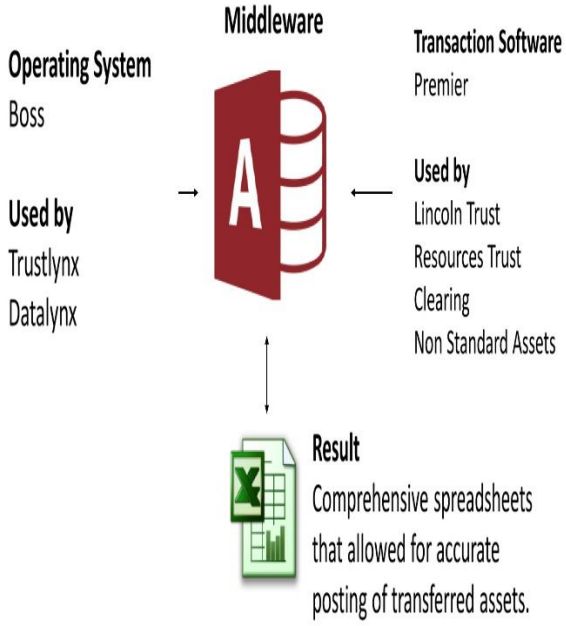

Figure 1: Fiserv IT Infrastructure

3. CURRENT SITUATION

Mark Bennett needed to assess the situation first hand and decided to start by calling a few clients from both Trustlynx and Datalynx to see if he could find out why their customer satisfaction had dipped. He called several clients of those two departments and found that the complaints were always some variation of delayed processing. One client he called, named Ron Gage, was on the Datalynx platform and expressed serious concerns over the Information systems platform: "*My business is growing at an incredible pace. I work with a lot of nonstandard assets. A non-standard asset is one that cannot be accurately and fairly valued and cannot be sold or transferred at a non-detrimental value within 30 days. In times past, I knew that transferring these assets would not be a problem. I was confident that the asset would be booked into the account as soon as it had changed ownership. It would have monthly price updates as Fiserv ISS received statements. Now I am seeing assets booked two to three weeks after they have transferred into your company. The asset prices are rarely updated and clients are complaining that their statements do not reflect the asset values that I am showing on my website*."

Ron Gage continued to describe his frustrations with the Datalynx client support team, *"I have to make multiple calls and each time describe my requests from scratch. Then the wait, the endless wait as the issue is verified and assigned and worked internally in your team."*

Mark Bennett began to consider this and talked to the Customer Account Relationship Manager in charge of Datalynx. The relationship manager, Dan Donnelly: "*Listen, I am doing the best I can. I follow up with the nonstandard asset department every other day. Every time I call down there I get someone unfamiliar with the account I am talking about. They have no way to track my request history and I have to explain the whole situation again and again. I now have a formatted email that I am sending to the department each week, but I get no response. I can't do it myself. I have escalated it to management. They ask me to forward all my communications with the nonstandard asset department and after a few weeks after the asset is transferred, it gets booked."*

Dan Donnelly continued: "*My time is always wasted getting status updates instead of trying to get new trust accounts. I want to get out of being the middle man and allow my clients to directly create the request, track and follow-up with the non standard assets team."*

Mark moved on to the final piece in the puzzle, the nonstandard asset team. When asked about the problem, the manager Lisa Walk was quick to the defense. "I *have lost five people this year. I cannot hire anyone else. I have temps working for me and while they can book the assets, I am the only one that knows how to use the Access database. I have email upon email from the temps asking me to run the reports on Access. The assets are not always there the first time I check and I need to follow up again and again. I am trying to create calendar reminders to follow up on these assets a few days later, but I forget. Then I am working on the new emails that have not transferred and I should create reminders but I forget. It is a vicious cycle.*"

Mark had an idea. He asked Lisa, "*Would it help if you had a program that listed your daily tasks and assigned priorities based on the importance of the originating clients, so that you could either decide to complete or snooze the task in favor of other more important tasks?"*

"*Greatly!"* Lisa replied. "*If only it had a way to access the system or at the very least Microsoft Access".*

"*You're in luck",* thought Mark. The answer became clear to Mark. He needed to get the company on a Customer Relationship Management system (CRM) to help with the tasks that were building up. CRM is a management approach that seeks to create, develop, and enhance relationships with carefully targeted customers to maximize customer value and corporate profitability. However, Mark knew that implementing an Enterprise system (ES) of that magnitude needed careful analysis and planning of organizational impacts. Although companies can spend a large amount of their IT budgets on ES projects, a significant proportion of ES projects do not succeed (Nguyen and Mutum, 2012).

4. CRM PLATFORM ALTERNATIVES

Mark needed to decide which CRM system he would pursue and how much would he have to spend. In years past, Fiserv ISS would have worked on building their own system. This took years to get done and unlike in years past, Mark did not have the time or resources to do so. He knew that he was going to have to buy an off the shelf product. Confident that he had found the answer Mark began to look around for different CRM products. Because Agile Financials was

buying the business, his first thought was to consider what they used for a CRM. They used the giant of the CRM world - Salesforce. Salesforce was by far the CRM that Mark had heard the most about. It had a variety of offerings that could help with the management of tasks. Mark had seen Agile Financial's version of Salesforce and knew that in addition to monitoring tasks, Salesforce also had the ability to monitor the client's satisfaction index score on a weekly basis. This would help to monitor the clients that were dissatisfied and make sure that special attention was paid to them to improve their scores. In addition to this, Agile Financials confirmed that they would help with the setup, implementation and training of Fiserv employees. If the fields were identical to how Salesforce looked at Agile Financials, porting the data into Agile Financial's Salesforce implementation would be much easier and would be a cost saver to them and in training the employees that were to be hired on Salesforce now, they would be saving time once the transition occurred in a years time.

However, Salesforce was expensive. The cost ranged anywhere between $300-500 a month per user per month. With all the features, he needed the best enterprise package which was the most likely came in at $325 a month for each user. Quickly doing some math of $325 times the 45 users he needed to give access to he was looking at a price tag of $14625.00 a month with a full price tag of $175,500 to be paid before the merger was complete. Mark saw that different programs could also be used with Salesforce. He looked to find if Microsoft Access was one of them and but couldn't find it on the Salesforce website. Calling Salesforce, the representative for the company responded, *"Who still uses Access? That seems like a terrible way to run a business."*

Mark did not feel confident in that answer at all. Mark knew that even with the implementation of the new CRM system, he would not be able to retire the Access database. Drawing upon the extant published CRM literature, Mark found many organizational factors, technical factors and economic factors that would impact how successfully he could integrate the CRM system with his existing systems. Mark would need to perform impact analysis to evaluate the ripple effects of the proposed change and identify the organizational stakeholders (both internal and external) who might be impacted by the new system (Nguyen and Mutum, 2012). This list of stakeholders needed to be built analyzing the dependencies of the component(s) involved in the Fiserv client management processes. Mark knew that the dependency model would also help document the changes that would be faced by his staff in performing their client management tasks. In many cases, the changes would affect running instances of long-running business processes by modifying the workflow of his client support agents. Mark realized that he would need to estimate the magnitude of the change and, possibly, the effort required for its implementation and the potential cost for the organization. A change that is very complex to implement because, for instance, it requires complex ad hoc modification of the CRM source code, should be accommodated only if its impact is sufficiently large in size. Would this rule out the selection of Salesforce? Without the ability to integrate the Fiserv Access Database with the new CRM, it would take many hours for Fiserv and Agile Financials to input the client's data and historical information. Also, he would have to wait until the merger was announced before he could receive help from their computer engineers, which would put the burden of transitioning to the new CRM on Fiserv's limited IT resources.

Trying to compile a more comprehensive list Mark turned to research another CRM. The next CRM that he looked into was Microsoft Dynamics. They covered 6% of the market for CRMs but were growing quickly. Fiserv ISS used Microsoft products exclusively. Mark was confident that Microsoft Access, which much of the company was dependent on, would be more easily integrated with this Dynamics system. With his prior research Mark knew that customers often communicated with their Fiserv ISS representatives by email. Fiserv ISS used Outlook and this would allow for the integration of those emails with the Dynamics CRM system. Part of the other issue with the Fiserv ISS system was the way that client information was stored in the Access database. It was the responsibility of each relationship manager to update their individual advisor or third party administrator information. The records in the database were outdated and often wrong, Mark learned that contact information in Dynamics was imported directly from Outlook. This would ensure that these records could be updated more frequently. Finally he thought of Lisa with her Access database dilemma. Tasks could be created and completed directly on the CRM. This was a huge benefit for the different departments. He was confident that the process would be more automated. He would be able to get the Dynamics CRM up and running much quicker than the Salesforce CRM. Researching further he found Microsoft Dynamics was cheaper for the package that Mark needed at only $165.00 per person per month. Coming in at $7425 a month, for a total

of $89,100. The Dynamics CRM program had a lot of benefits and seemed like a better deal.

