SPECIAL ISSUE:
TEACHING CASES

In this issue:

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INFORMATION SYSTEMS EDUCATION JOURNAL

Editors

Teaching Case

ACS: Bringing Business Intelligence and Analytics to a Massive Multiplayer Online Gaming Company

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Abstract

Advanced Competition Simulations (ACS), a massive multiplayer online (MMO) strategy gaming company, has petabytes of customer data at their data center in Brentwood, Tennessee that could assist executives with decision making, but they currently do not have business intelligence software or a business intelligence and analytics (BIA) team. As is the case with most companies that want a new capability, they must decide if they want to hire a team internally or outsource this to a vendor. This decision was not taken lightly by ACS, but ultimately the business intelligence and analytics team was formed. Once the team was formed, the project to bring BIA to ACS gets off to a rough start when the team does not agree with the project manager choice. There are further setbacks when the data needs to be cleaned and the vendor refuses to help. Finally, the CEO of ACS questions his decision to rush the project when their data center has power failures during the data migration phase and he is reminded that the BIA project was moved ahead of the disaster recovery project. Bringing business intelligence and analytics to ACS proves to be much more difficult than they anticipated.

Keywords: IT Priorities, Business Intelligence and Analytics (BIA), Outsourcing Decision, Data Cleansing, Disaster Recovery Planning.

1. INTRODUCTION

Jill walks past the seventy-inch interactive project smart board one Monday morning and realizes that Rich has added a new project to the top of the project priorities list, and this immediately infuriates her. She rushes down the hall to Rich's office and shuts the door not too gently behind her. Before Rich has a chance to say anything, Jill practically yells, "Are you kidding me?" "What is this BIA project on the board and why did you put it above all of my IT projects?" Rich has a habit of rearranging the project board but this time he may have gone too far. He attempted to

argue that Business Intelligence and Analytics (BIA), which includes implementing data visualization, would help them make better business decisions about their primary focus: the new app that they were developing. But Jill was not buying it. Rich, while motioning for Jill to lower her voice, made the comment, "this project needs to go first and if you just trust me, you will see why. If you remember, you trusted my crazy idea once before and look where it got us." After a lengthy discussion, Jill began to see why Rich wanted to move forward with the BIA project, but she still did not agree with postponing their other IT projects. As she was walking out of his office, she made the comment, "I cannot believe you are going forward with this when our data center is incomplete and vulnerable to instability. We should at least finish the disaster recovery project first."

Jill currently has five of the top ten projects on the priorities list, but the projects are only at the top because Rich keeps skipping them.

2. ACS BACKGROUND

In April of 2014, Rich and Jill Amber were enjoying their first year of marriage in Silicon Valley, California when Rich had an awesome idea for a mobile massive multiplayer online (MMO) strategy gaming app. Rich and Jill were both developers for a small software company at the time, so they decided to write the app in their free time. Being avid gamers and experienced developers allowed them to create a game with all the features that they had always wished were in an app. This combination made their app an instant success in many countries. They hit one million downloads in the first three months. This husband and wife team quickly realized that they needed to leave their current jobs and start their own company to support their massive fan base and growing number of advertising requests. They started Advanced Competition Simulations (ACS) on July 1, 2014 and hired their good friend, Samuel "Sam" Williams, to manage their growing databases.

Current Datasets and Databases
When Rich and Jill started the company in 2014, they chose to use a PostgreSQL database for their customer and billing records since their app was already using SQLite and they were both familiar with PostgreSQL in their previous jobs. Over time, Sam setup a third-party advertising vendor database that contained all the data pertaining to the vendors that paid them for advertising space in their app. All their databases are SQL based, but some of their table names and aliases were

incorrectly labeled when Sam took over and chose a different naming convention. Their app database also contained unstructured data such as video clips of game replays.

In early 2015, Sam approached Rich and Jill and voiced his concerns about the stability of their servers and the quality of their data. Sam was also worried about the earthquakes that they had been having and suggested that they invest in new servers and an offsite location. Rich agreed and immediately began looking for the perfect location for their new data center. After a detailed risk assessment, Rich ultimately decided to move ACS's data center to Brentwood, Tennessee because, other than the occasional tornado, Tennessee was one of the safest places on his list. He also had a former college roommate, Levi Anderson, living there that he kept in touch with, and knew was looking for a career change. Rich hired Levi and had their new data center up and running by the end of 2015.