However, in doing research Mark found out that Microsoft Dynamics was set up as an "on premise" software that required dedicated storage. The Dynamics product was not as highly rated as Salesforce and complaints said that some features of the Dynamic software did not live up to what was offered before implementations. Another complaint about Dynamics CRM is that it is set up for dynamic sales operations. With smaller companies, the system does not work as well. Microsoft has suggested that if this is the case before Dynamics can be used that a predefined process should be created. That would take longer for Mark and may not translate well when the business is taken over later by Agile Financials. The longer that this process reengineering takes to implement, the longer things fall through the cracks and the angrier the clients would became. Unlike with Salesforce, Mark could not rely on Agile Financials to help train the staff. In fact, Agile Financials had scoffed at the idea of using Dynamics. Mark knew he would be unable to take the training on by himself. He would need to hire a company to come in and help with set up and training. Those companies charged close to $200 an hour. Mark was not sure how many hours the total time would take but he figured it would take at least 80 hours for the build out and the training sessions. That would cost around $16,000. This brings the total cost of this product to $105,100. This would cut down on his savings from Salesforce.

The last CRM that Mark looked at was Infor. Infor CRM had many of the same characteristics that the other two products offered but at a fraction of the cost. Like Salesforce, Infor was cloud based. However, like Salesforce it started online and did not have some of the downside that Dynamics had in reviews. It could integrate with Microsoft outlook. Infor has great analytical tools that would track and monitor KPIs (Key Performance Indicators) like customer satisfaction and clear ways to assign tasks to different departments to make sure items are taken care of. All of the reviews Mark could find were positive. He had a hard time finding a negative opinion. Mark realized that this may be because the product was so great that users fell in love with it once they started using it, but it may also be that the market share was so small for Infor that the clients that used it were clients that had researched it and felt that it would be the perfect fit for their company. The cost was $55 per user per month. That would be $2475 per month for a total of $29,700. This was a number that would look great when presenting the need for a CRM to the Fiserv board.

Like other cloud based products, there were downsides to Infor (Marston, Li, Bandyopadhyay, Zhang and Ghalsasi, 2011). They included difficulties with formatting tasks. Tasks created had to be associated with an account. That would be difficult if you were trying to check the purchase availability of a certain product. Making changes to a client profile can get complicated and may not be able to be completed by the end users and searching for situations on the system can be complicated. Mark realized that among the three CRM systems, he would need the most help with implementing this one. The available companies that can help with the implementation and training of Infor is a much smaller pool than for Microsoft Dynamics. These rates usually ran close to $250 an hour and would be even greater for the relationship managers using it so training would need to be more in depth and would most likely take longer. Mark thought that would make the needed hours for a company to help implement the new CRM creep up to around 150 hour at a cost of $37,500. That would bring the total cost of training and the Infor CRM program to $67,200.

Comparing CRM Platforms

Mark could not believe it. Each of the three CRM systems had benefits and drawbacks that differentiated each other (Table 2).

CRM System	Cost per User (45)	Design & Training Effort	Notes
Salesforce	$325	Covered by Agile Financials	Compatible Tong term
Dynamics	$165	80 hrs @ $200/hr	Premise Storage in Access
Infor	$55	150 hrs @ $250/hr	Cloud based

Table 2: CRM System Comparisons

Salesforce was going to create a lot of work for Mark and he needed the help of Agile Financials. The Dynamics platform seemed a good short term fit, but he would not get any help from Agile Financials with Dynamics and this would create significant rework after the merger was completed. The CRM was desperately needed to help complete tasks during this one year transition period. Any delay in rollout would affect customer satisfaction even more. Microsoft

Dynamics would be the easiest for the data to be imported but Agile Financials was not happy about using Dynamics instead of the program they were used to (Nolan and McFarlan, 2005). On top of that the learning curve would require outside help to come in and train the staff. It would require staff to be away from the phone and may decrease the level of customer service that clients depended on. Finally, Infor would be the cheapest. Only by a few thousand dollars but for Fiserv's board, every penny may count. The learning curve and implementation cost were higher for the Infor product, but it seemed to have only positive reviews. Mark had not asked Agile Financials of their opinion but was fairly certain that a decision to use Dynamics would not be met with praise. Mark had a lot of factors to consider for his decision, but had very little time to do so. He hoped he could choose the CRM that would have the most success for Fiserv in its final days. "*We need to thrive and not just survive in this interim period*", Mark thought.

5. SYSTEMS CHANGE MANAGEMENT

In addition to the technology selection, the organization dimensions are very important for capturing the complexity of CRM implementations (Pozza, Goetz and Sahut, 2018). When companies need to adopt a new mission critical enterprise system like CRM, they need to identify and speak with numerous stakeholders to not only discern pricing, but to determine what can and cannot be done within the established systems implementation plan (Wagner and Piccoli, 2007). Stakeholders will come up with ideas about what options they need in the CRM system to be able to accomplish their plans and business processes. The CRM implementation team needs to figure out how best to manage these stakeholder's needs and try and make sure the software allows for it. Procedures for certain business process transactions can vary from company to company based on what the software programs allows for, so no two transactions can look the same. This is certainly the case here where transactions that once required manual/paper based processes, must now be done as paperless. Fiserv was using a Microsoft Access database software that was fairly generic, but got the job done. It was also a slow and manual program that was primarily setup to allow data transfer between lines of business. Most of the bugs had been worked out, but Mark knew that trying to convert older data onto any new system platform was going to take time. On average it took a "typical" company just over a year to finalize their conversion plan, and the timeline they had was at most 6 months for a complete conversion over to the new CRM platform (Davenport, 1998). Mark felt confident this was possible only if a phased approach was used and client data for more the profitable and important clients converted first. They figured they would eventually be able to convert a certain number of clients every week. Since the firm held well over 500 clients this means that some "waves" would be bigger than others. They would also have to prioritize so that the more "sensitive" clients, ones with more assets and financial transactional demands would convert first therefore giving more time for the other clients to convert. This also allows them to find bugs and make adjustments as needed.

Fiserv also had to worry about training phone representatives on the new platform. This included the call center staff that handled customer service. Mark knew that this is where a lot of trouble was going to originate during the system change. Many seasoned veteran reps were reluctant to switch, while others knew the inevitability of a system switch and could almost predict what the biggest complaints from plan participants was going to be. "*These participants are so used to the things offered before, a lot of them are going to be more then confused, they are going to be upset*." was one complaint heard in different variations. But some of the representatives were taking more optimistic approaches, addressing certain things that the new software is capable of that the previous one couldn't do before.

Orders of Change Management

Assessing the orders of change revolve around impacts caused to the basic structure of the company (O'Hara, Watson and Kavan, 1999). A first order change leverages a new software to maintain the basic structure and culture of a company. An example of this would be changing out an account management system, which utilizes paper or electronic interface, to a fully digital environment which utilizes and leverages Network or Cloud storage. This change does not inherently require users to change the way they do work, but does require them to change how they interface with the work. It is realistic that a user could maintain most of the same way of doing business.

However, a second order change incorporates a more disruptive effect to the company. This sort of change requires users to not only change the "how" of their work behavior but also the more immediate "why". One example of a second order change would be automation and online book sales. Previously the skillset for book- sellers was

to be knowledgeable of where and what a book was. But with an automation of that scale, the sales person becomes not only a sales individual, whose knowledge of the book or location is useful, but further they have to become a facilitator of the new system to the customer as their knowledge of the product is not so important as their ability to find and access the data about the product. In this way their job description goes from "retail sales" to "retail sales and facilitator".

Finally a third order change incorporates the most disruptive behaviors to affect a company's structure. The nature of this change is that employees and the company both alter their viewpoint. An example of third order change is Kodak and their change from a one-dimensional producer of film to a digital producer of film and content. In the "old" version of Kodak they produced film, which was used by multiple media houses for various formats of media - film, B&W, color, art, practical. At no point however did Kodak engage in the content on anything other than a method to provide it to the end-user/customer. During its relatively failed attempt to make a third order change from paper to digital there were growing pains and rejection - many employees saw little need of a "soul-less" digital media and fought the change, while those who embraced the cutting edge considered these people Luddites.

6. CONCLUSIONS

Mark realized that if the appropriate order of change was not recognized, planned and addressed during the CRM system implementation, problems would quickly mount as the client data conversions kicked in. Finally there was a big discrepancy between what service representatives had recorded on paper forms and was not recorded in the Access database. Employees and customers started to report issues with accounts being shown on their reports but the asset prices were not updated online. After reviewing a few client dashboard results, Mark noticed some key items missing from the reports. This was just the beginning of the customer complaints. There was no consistency for clients and how they were handled across the four smaller companies. The content team, which is responsible for the data integrity online, had price discrepancies that caused major clients to get upset and claim that Fiserv had violated contract agreements. There were now four disjoint trust companies with their own nuanced processes instead of the omni-channel accounts model that Fiserv and Agile Financials were trying to achieve.

7. CASE STUDY QUESTIONS

While the decision to implement a CRM may seem simple, Mark knew that there would be issues when the new software allowed things that his current system doesn't support and vice versa (Hammer, 2004). Compromise is going to be needed from multiple stakeholders for this project to happen. And in some cases, things are going to change in business processes and these changes need to happen very quickly to keep the Fiserv-Agile Financials deal moving forward and closing. Mark is going to be tested on what his company's software is capable of.

After analyzing the situation posed in the case study, answer the following questions.

1. List the major problems facing Fiserv.
2. Was Fiserv being realistic in attempting to implement a new CRM system rather than incremental changes to their existing systems to fix customer service in the short term?
3. What additional benefits would a CRM System have over some other less expensive ways of using IT to fix the customer service problems?
4. If a CRM product is chosen, which one would you chose and why?
5. What order change would be required to implement the CRM system?
6. What order change would be required if an incremental approach was used (from Question #2)
7. As the CIO, Mark Bennett, how would you approach the Fiserv board to ask for funding for the CRM system implementation?

8. REFERENCES

Comuzzi, M. and Parhizkar, M. (2017). A Methodology for Enterprise Systems post-implementation change management. *Industrial Management & Data Systems, 117(10),* 2241-2262.

Davenport, T.H. (1998). Putting the Enterprise into Enterprise Systems. *Harvard Business Review*, *July/Augustl,* 121-131.

Hammer, M. (2004). Deep Change: How operational innovation can transform your company. *Harvard Business Review*, *April,* 84-93.

Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J. and Ghalsasi, A. (2011). Cloud Computing:

The business perspective. *Decision Support Systems, 51(1),* 176-189.

Nolan, R. & McFarlan, F.W. (2005). Information Technology and the Board of Directors. *Harvard Business Review, 83(10), 9-24.*

Nguyen, B. and Mutum, D.S. (2012). A review of customer relationship management: successes, advances, pitfalls and futures. Business Process Management Journal 18(3), 400-419.

O'Hara, M.T., Watson, R.T., & Kavan, C.B. (1999). Managing the three levels of change. *Information Systems Management Journal, 16(3*), 63-70.

Pozza, I.D., Goetz, O. and Sahut, J.M. (2018). Implementation effects in the relationship between CRM and its Performance. *Journal of Business Research 89(8),* 391-403.

Thakur, R. & Workman, L. (2016). Customer portfolio management (CPM) for improved customer relationship management (CRM): Are your customers platinum, gold, silver, or bronze? *Journal of Business Research 69(3),* 4095-4102.

Wagner, E. & Piccoli, G. (2007). A call to engagement: Moving beyond user involvement in order to achieve successful information systems design. *Communications of the ACM, 50(12),* 51-55.

Editor Notes: Teaching Notes are available for this case, please contact the author directly.

Teaching Case

Alpha Insurance: A Predictive Analytics Case to Analyze Automobile Insurance Fraud using SAS Enterprise Miner™

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Abstract

Automobile Insurance fraud costs the insurance industry billions of dollars annually. This case study addresses claim fraud based on data extracted from Alpha Insurance's automobile claim database. Students are provided the business problem and data sets. Initially, the students are required to develop their hypotheses and analyze the data. This includes identification of any missing or inaccurate data values and outliers as well as evaluation of the 22 variables. Next students will develop and optimize their predictive models using five techniques: regression, decision tree, neural network, gradient boosting, and ensemble. Then students will determine which model is the best fit providing consideration of the misclassification rate, average square error, or receiver operating characteristic (ROC). Lastly, students will generate predictive scores for the claims and evaluate the result using SAS Enterprise Miner™. Ultimately, the goal is to build an optimal predictive model to determine which of the automobile claims are potentially fraudulent.

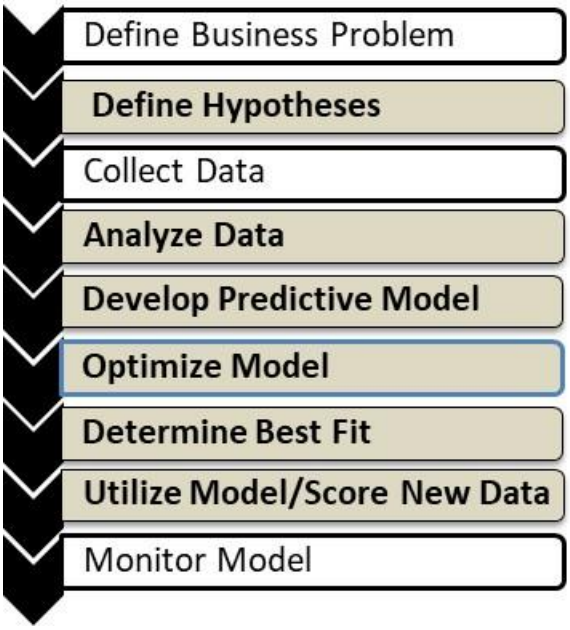
Keywords: predictive analytics, neural network, decision tree, regression, data mining, predictive scores, SAS Enterprise Miner

1. INTRODUCTION

This case is designed to be used in a predictive analytics course. The case provides an opportunity for extensive research and analysis of six of the nine steps in our Predictive Analytics Process Model (see Figure 1). Predictive techniques in the case include the *Big Three* - regression, neural networks, decision trees as well as Bayesian networks

Students are provided the business problem as well as the data. The business problem is to determine which new claims have the highest probability of fraud. However, based upon the data provided, the students must determine which hypotheses will be the focus of their analysis. They must then analyze the data and create their initial predictive model. Once the model is constructed, they can then optimize each node to determine the best fit. Finally, the new data can be scored from the best fit to determine the new claims that have the highest probability of fraud.

Figure 1 Predictive Analytics Process Model



Background

Despite recent developments in data analytics techniques and technology, the cost of fraud to the insurance industry continues to increase globally. According to the Coalition Against Insurance Fraud (2018), at least $80 billion is stolen each year as a result of insurance fraud.

Fraud is a common and recurrent problem in the property-casualty insurance industry. Insurers must be vigilant in identifying and dealing with fraudulent claims. Claim fraud analysis is a key analytic for many property-casualty insurers and most have a dedicated Special Investigative Unit (SIU) to investigate and resolve potentially fraudulent claims (Saporito, 2015). According to the Insurance Information Institute (2018), 42 states and the District of Columbia have set-up fraud bureaus for reporting potentially fraudulent claims. In some cases, they have multiple bureaus by line of business. Healthcare, workers compensation, and automobile insurance have been the three most prevalent lines of business to experience fraudulent claims. Insurance fraud continues to be a big challenge for the industry, regulatory authorities, and the public worldwide. Data driven fraud detection offers the possibility of utilizing a massive volume of prior claim history to determine patterns that uncover new potentially fraudulent claims which can then be investigated. This can provide both a cost and workload efficiency (Baesens, Van Vlasselaer, Verbeke, 2015).

Some activities that are fraudulent include vehicle dumping (i.e., the owner abandons or dumps the vehicle and reports it stolen), or exaggerated costs of repairs after an accident (Essurance, 2018).

Some of the techniques to predict insurance fraud include regression, neural networks, decision trees as well as Bayesian networks. Applications such as SAS Enterprise Miner™, IBM Watson Analytics, and Microsoft Power BI are used by insurance companies to help detect, analyze and ultimately reduce fraudulent activities. There are many tools and techniques in use to predict potentially fraudulent claims, therefore it is appropriate to use multiple techniques when analyzing specific claims.

The Case

The Alpha Insurance Company (this is a pseudonym and not intended to reference a specific organization) has contracted with you to develop an optimal predictive model to determine which of their automobile claims are potentially fraudulent. Historical data is a very good indicator of potential fraudulent claims, so it is appropriate to use it for analysis. They have provided two datasets for analysis. The first is a historical sample of automobile claim data containing 5,001 records. It contains attributes that are considered significant in the identification of

fraudulent claims, though it will be up to you, the analyst, to determine which of these attributes are the best determinants. The second file contains 4,008 current automobile claims that have not yet been analyzed. This file will be used to apply your best model to analyze which claims have the highest probability of being fraudulent (i.e., this is the dataset to be scored). This provides an opportunity to utilize the best predictive model to analyze current data.

At a minimum, Alpha Insurance would like you to utilize regression, decision trees and neural network models to determine the best model to predict which future claims are potentially fraudulent. These models are considered the *big three* in predictive analytics. In addition, you should consider gradient boosting and ensemble models.

The subsequent sections outline the requirements for each of the six required steps from the Predictive Analytics Process Model.

2. DETERMINE HYPOTHESIS

The data set used for this analysis contains 22 variables that each represent a single automobile claim.

Since the data source denotes the initial point for higher-level business analytics, data cleansing and data pre-processing efforts should be used.