Organizational Structure
After three years of continued success and the development of their second app, Rich and Jill decided to give themselves more appropriate titles. Rich assumed the role of Chief Executive Officer (CEO), Jill was appointed the Chief Information Officer (CIO), Sam was promoted to Information Systems Division (ISD) Director, and Levi was named the Director of Data Center Facilities Operations (DDCFO). ACS quickly grew from a four-employee company to more than 100 employees; to include one of the best development teams in the industry. ACS is now a $250 million-dollar gaming company and generated $125 million in revenue and $40 million in profit last year. The majority of their revenue comes from in-app purchases, but a small portion comes from their advertisers. Rich has always viewed in-app advertisements as a nuisance, but a necessary evil in order to fund their expensive development team that is constantly working on new apps and improvements.

3. THE BIA PROJECT

On January 27, 2017, Rich returned from a conference where he saw a demonstration of Tableau, and decided that he needed to be able to visualize all the customer data that ACS had accumulated over the past three years to make better business decisions about the new app that the development team was working on.

Like Rich, many companies are realizing the potential of the data that they have been

collecting in their data centers. Companies have been using data to predict or "forecast" for decades, but recent updates to technology are allowing companies to speed up this process tremendously.

Software companies, like IBM and Tableau, are now focused on bringing business intelligence to users that typically do not query company databases for trends. They are achieving this by making the desktop software needed for creating custom queries and visualizations more mobile. Users can now use their iPad to answer key business questions on a moment's notice.

Rich had already decided that he wanted to use the Tableau software, but his big decision now was whether he should hire a team to handle this internally or outsource this capability to a trusted vendor. Since Jill was still not happy that Rich decided to move forward with the project, she thought they should just outsource it to a company that does it every day so they could get back to the data center disaster recovery project. Rich believed that they should hire a team internally to have more control over their actions. At one point when Rich and Jill were discussing the options, Sam walked into their office and heard Jill make the comment:

"You know, you are always doing this Rich! You go off to these conferences and come back with these huge ideas and expect me to make them a reality! What makes you think we can handle hiring an entirely new team when the new app is taking up all of our resources and we don't even have a disaster recovery plan? I am genuinely concerned about our data center."

After their heated debate and weeks of research, Rich decided that creating a business intelligence department within their company was the better decision in the long run.

Due to most of ACS's resources being tied up on the new app project, Rich only gave Jill three months to implement Tableau, a project budget of $250,000 and a recurring yearly salary budget of $225,000 to hire a business intelligence and analytics team. Since Rich did not give Jill the budget to hire a well-established business intelligence expert, Jill hired an experienced business intelligence data scientist, Pradeep Dey, to head the department as the Director of Business Intelligence (DBI). Pradeep Dey had over 15 years of experience as a data analyst and 4 years of experience as a data scientist. As a data analyst, he was responsible for merging multiple datasets and answering questions that

the management team asked. Once he was promoted to data scientist, he was responsible for studying datasets independently and coming up with new questions that needed to be answered to push the company in a new direction.

Jill's research suggested that the DBI should report directly to her instead of the Information Systems Division (ISD) Director. This would ensure that the business intelligence team was focusing on the direction of the company rather than just the IT department's vision. Once Pradeep was on board and caught up to speed on ACS's current setup, Jill and Pradeep hired two business intelligence analysts, Uche Ike and Michael Christopher, who report to Pradeep. Uche Ike recently moved to the United States from Nigeria, but had six years of experience as a business intelligence analyst. Michael Christopher was a recent college graduate with no experience, but was very eager to learn and was top of his class.

Rich and Jill's longtime friend and current ISD Director, Sam, was currently the only employee that knew the intricacies of ACS's databases and had experience with business intelligence software. He used Power BI in Microsoft Excel to connect to their existing desktop support ticket database to view IT employee metrics. This experience and relationship with Rich and Jill earned him the role as project manager from this point forward.

4. PROJECT MANAGEMENT APPROACH

Selecting the right project manager can make or break your project. In ACS's case, Rich and Jill chose a trusted friend to lead the project instead of the newly hired Director of Business Intelligence. This did not bode well with the newly formed business intelligence team and caused the project to get off to a rough start. Pradeep, Uche and Michael all felt as if the executives did not trust them to do the job that they were hired to do. Pradeep voiced his concern to Jill in a casual hallway conversation, but Jill reassured Pradeep that Sam was chosen as project manager because of his vast knowledge of the current databases and that she would still rely heavily on Pradeep's technical knowledge throughout the project.

Sam intended to approach this rollout in his usual agile way by keeping Rich and Jill in the loop every step of the way as the project progressed and altering the project based on their feedback. However, Pradeep favored a more traditional approach. He suggested that the project follow a

sequential series of steps that would include among other things: a requirements definition, planning, data cleansing and migration, testing, and deployment; as can be seen in Figure 1. Sam agreed to go along with this approach, because the project is internal, for an internal customer and as such may not be affected by incessant changes in scope. Sam may have agreed to Pradeep's iterative approach, but he was quick to let the project team members know his intention to inject this method with as much flexibility as possible.
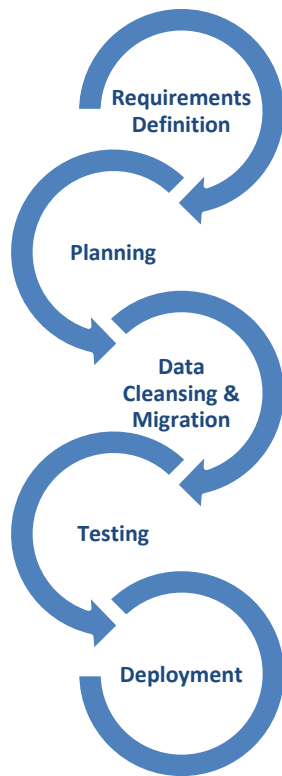

Figure 1: Pradeep Dey's Proposed Approach

Requirements Definition and Planning

Sam still wanted to integrate as much agile project management into the project as he could, so he decided that daily scrums would take place in order for him to monitor the project more effectively. With this hybrid approach of iterative and agile, the goal was to breakdown the work into manageable chunks with limited alterations. After several weeks of brainstorming sessions, they agreed to phase the project. The team quickly defined the requirements, wrote the statement of work and planned the next phases.

The team emphasized effective communication as a necessary virtue for all the team members during most of the meetings and brain storming sessions. Due to the size of the team, they agreed

on making communication as open as possible. ACS runs a top-down communication structure, but the team figured that would cause unnecessary red tape that could hold up work significantly, so they decided to do away with structure as far is this project is concerned.

Data Cleansing and Migration

Data cleansing is not a new idea to ACS. It was actually placed on the project priorities board a year ago by Jill and it had the third highest priority since the new app that the development team was working on would leverage only structured data.

Since ACS's data center contained structured, semi-structured and unstructured data, the first step in the data cleansing and migration phase was to improve the data quality by structuring the majority of the data. The objective was to weed out junk data that would generate wrong results and mislead the business. The team deemed it imperative that the validation and cleaning step scaled, since having a continuous data value chain required that the incoming data get cleaned immediately and at very high rates. This would require automating the process and possibly eliminating any form of human involvement with data entry.

Integration with either R programming or Python would help with procedural computation and data cleansing. R and Python programming are well equipped to handle this process. R helps to do the heavy statistical analytics. Their machine learning and artificial intelligence programs used the complex algorithms for detecting the repeatable patterns.

The second step in the data cleansing and migration phase was to architect a data model that the visualization would be based on. This would require a strong background in statistics and machine learning to build. The team was not interested in this skill as they intended to use R – statistics and a good number of the team members were very familiar with the language. On the other hand, their statistical background was not enough to build this model accurately. They needed someone who understood the business well enough to recognize whether the results of the mathematical models were meaningful and relevant. So they solicited more of Jill's involvement to cover the business knowledge area.

Testing and Deployment

Data migration, testing and deployment of the Tableau software were intended to be a simultaneous process. Depending on how the test run turned out, they intend to go live with deployment immediately on their production server. However, the test server that was set up for the project was not configured correctly and the team had to move their migration efforts and testing onto the production server earlier than they had planned.