Two of the variables are redundant and therefore may be rejected. These are the State (which is the expanded definition of the State_Code) and the Monthly_Premium (which is 1/12th of the Annual_Premium). Nine other variables are useful in understanding the cause and impact of the claim, however, they are not indicators of whether a claim is potentially fraudulent and thus should not be included in the analysis. They include: Vehicle_Model, Annual_Premium, Claim_Cause, Months_Since_Policy_Inception, Months_Since_Last_Claim, Claim_Report_Type, Location, Claim_Date, and Outstanding_Balance. The target variable is the Fraudulent_Claim indicator. This is a binary variable that documents whether the claim was fraudulent. It contains a value of Y (Yes) or N (No).

Appendix A provides a description of each of the attributes for both the sample historical data and as well as the current (score) dataset. From the remaining variables, you must then determine your hypotheses that is the subject of your analysis. Consideration must be given to whether all remaining variables will be subject to analysis or if additional variables will be rejected.

3. ANALYZE DATA

The sample claim data was extracted from Alpha Insurance's claim database.

Before you begin analysis, make sure your data source matches the roles and levels as described in Appendix A. The data needs to be processed to determine if there are any missing or inaccurate data values. In addition, outliers may have a significant impact on analysis and therefore they will also need to be considered. Alpha Insurance is interested in determining which factors (variables) are the most likely indicators that a claim is potentially fraudulent and what is the likelihood that the claim is fraudulent.

When preparing the data, you should test for outliers and missing values and handle them appropriately. You should also evaluate each of the independent variables to determine if any variables are skewed. If so, use appropriate transformations.

For your analysis, begin by partitioning the data using a 60/40/0 data set allocation for training, validation, and testing. Varying the partition sizes can impact the performance of a model. For a dataset of this size, it is possible to evaluate your models without creating a test dataset, later you may want to experiment with these settings.

4. DEVELOP AND OPTIMIZE PREDICTIVE ANALYTIC MODELS

Based upon the requirements set forth by Alpha Insurance, at least five techniques must be modeled to analyze this data (regression, decision tree, neural network, gradient boosting, and ensemble). For some of these techniques, it is appropriate to try several different approaches.

When performing a regression analysis, you should try several methods to determine which of these is the best fit model. These regression methods should include linear and/or logistic, multi-factor polynomials, and DMINE. When performing regression, consider the impact of utilizing stepwise, backward, or forward regression.

Decision trees are machine learning techniques that state independent variables and a dependent variable in a tree-shaped structure. Decision trees can vary in complexity, therefore when establishing your tree investigate the impact of

changing the depth and number of branches. Limit your depth to six and your branches to five to ensure that the tree does not have too many splits and therefore is no longer appropriate to explain the business problem.

Neural Networks vary greatly based upon the network type and number of hidden layers. Since we have a target variable to analyze, try both a generalized linear model and multi-layer perceptron model. Investigate the impact of varying the type of activation and combination functions as well as varying the number of hidden layers between two to six.

Each of the above techniques may result in the use of multiple nodes. Each node tested should be included in the final analysis. However, only the optimal node within each technique should be utilized within the ensemble node. If multiple partitions were tested, the results of the best performing partition should be considered in the final analysis.

5. DETERMINE THE BEST FIT AND SCORE NEW DATA

Alpha Insurance has not specified a specific selection statistic to be used as the basis for a recommendation on the model that is the best fit. Therefore, it is appropriate to consider whether the misclassification rate, average square error, or receiver operating characteristic (ROC) should be utilized, particularly if they yield a different result to determine which model is the best fit.

Once you have determined which model is the best fit, use that model to score the supplemental claim score data set to generate probabilities that these claims are fraudulent.

6. FINAL REPORT

The best fit model enables an insurance company to identify and detect potentially fraudulent activity more accurately and quickly, to ultimately reduce the payout on fraudulent claims.

In your final report, you must include the following sections:

1. Determine Hypotheses:
   What were the hypotheses that you tested? If any variables were excluded, discuss why they were removed from the subsequent analysis.

2. Analyze Data:
   Which variable(s) had missing values and how were they treated?
   Which variable(s) contained outliers and how did you address them?
   What variable(s) did you identify as being skewed and how did you handle them?
   What partition sizes were used and why?

3. Predictive Model:
   For each model type, document the properties that resulted in the best fit model?
   Which selection statistic was used and why? Show the results of all of the selection statistics.
   Which model type resulted in the best fit and why?

4. Scored Results:
   Which claimant number(s) had the highest probability of potential fraud and what were the probabilities?

7. REFERENCES

Baesens, B., Van Vlasselaer, V., Verbeke, W., (2015), Fraud Analytics: Using Descriptive, Predictive, and Social Network Techniques: A Guide to Data Science for Fraud Detection, Wiley & Sons, Hoboken, NJ.

Coalition Against Insurance Fraud, (2018), Fraud: Why Worry? Retrieved on May 20, 2018 from www.insurancefraud.org/fraud-why-worry.htm

Essurance, (2018), retrieved on August 10, 2018 from https://www.esurance.com/info/car/5-examples-of-car-insurance-fraud

Insurance Information Institute, (2018), Background On: Insurance Fraud, Retrieved on Jan 1, 2018 from www.iii.org/article/background-on-insurance-fraud

Saporito, P., (2015), Applied Insurance Analytics, Pearson Education, Upper Saddle River, NJ.

8. NOTES

Two datasets accompany this case. They are: Claim Raw Data – containing 5,001 records that represent a historical analysis of fraudulent claims; and Claim Score Data – containing 4,008 records to be processed to determine which new claims have the highest potential for fraud.

Editor Note: Teaching Notes accompany this case, contact the authors

9. APPENDIX A – DATA DICTIONARY

Attribute	Role	Level	Definition
Claimant _Number	ID	Interval	Unique identifier assigned to each claim
State_Code	Input	Nominal	Two-letter state abbreviation where the claim occurred
State	Reject	Nominal	Name of the state where the claim occurred
Claim_Amount	Input	Interval	Total amount paid for the claim
Education	Input	Nominal	Level of education attained by claimant (High School or Below, College, Bachelor, Master, Doctorate)
Claim_Date	Reject	Nominal	Date when the claim occurred
Employment_Status	Input	Nominal	Employment status of the claimant (Employed, Unemployed, Medical Leave, Disability, Retired)
Gender	Input	Binary	Code indicating the claimant's gender (F, M)
Income	Input	Interval	Annual income of the claimant (in USD)
Location	Reject	Nominal	Categorical location where the claimant resides (Residential, Suburban, Urban)
Marital_Status	Input	Nominal	Marital status of the claimant (Divorced, Married, Single)
Monthly_Premium	Reject	Interval	Monthly premium amount for the policy
Annual_Premium	Reject	Interval	Annual premium amount for the policy
Months_Since_Last_Claim	Reject	Interval	Number of months since the last time the claimant had a claim prior to this claim
Months_Since_Policy_Inception	Reject	Interval	Number of months since the insured began policy coverage
Claim_Cause	Reject	Nominal	Cause of the claim (Collision, Fire, Hail, Other, Scratch/Dent)
Claim_Report_Type	Reject	Nominal	Code indicating how the claim was reported (Agent, Branch, Call Center, Web)
Vehicle_Class	Input	Nominal	Type of automobile damaged as a result of the claim incident (Two-Door Car, Four-Door Car, Luxury, SUV, Luxury SUV, Sports Car)
Vehicle_Size	Input	Nominal	Category indicating the size of the vehicle that was damaged (Compact, Midsize, Luxury)
Vehicle_Model	Reject	Nominal	Model of the vehicle that was damaged (Chevrolet, Ford, Honda or Toyota)
Outstanding_Balance	Reject	Interval	Remaining balance owed on the vehicle by the claimant at the time the claim occurred
Fraudulent_Claim	Target [Dependent]	Binary	Code indicating if the claim was fraudulent (Y/N)

Teaching Case

IT Disconnect at Cascade Sustainable Energy

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Abstract

The IT or IS department of a business or other organization exists to serve the larger organization and support other parts of the organization in working to achieve departmental and organizational goals. This case explores a situation where the IT organization has lost focus on the need to serve and support the rest of the organization. The case explores problems with the technology system used to support the new employee orientation process at Cascade Sustainable Energy and follows a new IT employee as he explores the problem and looks to improve the connection between IT and the HR staff responsible for the orientation process. The similarities between a corporate new employee orientation process and the new student orientation processes used at most colleges and universities should allow students to understand the case. The case is setup to allow students to engage in developing ideas for improving the technology supporting the orientation process and to look at the existing disconnect and how it might be solved. This case can also be used to support discussion of recent studies showing that a sizable portion of business leaders have concerns about their IT organization's ability to support the company's business strategy.

1. GETTING ORIENTED

As Ryan finished his breakfast, he thought ahead to what should be an interesting day. Today would be his first day as an IT business relationship manager at Cascade Sustainable Energy. He had learned a little about the job during his interviews but wasn't completely sure what he would be doing. He did know that today would be very different from the first day at his previous jobs where he spent the day being shuffled from office to office to fill out forms, hunted down login credentials, and worked to clear out the accumulated stuff in is new cubical. At Cascade Sustainable Energy, he would join a number of other new employees in a two-day orientation process.