5. THE DATA CLEANSING SETBACK

The project appeared to be planned well and running smoothly until Lu Wei made his third status visit to ACS headquarters. Lu Wei is the Senior Tech Support Engineer with Tableau that is assigned to assist ACS with the implementation process. Lu makes weekly office visits to ACS's headquarters to check in on the project. On his third office visit Sam approached him in the hallway and asked how Tableau's side of the data cleansing was going. Lu looked at Sam with a surprised look and said, "We are not responsible for cleaning or formatting any of the data. I thought your team was handling that in the current phase?" Sam could not believe he was hearing this and immediately pulled Lu into his office, and had a lengthy discussion about the contract that was signed earlier in the project. Sam argued that he remembered asking Lu about it during the planning phase and Lu agreed that he would assist with a portion of the cleansing operation. Lu called Sam's bluff and pulled up the contract on his tablet. He specifically read the part that stated:

"ACS will be responsible for data cleansing and formatting all of their data correctly prior to the Tableau implementation and failure to do so could result in project delays."

Sam was not very happy, but the only choice he was left with was to have the team clean the data alone, which he thought would set them back several weeks. Luckily, the data cleansing operation did not take as long as expected, thanks to the expertise and productivity of Pradeep and the BIA team along with a decent amount of overtime spent working weekends. Once the cleansing was completed, Jill was beginning to think that this project would pay off after all. She was even able to check off the data cleansing project on the priorities board.

6. THE DISASTER

Jill is awoken at 4:30 a.m. again to the sound of her phone vibrating on her mahogany bedside table. She lets out a sigh and a moan before rolling over to see Levi's name on the caller ID. She says to herself, "if he asks me how to sync his OneNote again I am going to scream." Jill whispers, trying not to wake up her sleeping husband next to her, "Hey Levi, what's up?" Rich, is awakened by Jill's voice, and asks "is that Levi again?" "I just don't understand why he can't wait until our 7:00am video conference."

Levi responds, "Jill! I am sorry to wake you up but we have a big problem and Sam told me to call you. We've had a power failure and Koffi and I are having trouble getting the production server that was handling the migration to stay up for more than 10 minutes before it crashes again. I am not certain, but I think it is hardware related." Jill turns and looks at Rich and whispers, "do I have to say I told you so?"

Levi voiced his concerns over a year ago regarding not having a disaster recovery plan in place, and he recommended hiring an information security expert and setting up a hot site or outsourcing to an Infrastructure as a Service (IaaS) vendor. Jill agreed and added the "Disaster Recovery Project" to the project priorities board, but the project kept getting jumped by Rich's "great ideas," just like the BIA project. When Jill hung up the phone, she was quick to remind Rich about her comment when he decided to skip the other projects, "Didn't I say that we should at least finish the Disaster Recovery Project first?"

The entire team quickly set up a conference call to talk through the problem. Sam was the first to speak up with the following comment:

"The power failure could not have happened at a worse time, I mean, right during the migration phase, but I think we are going to be okay. Koffi is close to a solution."

Koffi Anan, the database administrator that Levi hired a few years ago, had been up all night researching the problem and was close to a solution but needed a little more time to confirm his theory. The team offered some advice to Koffi, but ultimately it was up to him to solve the problem.

7. CONCLUSION

As always, Rich prioritized his "great ideas" and fun projects over the boring IT projects. He assumed that the project would be relatively easy and cheap, but after several project setbacks and a disaster at their data center in Tennessee, he realized it was quite the opposite. This project ultimately put ACS's daily operations in jeopardy, and could put them out of business if they are unable to recover the failing production server.

8. DISCUSSION QUESTIONS

1. Would you have prioritized the projects differently?

2. Do you think Rich made the right decision to hire a business intelligence team instead of outsourcing the capability to a proven company?

3. Was the right person chosen to lead the project?

4. Did the Tableau integration go as planned or could it have been handled more effectively?

5. Could the disaster have been prevented or mitigated?

9. REFERENCES

Ransbotham, S. (2015). Coca-colas unique challenge: Turning 250 datasets into one. *MIT Sloan Management Review, 56*(4), 0.

Power, D. J. (2016). Data science: Supporting decision-making. *Journal of Decision Systems, 25*(4), 345-356.

Englmeier, K., & Murtagh, F. (2017). Editorial: What can we expect from data scientists? *Journal of Theoretical and Applied Electronic Commerce Research, 12*(1), 5-I,II,III,IV,V.