Even though he wasn't completely sure what the new job would involve, Ryan was excited to be working at Cascade Sustainable Energy with the opportunity to help them with their mission to bring green energy to anyone and everyone. As Ryan drove to the local conference center reserved for the orientation sessions, he thought about the research he had done to prepare for his interview with Cascade Sustainable Energy. Cascade was the market leader in providing green energy solutions to residential and commercial customers. While Cascade had started with solar energy, they now worked with many types of renewable energy including solar, wind, geothermal, and hydropower.

During his interview, Ryan had received a good overview of how Cascade Sustainable Energy worked with their customers and the value of team work. Once a customer contacted Cascade Sustainable Energy, a cross-functional team would work with the customer to develop a solution meeting their needs. This involved working with the customer to identify the mix of energy sources that would work best in the customer's location. The Cascade team also addressed requirements for local zoning, historic preservation commissions, environmental

assessments, and obtained all needed permits. The Cascade team could also help the customer find financing including available tax incentives, model financial payback, and help with marketing campaigns.

As Ryan entered the conference center, he was surprised to see a full breakfast buffet with hot and cold foods rather than the coffee and stale donuts he had expected. Clearly, Cascade wanted to make a good impression on their new employees! At the registration table, he was greeted and given a brief overview of the day. The first activity would be a welcome session. It would start soon, but that left time to grab a snack and look at the packet of information he had been given.

That evening, Ryan looked back on what had been an interesting day. Starting with the welcome session, the day had been active and full of surprises. Cascade Sustainable Energy's three co-founders and most of the company executives presented the welcome session. After the founders gave a brief history of how Cascade Sustainable Energy started, they asked the audience of new employees to help them imagine the company's future. Ryan got a clear idea that the company valued collaboration and wanted all employees, even the newest, to contribute.

The welcome session included an overview of how Cascade worked with their customers. First, they meet with the customer to understand their needs and assess the local physical and political environment to identify a mix of renewable energy solutions for the customer. Then the team considers the finances – payback periods, return on investment, available tax credits, etc. – to focus on the best solutions. Next, the team does a design of structural and electrical details for the project and while assembling the needed components, the team works to obtain the needed permits and if requested, starts a marketing campaign to help the customer spread the word that they are "going green." After delivery, the components are assembled, tested, and put to work generating power. A key part of the overview was the focus on how each team members focused on their specific specialty area but also worked collaboratively with the team to deliver a successful implementation for the customer.

After this, there were sessions where new employees learned more about their designated specialty – Ryan joined a group focused on the technology tools used by the Cascade field teams and the technology provided to let Cascade's customers monitor their green energy systems. A couple of experienced field team members led the session and worked through the IT details of a sample customer project. Ryan thought it was interesting that all of these tools were cloud hosted and developed by third parties rather than by Cascade's internal IT team.

In addition to the detailed session on their specialty area, the new employees also rotated through sessions covering the other specialty areas including finance, marketing, environmental (Ryan now knew his parent's house wasn't a good candidate for wind power but had some potential for solar power), and all aspects of design and engineering – mechanical, electrical, and civil. The focus of these sessions was not to make everyone an expert in every area, but to provide some basic cross training. Once again, the importance of team work and collaboration were stressed.

Even though it had been a long day, the orientation process had energized Ryan and he felt excited to be part of the Cascade team. Tomorrow promised to be another busy day with teams of new hires working through a simulated customer project. After that, there would be a "team-building" activity – rumor had it that the company executives would be joining them for a scavenger hunt around town.

Although it had been a good day, Ryan had noticed a number of ways that technology could help improve the orientation process and he wanted to make some notes. For example, he noticed that participants received numerous paper documents. This seemed odd for a company that valued the environment. He had also noticed that the orientation staff did not always have current information. In his session focused on IT tools, a couple of people did not belong there and the orientation staff had to re-direct them to a different session. There had also been a session in a room that reminded him of his college computer lab where he was parked in front of a computer and given a paper list with links to different online forms he needed to completed to sign up for benefits, payroll direct deposit, and other standard new employee paperwork. Finally, there was a poor mix of new employees in the different specialty areas and Ryan wondered how that might affect tomorrow's customer project simulation. He had taken some finance classes in college, but hoped he did not have to fill the role tomorrow!

Questions to consider:

1. How could technology be used to improve the orientation process?
2. What is the value of the orientation process for the new employees and for the company?
3. What is the cost of the orientation process?

2. FIRST DAY IN THE OFFICE

After his orientation, Ryan was eager to get started. His first day in the office was off to a good start. A desk was waiting for him along with a laptop that was set up and ready to use. He had logged into his e-mail and found a message from Nick, his boss, welcoming him and telling him to stop by his office once he had settled in so they could talk about Ryan's role as an IT business relationship manager.

Ryan sent off a quick e-mail to a couple of people he'd met at the orientation confirming plans to meet up that night and set off in search of Nick's office. Fortunately, he still remembered the layout of the IT offices from his interview visit and easily found Nick's office.

Nick welcomed Ryan and they briefly talked about the orientation sessions – Ryan was the first corporate office IT employee to go through the orientation process. Then they got down to business – what exactly would Ryan be doing? As Nick explained it, the IT business relationship manager position came out of a recent external review of all of the operations areas in Cascade's corporate headquarters. Apparently, in talking to other areas – finance, human resources, purchasing – there were comments that IT did not have a good understanding of these areas' strategic priorities and was hindering progress towards corporate goals.

Nick commented that this had been news to IT, but "you know consultants – they have to find some problems to justify their fat fees, and IT is always an easy target." One recommendation offered by the consultants was to extend Cascade's use of the IT Infrastructure Library (ITIL) by developing the Business Relationship Management process. Nick rambled on some more about consultants while Ryan remembered that one of his college classes had covered ITIL. He'd have to do some research to remember the details, but he did recall that business relationship management focused on making sure that IT understood the customers' needs and was delivering the needed services.

Ryan turned his attention back to Nick in time to hear him comment that he did not really see the need and expected that Ryan would really serve more as a business analyst. Ryan remembered his ideas about how technology might improve the orientation sessions and suggested that he could meet with the orientation staff to discuss these. Nick thought this was a good idea and told him to give it a try.

Ryan headed back to his desk. He needed to work on his ideas about how technology could improve the orientation process. In addition, he thought the orientation paperwork he had received might have the contact information for the person responsible for the organizing the orientation sessions.

Questions to consider:

1. Why does the IT organization need to understand what the other parts of the business do?
2. What might happen if IT continues to hinder progress towards corporate goals?
3. What do you think about Nick's comments about the consultants?

3. RELATIONSHIP BUILDING

Ryan had found the contact info for Maggie Franklin in his orientation packet and setup a meeting. Maggie worked in the Cascade HR department as the Onboarding Manager. As Maggie explained when they met, her job started once a candidate had accepted an offer from Cascade. Her department's goal was to make new employees feel at home at Cascade and turn them into productive, engaged employees as quickly as possible. She explained that both aspects of this were important – the company leaders were very interested in making sure the new employees were "earning their pay" as quickly as possible but also focused on engaging employees so that they would stay at Cascade.

Ryan told Maggie that he had greatly enjoyed the orientation process and that it was better than the welcome he had received at the other companies. He mentioned that he had some ideas for how technology could improve the orientation process.

Maggie was interested to discuss his ideas, but as he worked through his list, he realized that Maggie had already thought of most of them. Since it seemed like she was very interested in using technology to improve the orientation process, Ryan asked when they expected to introduce some improvements.

Maggie admitted that she would love to implement some of the ideas but first wanted to just get the current system working. She described several problems that caused additional work for her staff and complicated the orientation sessions. One issue was that while her staff could set limits on the number of people with each specialty who could register for an orientation session, the system seemed to randomly ignore these. Maggie mentioned that this had affected Ryan's orientation session, which had too many electrical engineers and not enough marketing and finance specialists. She also mentioned a periodic issue where a new hire would have to cancel their registration for an orientation session, but this did not result in the cancellation of the person's hotel room, resulting in Cascade paying for an empty hotel room.

Maggie admitted that it was a challenge to get IT engaged in a discussion about changes to the process. She mentioned that since Cascade was mostly hiring new college graduates, they spent the summer holding orientation sessions and then in the fall would try to get IT engaged in making improvements to the orientation system.

The first challenge was finding someone in IT to talk with. She usually started with the last person who had done work on the orientation system, but always found that they had been moved to another project and did not know who was currently responsible for the orientation system. After several phone calls or e-mails, Maggie could manage to track down a manager who would agree to talk to her.

Then she would need to explain the orientation process and the orientation system. The manager would then spend several weeks trying to learn what he could about the system and who had done work on it. Eventually, they would be ready to discuss what changes Maggie wanted. Ideally, this would include both new features as well as fixes to existing functionality, but time constraints usually led to a focus of fixes at the expense of new functionality. IT then prioritized the work using a process that seemed to involve Maggie's boss, the VP of Human Resources, and other VPs.

Once work on the orientation system was prioritized, the IT staff member assigned to the project would eventually contact Maggie. Unfortunately, it was always a different person, so Maggie would need to spend time explaining the onboarding process and explaining how the orientation system worked. She was surprised that there wasn't much documentation on the system.

Maggie noted that work on fixes and improvements to the orientation system would typically start in mid-winter and since planning and setup for the next summer's orientation sessions usually started in mid-spring, this did not leave time to implement many of her requested changes. Adding in the winter holidays and the fact that the IT person assigned was often was pulled off to work on other projects, Maggie said the improvements were usually limited to fixing any major problems found in the last orientation system and adding one or two small new features.

Maggie commented that a few months ago, the VP of Human Resources (HR) had talked to the CIO about the ongoing challenge of improving the orientation system and IT had agreed to do a review of options for improving the system. This has resulted in an in-depth discussion with IT about the desired features for the orientation system and a promise to review the options for making these features available for the orientation process. The VP of HR had also provided information about a couple of promising vendor solutions that Maggie had seen at an HR professional's conference and asked IT to include them when they reviewed the options.

Ryan asked if Maggie had seen the results of the IT review of options for the orientation system, but she had not. Ryan said he would try to track them down, thanked Maggie for her time, and headed back to his office.

Questions to consider:
1. What problems can you identify in Maggie's interactions with IT?
2. Who should be responsible for fixing these?
3. What skills are needed to fix these problems?
4. What is Ryan thinking after his meeting with Maggie?

4. REVIEWING THE OPTIONS

Back at his desk, Ryan found an e-mail from his boss. Nick had remembered that IT was working on a review of options for the orientation system, and offered a couple of people who might know more about the effort.

After a couple of tries, Ryan found Don Katz who said he had finished the review a few weeks ago but had not had a chance to send it to the VP of Human Resources. He offered to send the report to Ryan and let him deliver it to HR.

A day later, Ryan had a spreadsheet titled "Orientation Options Analysis" to review (see Appendix 1). From what Ryan could see, the analysis looked at how to implement the orientation system in four systems that Cascade currently used – the Customer Relationship Management (CRM) system, the Enterprise Resource Planning (ERP) system, a conference scheduling system, and a more general room and resource scheduling system. For the ERP system, the analysis actually considered the next release of the ERP system. Ryan had heard that work on the upgrade was underway, but that it was a "big" upgrade.

Reviewing the analysis, Ryan was a bit puzzled. It was hard to tell which, if any, of the options were recommended. There was no information about the relative importance of the requirements, but a rough count of the number of requirements met seemed to indicate that the solution based on the new version of the ERP was the best fit.

Even if the next ERP release was the best of the four options, it was not clear how good an option it was. For several of the requirements, the solution appeared to involve custom reports, interfaces, or processes like extracting data and using mail merge. Would these be acceptable? Ryan was also concerned that the analysis had no indication of the effort needed to build any of these solutions. While there was value in a better orientation system, he expected cost would be an important consideration. And what about the vendor solutions that Maggie had found? It didn't look like these had been evaluated. Ryan headed off to see if he could find some additional information before he met with Maggie to discuss the analysis.

Ryan managed to find Don Katz and asked if he had time to discuss the orientation options analysis. Don said he was between meetings and could talk to Ryan for a few minutes. Ryan noticed that Don's office had a large flat panel monitor on the wall displaying lots of data and chart. He was curious and wanted to better understand Don's role in the IT organization, so he asked about the data display. Don was excited to talk about it and explained that this was the new monitoring system that IT was building. He mentioned that IT had put a lot of work into it over the past year, but had finally gotten it working. The next step was installing similar displays throughout the building so that users could see the current status of all IT systems.

He showed Ryan how the display showed the status of every server in the data center so that at a glance anyone could see if there were issues. He asked Ryan to name a server so they could check its status. Naturally, Ryan asked about the orientation system, but unfortunately, he had no idea what server it was running on. After a few minutes of rummaging through the papers on his desk, Don was able to find a chart that showed what server the orientation system used and they were able to find it on the display. Ryan was impressed but thought it might be useful to view the data based on the systems that IT supported rather than the servers.

Ryan finally brought up the orientation system and mentioned Maggie's interest in getting the current system to work. Don was dismissive – "There's nothing wrong with the system, the users just need more training." Ryan didn't know what to say, so he asked about the most recent project to update the orientation system and the limited progress in adding new features. Don agreed that the project had suffered since resources were needed for other more important projects like the IT monitoring project.

Ryan moved on to ask about the solutions analysis. Don agreed with Ryan's interpretation that the solution based on the next release of the ERP met the largest number of requirements and would be the best fit. When Ryan asked when a new orientation system based on the next ERP release might be available, Don didn't have a clear answer. He explained that first, they needed to complete the upgrade. Since they were still in the planning stage, he guessed it would be six to nine months, but the new release included major changes to the development environment and tools used in the ERP system and it would take time for IT to get up to speed on these. He also noted that since orientation wasn't that important, it would be a low priority and his team might not get to it for a year or more.

An in-house developed solution wasn't sounding very promising, so Ryan asked about the vendor solutions that the VP of HR had asked IT to review. Don mentioned that to review vendor solutions they would have had to develop and distribute a Request for Proposals (RFP) and he had decided that wasn't worth the effort since he expected one of the in-house developed solutions would be sufficient. Ryan was a little puzzled since it sounded like the VP of HR had specifically asked IT to consider the vendor solutions. He didn't think it would be useful to mention that so

he thanked Don for his time and headed back to his cube.

Questions to consider:

1. What do you think of the content and presentation of the options analysis document?
2. What is the best option, and why?
3. How would you improve the presentation of the options?

5. Next Steps…

Back in his cube, Ryan considered his next steps. He should probably meet with Maggie to share the options analysis and get her view on the options. Don had confirmed that IT saw the solution based on the next ERP release as the best option, but it still wasn't clear if it was a viable option since it didn't clearly meet all of the requirements, and then there was the issue that it would be a year or more before the solution was available. Could Maggie live with the current system for one, or maybe two more summers?

And what about the vendor solutions? From Maggie's description, she clearly expected IT to look at these. He remembered learning about RFP processes in his IT strategy course, and from what he knew, it shouldn't take a lot of effort to do an RFP for a smaller system like the orientation system, especially since Maggie already knew about a couple of potential options. Ryan made a note to refresh his memory about RFPs and e-mailed Maggie to setup another meeting.

Maggie greeted Ryan and welcomed into her office. She asked how he was enjoying his new job and he told her it was interesting and he was enjoying it. He gave her a copy of the spreadsheet with IT's evaluation of the options for the orientation system. He'd e-mailed her a copy a couple of days ago but wanted to make sure she had a copy to review as they discussed it.

Maggie commented that she had reviewed the analysis, and like Ryan, found it hard to tell whether any of the options would meet her group's needs. She noted that several of the items mentioned as "possible" or requiring "customization" were key features and the assessment didn't give her a clear indication that these features would be included. She also noted that the assessment hadn't offered any details about when a new system might be available, so Ryan told her it might be a year or more.

Maggie agreed with Ryan that it looked like the solution based on the next ERP version was the most promising option, but had specific concerns about it. A colleague in the HR department had recently attended a conference, and knowing Maggie's interested in a new orientation system, had scouted the vendor area for promising solutions. The colleague had talked to several vendors and found a couple of additional vendor options. He had also talked to Cascade's ERP vendor about using the ERP system as a starting point for developing an orientation support system. The vendor had strongly recommended against that approach. Instead, they suggested a couple of standalone orientation systems that could be easily integrated with current and future versions of Cascade's ERP system.

Maggie asked if Ryan knew whether IT had looked at the two vendor solutions that she had previously identified. Ryan tried to think of a diplomatic way to tell her that they hadn't but couldn't come up with one, so told her "no." After some discussion, they concluded that investigating vendor solutions seems like an obvious next step. "Ok," Maggie said, "let's do an RFP."

Questions to consider:

1. Should Ryan and Maggie move ahead with an RFP?
2. What will Nick and Don say if Ryan wants to do an RFP?

EDITOR NOTES: Teaching Notes are available for this case, please contact the author directly.