Elwer, P., & Corporation, I. (2008). Agile Project Development at Intel : A Scrum Odyssey, 1–14.

Gwen Shapira. (n.d.). The Seven Key Steps of Data Analysis. Retrieved April 10, 2017, from http://www.oracle.com/us/corporate/profit/big-ideas/052313-gshapira-1951392.html

Špundak, M. (2014). Mixed agile / traditional project management methodology – reality or illusion ? *Procedia - Social and Behavioral Sciences*, 119, 939–948.

Scavicchio, J. (2016, July 6). Tableau Pricing: How Much is Tableau and what are the Costs? Retrieved April 08, 2017

Milligan, J. N., & Milligan, J. N. (2016). *Learning Tableau 10: learn how to create effective data visualizations with Tableau and unlock a smarter approach to business analytics: it might just transform your organization.* Birmingham: Packt.

Acharya, S., & Chellappan, S. (2016). Integration of Tableau with R. *Pro Tableau*, 795-833. doi:10.1007/978-1-4842-2352-9_11

Weber, J. (2015). Collecting Data from Mobile Apps. *Practical Google Analytics and Google Tag Manager for Developers*, 221-230. doi:10.1007/978-1-4842-0265-4_13

Unstructured Data Analytics: Unstructured Data Analytics. (2015). *Win with Advanced Business Analytics*, 359-376. doi:10.1002/9781119205371.ch18

Pham, T. (2016, March 15). The Company Who Made Clash of Clans is Worth More Than Evernote, Eventbrite, and BuzzFeed Combined. Retrieved from: https://thehustle.co/the-company-who-made-clash-of-clans-is-worth-more-than-evernote-eventbrite-and-Buzzfeed-combined

Appendix

ACS Organizational Chart
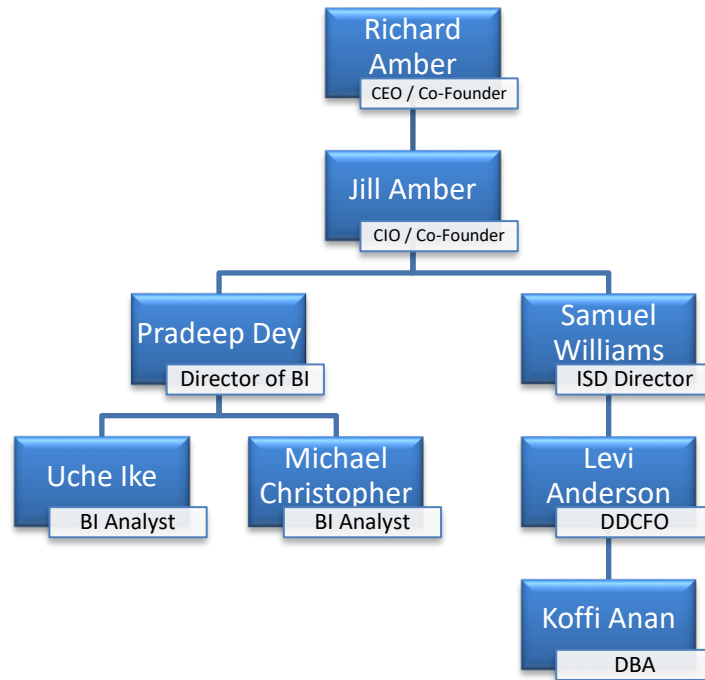
Key Characters and Locations

ACS headquarters in Silicon Valley, California

Richard "Rich" Amber	Chief Executive Officer (CEO) and Co-Founder of ACS
Jill Amber	Chief Information Officer (CIO) and Co-Founder of ACS
Samuel "Sam" Williams	Information Systems Division (ISD) Director, formerly the Database Administrator
Pradeep Dey	Director of Business Intelligence (DBI)
Uche Ike	Business Intelligence Analyst 1
Michael Christopher	Business Intelligence Analyst 2

ACS Data Center in Brentwood, Tennessee

Levi Anderson	Director of Data Center Facilities Operations (DDCFO)
Koffi Anan	Current Database Administrator (DBA)

Tableau Vendor in Seattle, Washington

Lu Wei	Senior Tech Support Engineer assigned to assist ACS with the implementation of Tableau