Appendix 1

		Potential Solutions			
	Requirements	**CRM**	**Next ERP Release**	**Conference Software**	**Scheduling Software**
1	Handle 500 new employees and 10 Staff Users	Need to be tested	Yes (can handle number but need to create new employee page)	Need to be tested. (Sessions would be open to all)	Yes (Sessions would be open to all)
2	Integration with tablet use for New Employee Check-In.	Has web interface	No, but could write a web interface	Has web interface	Has web interface
3	Messaging (email) ability to notify new employees	Yes	No, but this feature can be achieved by extracting data from specific pages using the data extract functionality and using mail merge feature in Microsoft Word, Outlook etc.)	?	Yes
4	Create affinity groups (new employees from the same university or with the same job function)	Yes	Yes	No, cannot assign small groups	No
5	Sign-in from Corporate Portal	Yes, single sign-on from Portal if we develop new employee web page	Yes, single sign-on from Portal if we develop new employee web page	No, but may be possible	No, but may be possible
6	Collect several pieces of new employee information/preferences related to orientation (e.g., session dates, housing preferences, dietary restrictions, professional certifications, etc.)	Yes	Yes	Yes	Yes

		Potential Solutions			
	Requirements	**CRM**	**Next ERP Release**	**Conference Software**	**Scheduling Software**
7	Appear as a checklist item in the corporate portal	A link is possible. To mark completed would require customization	A link is possible. To mark completed would require customization	A link is possible. To mark completed would require customization	A link is possible. To mark completed would require customization
8	Import new employee information from ERP (e.g. job offer acceptance status, address, specialization)	No, but we can write a script to accomplish this feature.	No, but can be written with new employee web page	No	No
9	Write information to ERP from the system (e.g. orientation session number)	No, but we can write a script to accomplish this feature.	No, but can be written with new employee web page	No, but we can write a script to accomplish this feature.	No, but we can write a script to accomplish this feature.
10	Send an auto-confirmation when new employee registers	Yes. But only for initial registration. No confirmation for changes in registration	No, but can be written with new employee web page	Unknown	Yes
11	Assign housing	No	Yes	yes	No
12	Run reports downloadable in .csv, .pdf, .xls	Yes	No, Baseline version has limited reporting functionality. But we can modify or write extract that can be downloadable in .csv, .pdf, .xls formats.	Unknown	yes, some standard reports but some may need to be developed
13	Includes a test environment for annual maintenance	No, CRM does not have a test environment for users but can be created.	Yes, has a test environment	Unknown	No
14	Allow new employees to change some of their information (e.g. address, emergency contacts) and updates ERP records	No	No, but customization possible	No	No
15	Show new employees who are not registered for orientation	Yes	Yes	Report may be possible	Report may be possible

		Potential Solutions			
	Requirements	**CRM**	**Next ERP Release**	**Conference Software**	**Scheduling Software**
16	Allow collection of different info for new college hires and professional hires	Yes	Yes	Yes	Yes
17	Send a daily status report of registration numbers	Yes, custom report is possible	Yes, custom report is possible	Report may be possible	Yes, custom report may be needed
18	Display new employee info on a page, including notes fields for staff to edit. Allow the following administrator actions 1. Look up a new employee 2. Enter new employee orientation data (e.g., sign up someone over the phone) 3. Manually add a new employee who isn't found in the system 4. Look up canceled new employees (who have accepted then declined employment offer) 5. Specify/Change capacity of a session 6. Specify/Change dates of a session 7. Specify orientation hotels/rooms for overnight accommodations 8. Specify/change secondary specialty that new employees may select	No, But a custom application can be written to accomplish these features.	Yes, except change specialty	Partial	Partial
19	Can connect to existing online training for corporate policies (ethics, etc.)	No, but a custom web page can be created	No, but customization could be written	No	No
	Reporting requirements				

		Potential Solutions			
	Requirements	**CRM**	**Next ERP Release**	**Conference Software**	**Scheduling Software**
1	Same as the existing system currently offers	Yes, but custom reports would need to be written	Yes, but custom reports would need to be written	Unknown	Yes, but custom reports would need to be written
2	The ability for orientation staff to create custom reports.	No, would require IT effort	No, would require IT effort	No, would require IT effort	No, would require IT effort
	System and Integration Requirements				
1	Integrate with ERP (realtime desired, nightly required)	Yes, would have to be written	Yes	No, but could be developed	No, but could be developed

Teaching Case

System Design and Development of a Tween Esteem Event Management System Case

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Abstract

The case provides a realistic scenario that can be used in a systems analysis and design, database development or graduate level management information systems course. The case focuses upon the development of an event management system for a small conference with participants and exhibitors. Multiple assignment options are provided allowing instructors to select an assignment based upon course material coverage. Suggested assignments include the development of process modeling diagrams such as data flow and swim lane diagrams, a request for proposal and a response to the request for proposal, and database design and development artifacts.

Keywords: Teaching Case, Process Design, Swimlane Diagrams, Database Design

1. INTRODUCTION

Lisa Williams eased her daughter's bedroom door shut. Normally, a whirlwind of laughter and sunshine, her nine-year-old daughter had come home from middle school in tears. "April finally calmed down enough to go to sleep," Lisa whispered to her husband Mark. "I knew this age was hard on little girls… but I hadn't realized it would be this rough."

"Were you able to figure out exactly what happened today at school?" Mark asked as he set his alarm for the next morning.

"The same group of kids that were bullying her last week about her hair style, started in again today about her weight. The students were called to the principal's office, but she's afraid that may have made things worse. I'm thankful we have the weekend to let things cool off."

"That makes me so mad!" Mark fumed. "I would like to give their parents a piece of my mind and fist!"

"From what April said, she's not the only one they are targeting. It sounds to me that they are targeting girls with low self-esteem. I wish there was something more we could do to help build her self-esteem," April mused.

"Why don't you bring it up at your book club tomorrow?" Mark suggested. "Surely other parents have been dealing with this problem too."

2. A NOVEL IDEA

The last member of Lisa's Saturday morning book club had just settled into her seat at the table. Before Jenna could even pour herself a cup of coffee, Lisa launched into the troubles that her daughter was experiencing at school and her decreasing self-esteem. Mark was right. Their family was not alone. Several of the other mothers shared similar concerns they had about their pre-teen daughters. "I can't just sit back and do nothing!" Lisa fumed. "Surely there is something that can be done?"

"I don't know if this is the answer, but it could be a starting point." Jenna started. "When my boys were younger, I went to a conference for learning

how to raise teenage boys. What if we did something similar and had a conference for tween girls and their parents to help them learn how to survive the tween years?"

"I think Jenna is onto something," Lisa added. "What kinds of things did they have at the conference?"

Jenna thought, "Well, they had workshops, booths, prize giveaways and, of course, food. I don't think there was a charge, so I'm sure they had a lot of donations. I would think that you would want to focus on issues that are affecting girls such as self-esteem and body image, nutrition and fitness, personal safety, teenage life change issues, developing a community of support, and continuing their education after high school to name a few. I'm sure there are more."

"Those are all great ideas! I am hoping that I can count on some of you ladies to help me put this event on?" Lisa proposed. The response around the table was an enthusiastic "Yes!" as ideas continued to bounce around the room and different ones assumed responsibility for specific topic areas and elements of the conference. "I investigated purchasing a conferencing management system but decided against it. We are not certain how the conference will be received by the girls and we have a pretty limited budget getting started. Sandy, I know you are busy with your MBA coursework, but since you have been studying databases in your class, could I ask you to build a database for us to use to capture data and coordinate the conference?"

"Of course," Sandy said as she mentally added this new item to her To-Do list. "Perhaps Jenna can help too since she's our resident conference expert. Let's get together next week to talk about what you want to do with the database."

The book club spent the rest of the morning hashing out their plans for the event. By the time the last member left, they had developed a fairly strong roadmap to guide them in their conference planning. Lisa wasn't sure if tween self-esteem had really resonated that strongly with her friends, or, if like with the last book, most of them had not read the book and had focused on the conference to get out of discussing the book. Either way, it didn't matter. She had something in the works to try to help her little girl.

3. THE DESIGN MEETING

The next week, Jenna and Sandy went to Lisa's house to discuss their ideas about the database. "Jenna! Sandy!" Lisa exclaimed as she ushered her friends to the kitchen table. "Thank you both for being willing to work on this. Before I get started, let me tell you what the mission of our conference is:

> *The Tween Esteem Conference is an expo style gathering meant to highlight local services provided in the areas of education, health, fitness and nutrition, safety, community and self-esteem. The emphasis and primary goal of the expo will be providing information on these services as they specifically relate to the demographic of 9 to 12-year-old girls in the local community and access to these services by the "Tween" herself or her caregivers.*

Sandy, would you mind getting the discussion started?"

"I guess the first thing I would like to know is, how exactly is this conference process going to work?" Sandy questioned. "How are you going to get the word out to the girls and their parents about the conference? How are we going to get the vendors to set up booths, the presenters for the workshops and the door prizes and food? I don't want to invest time into building a database that will never be used."

"I don't think you have to worry about that," Lisa started. "Our book club really came through. Everyone said that they would help. Tracy is going to create fliers, an online registration form and a social media presence with registration and event details. She also plans to send the fliers to local middle schools as well as content detailing the event that can be forwarded to the students. The details will have the URL of the registration web site through which students can tell us what workshops they plan to attend and how many guests they will bring. "

"Susan is in charge of the team of ladies who will be contacting various people to set up booths. We plan to have booths providing information about nutrition, exercise, hair care, makeup, self-defense, budgets, female health issues, and educational opportunities after high school. Susan's team will be contacting people in those areas and creating a list of those who can participate and what they are going to do, those who are interested but unsure, and those who are a definite "no." She also will be responsible for making sure that the vendors get the appropriate number of tables and chairs they need as well as collecting the payment for the booths."

"Wendy will be contacting area businesses in search of door prizes and food donations. Like Tracy, she will be keeping track of those who are willing to donate, what they are donating and the estimated cash value of the donations, as well as those companies who are a definite "no." The data that Wendy, Susan and Tracy collect will all need to be entered into the database so that we can keep track for generating letters and reports throughout the conference planning and implementation process as well as, hopefully, use in planning for future conferences. Once you create the database, I can enter all of the data and run the reports. The process isn't perfect, but it will hopefully get us through this first conference."

"I would love to print QR codes on the student and vendor name tags and then use those codes to take attendance at the conference and workshops. We wouldn't need that many scanners," Lisa mused, "…maybe about five. However, our resources are pretty tight this year and we don't have the time, money or expertise to implement that this year, so I'll put that idea on my wish list for the next conference."

4. THE DATABASE

"You have really placed a lot of thought into making this conference happen," Sandy noted. "I'll bet you know exactly what you want the database to do as well."

"I've been thinking a lot about that. I want it to do a lot of things. I basically want the database to keep track of the data and then be used for generating reports and letters. For instance, I would like each girl to be able to register for specific workshops. I would then like to be able to send a letter to each girl telling them for which workshops they are registered. I would like for booth vendors to be able to request a certain number of tables and chairs when they register and then to use the database to create an invoice to send to each booth vendor charging them $5 for each chair and $20 for each table and limiting each vendor to a maximum of two tables. I would like to create a report listing a schedule of all of the workshops that are being offered as well as a list of all of the vendor booths that will be there. I would also like to create a letter to send to each donor detailing what they provided, the estimated value and the total amount contributed for them to use as a charitable contribution for their taxes.

To create those reports and letters, the database is going to have to collect data about the tweens, the workshops being offered, the workshops the tweens and their parents want to attend, the vendors and the booths they are providing, the donors and what they are donating, and finally, the volunteers. In terms of data, I would like to collect data about the tweens and their parent attending the conference such as name, address, age, phone number, email address, school, parents' names, etc. In regard to the vendors, I would like to collect their company name, contact name, representative name, phone numbers, email address, postal addresses, number of tables and chairs, etc.

For the workshops, I would like to know the workshop name, presenter, workshop time, resources needed (presentation system, computer, etc.) room assigned and brief description. I would also like to collect contact information about the workshop presenter.

For the donors, I would like to collect their name, contact information, the item/service donated as well as the value of the item/service donated. In order to run smoothly in the future, I would also like to collect a list of jobs or roles that need to be performed by volunteers. In addition, I would like to collect volunteer information such as their names and contact data. Then, I would like to create a table indicating what jobs or roles each volunteer performed. Most volunteers will probably have multiple jobs and roles."

"Wow, Lisa! You have been thinking about this." Sandy said with surprise. "You've really given me a good place to get started. I'm sure there are some things we haven't thought of, but they'll come to us as we start building the database. Thanks for your thoughts and input. I'll start working on it and we'll meet again in a couple of weeks to take a look at my design for your database."

5. SIDE NOTE

This fictional case is based upon a real scenario in which the author is currently involved. The focus of the conference is on helping Tween girls build their self-esteem and to realize the numerous career options available for them. The names are made up, but the situation is unfortunately very real.

6. ASSIGNMENTS

Students should assume the role of Sandy or a systems analyst consultant hired to assist Sandy. The systems analysts' roles and responsibilities will vary depending upon the course and assignment.

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

Sandy would like to draw the functional processes out on paper to verify that she understands how everything will work. She does not want to overlook any important data, details or steps in the process.

1. Create diagrams modeling each of the processes.
2. Write short narratives to accompany your diagrams to verify and support your interpretation of the processes.
3. As the diagrams are developed, record any assumptions you make, regarding the processes, in a separate document.

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

Assume that Sandy is ready to build the database. She wants to:

1. Accumulate the functional and technical requirements for the system
2. Prioritize the requirements
3. Create system development diagrams
4. Create a data dictionary
5. Create data entry forms
6. Create queries to generate student workshop schedule letters, a conference attendance list, workshop attendance sheets, lists of exhibitors, presenters and donations and exhibitor invoices.
7. Create reports including schedules, lists, attendance sheets and invoices.
8. As the database is developed, record any assumptions that you make in a short report.

Editor Note: Teaching Notes accompany this case, contact the authors

APPENDICES

Tween Esteem Workshop Attendance Report Example

Workshop Attendees

Healthy Snacks

Date: 8/02/2018

	Participant ID #	Name	Student	Guardian	Attended
1	P18151	Amber Smith	X		Y
2	P18025	Britany Adams	X		N
3	P18152	Betty Smith		X	Y
4	P18056	Lisa Martin		X	Y
5	P18098	Susie Martin	X		Y
6	P18024	Tonya Adams		X	N
7	P18066	Jane Wilson	X		Y
8					

Tween Esteem Exhibitors' Participation Report Example

Exhibitors' Report

Date: 8/02/2018

	Participant ID #	Name	Organization	Chairs	Paid
1	V001	Suzie Martin	Suzie's Boutique	1	Y
2	V002	James Wilson	Wilson's Grocery	2	Y
3	V003	Dr. Tammy Brown	Brown's Medical	2	Y
4	V004	Janie Anderson	Health Services	1	Y
5	V005	Samantha Adams	Adams' Apples	0	N
6					

Tween Esteem Vendor Invoice Example

Invoice No. 18005 8/2/2018

Suzie's Boutique
145 Main
St. Louis, MO 63101

	Quantity	Resource Description	Unit Price	Total
1	1	Table	$20	$20
2	2	Chair	$5	10
...				
		Total Due		**$30**

Thank you for participating in our Tween Esteem Conference and making a difference in several girls' lives.

For questions about your bill or the conference, please contact Lisa at (555) 555-1112.

Tween Esteem Conference Participant Letter and Schedule Example

Tween Esteem Conference 8/2/2018

Amber Smith
115 Park St.
City, State ZIP

We are so excited that you are planning on attending our first-ever Tween Esteem Conference. We look forward to getting to meet you and share the day with you. Listed below are the workshops for which you are registered.

	Workshop Name	Workshop Start	Workshop Room
1	Registration	8:30 a.m.	Atrium
2	Welcome and Keynote Speaker	9:00 a.m.	Atrium
3	Healthy Snacks	9:30 a.m.	100
4	The Art of Conversation	10:00 a.m.	125
5	Conference Break – Snacks and exhibits in the Atrium	10:30 a.m.	Atrium
6	Body Image	10:45 a.m.	135
7	Closing Speaker and Door Prizes	11:15 a.m.	Atrium

Please be sure to tell your classmates about the event. It's not too late to register.

For questions about your bill or the conference, please contact Lisa at (555) 555-1112.

Sincerely,

Lisa

Tween Esteem Conference Registration Report Example

Conference Registration Report

Date: 8/02/2018

	Participant ID #	Name	Student	Street	Email	School	Age	Phone Number	Parent Name	Attended
1	P18151	Amber Smith	Student	115 Park St.	XXXXX	West Lake	11	###-###-####	Betty Smith	Y
2	P18025	Britany Adams	Student	877 Sunshine St.	XXXXX	East Ridge	10	###-###-####	Tonya Adams	N
3	P18152	Betty Smith	Guardian	115 Park St.	XXXXX		NA	###-###-####	NA	Y
4	P18056	Lisa Martin	Guardian	219 Oak St.	XXXXX		NA	###-###-####	NA	Y
5	P18098	Susie Martin	Student	219 Oak St.	XXXXX	West Lake	10	###-###-####	Lisa Martin	Y
6	P18024	Tonya Adams	Guardian	877 Sunshine St.	XXXXX		NA	###-###-####	NA	N
7	P18066	Jane Wilson	Student	456 Main St.	XXXXX	West Lake	10	###-###-####	Marla Wilson	Y
8										

Tween Esteem Conference Donation Report Example

Donors' Report

Date: 8/02/2018

	Participant ID #	Name	Organization	Item	Quantity	Cost Each
1	V001	Suzie Martin	Suzie's Boutique	Jeans	3	$50
2	V002	James Wilson	Wilson's Grocery	Gift Cards	4	$25
3	V003	Dr. Tammy Brown	Brown's Medical	Athletic Shoes	1	$100
4	V004	Janie Anderson	Health Services	Health care items	5	$7
5	V005	Samantha Adams	Adams' Apples	Gift Cards	3	$20
6	V006	Mandy Thomas	Mandy's Hair Salon	Hair Care Items	2	$10
7						