DATA DRIVEN WORKFORCE PERFORMANCE PLANNING

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DATA DRIVEN WORKFORCE PERFORMANCE PLANNING

A Project
Presented to the
Faculty of
JHB College of Business and Public Administration,
California State University
San Bernardino

In Partial Fulfilment
Of the Requirements for the Degree
Master of Information Systems and Technology

By
Christopher Barajas

June 2019
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Abstract

The business of logistics and transportation is increasing in demand and complexity and will do so into the future. As with many businesses in the digital age, large amounts of data is being generated at increasing speeds leading us all into the era of big data. A common result is that organizations are left data rich and information poor. At ABC Logistics, and many other third party logistics and transportation companies, the question is how to harness the data and create centers of excellence through business intelligence methodologies. This research project goes through the steps taken to identify an area where business intelligence and data transformation could be an advantageous prospect and how to present it in a way that would be of great benefit to the organization as a whole.

Third party logistics companies, such as ABC Logistics, operate under a business model where they do not produce or own any of the product they manage through the supply chain process. What they sell is their expertise in logistics services from the inbound of product, processing of orders, and outbound shipping to and from the customer. This makes the third party logistics business very competitive. Competitive advantages are key to success in this type of business and one area that is underutilized is measuring and managing labor productivity. Currently, ABC Logistics utilizes an AS400 system for warehouse management and Kronos for timekeeping. The problem lies in how to get all the information together in one location where transactional master data is shared across the organization. Once we do that, then the second problem would be analysis and decision management i.e., how we analyze the data and present the information in a human readable format for frontline supervisors and middle management to be able to interpret the data and take action.
The solution will be to create a data warehouse to normalize all the various data sources for timekeeping and warehouse production transactions. In order to build the data warehouse, we will utilize an SQL Database with SQL Server Integration Services to transform the data into our data warehouse. With the data transformed into a structured and consistent format, the data is analyzed and the results presented in a human readable format. This will be done through business intelligence tools such as Power BI that allows us to create custom dashboards. This solution will lead to a better understanding of our operation, increase profit, and give ABC Logistics a competitive advantage over their competitors.

After implementation, we expect the results to be positive. Frontline supervisors and middle management would able to see how their operation is running compared to what was expected, which is very important in third party logistics because contracts are specific concerning how transactions are charged back to the customer. From the executive level all the way down, feedback is expected to be positive because key players at all level are able to easily access and understand their data through digital dashboards created with Power BI. This would allow each facility in the organization across the United States to maximize efficiency thereby increasing profit for the organization as a whole.

In conclusion, business intelligence methodologies and technology can be powerful tools. In the digital era, information is powerful, but only if harnessed and interpreted correctly and leads to action. In the case of ABC Logistics, a center of excellence created through Power BI to show facility productivity would be instrumental in increasing performance. Third party logistics companies must continually look for ways to maintain or create new competitive advantages and using data and business intelligence tools is the key in doing so.
Introduction

ABC Logistics has been in business since 1952 and started as a small company in the state of Ohio. They focused on managing the supply chain for a small set of customers with high volume. All of this was operated out of one building with a small management structure and a few employees, which kept overhead and labor costs very low. Labor productivity was not a concern at that time, but rather focused on getting shipments in and out on time as per the agreement with their customers. ABC Logistics did not even have an Information Technology department at the time and instead relied on a simple system and contracted for their IT support.

Organization Profile

Organizational Environment

Logistics Services

ABC Logistics is a leading third-party supply chain solutions provider specializing in integrated logistics, automation solutions, and transportation solutions. We help our customers make smarter choices about warehousing, fulfillment, and transportation for their companies, so they can streamline costs, improve performance, and operate more efficiently.

Mission, Vision, Values and Culture

ABC Logistics’ mission is to attract develop, and retain the best customers, associates, and investors to better our communities and to develop long-term relationships to control costs and streamlines processes.

Our vision is to provide our customers the ability to view each of their orders in real time through a portal where they can see their order from inception to shipment and follow it through to delivery on time, accurate, and in good condition.
Our values and culture are based on trust, team, and opportunity. Trust is earned over time by doing what we say we are going to do. We must always be clear and concise, direct and honest. You can accomplish more together than alone, that is why team is a core value. We work together towards a common goal and make everyone successful. We encourage everyone to realize his or her full potential. Each of our employees has the opportunity to affect the world around us.

Workforce Profile

ABC Logistics employs over six hundred employees across the nation. We have a diverse workforce with fifteen percent, about ninety associates, of our workforce in exempt status. The remaining eighty-five percent are hourly associates and are responsible for the manual labor and day-to-day activities like receiving, picking, and shipping.

Of the hourly associates, about thirty percent are not ABC Logistics employees, but rather hired through an agency for seasonal work or on a temporary basis. They do all the same functions our core ABC Logistics employees do, but they do not have the guaranteed schedules, pay, or benefits of our core employees. They report to their agency management team and not necessarily those of ABC Logistics.

Of the exempt associates, each facility has a manager and a few supervisors. The vast majority of exempt employees are at the corporate office and make up the IT, Human Resources, Finance, Marketing, Sales, and other departments. They are responsible for ensuring the operations across the nation run without interruption. They are also responsible for continuous improvement.

Assets
ABC Logistics does over two hundred million in revenue a year. While we do manage supply chains and provide transportation services, ABC Logistics does not own much of the equipment nor the office building. All the distribution and fulfillment centers are leased, as is the equipment inside each of them. Because this is a third party Logistics Company, the customer we are providing the services for are usually the ones who purchase and own the physical equipment at each site.

Our corporate office is located in Ohio where we occupy one floor of a five-floor building. All of the other floors have different companies as occupants. Our corporate office is also on a lease. The only real assets that we hold are the trucks and trailers for our transportation services we provide. These are estimated at about twenty million dollars when you add in overhead, maintenance, and fees. One could say that our greatest asset, and most valuable is our employees.

*Regulatory Environment*

We do not handle any hazardous materials, which makes it much easier to ship our customer’s products across the world without added regulation. Third party logistics in general has very little oversight or regulation past state laws regarding labor such as schedules, overtime, benefits, pay, and paid time off. There are local permitting for renovation and modification to the design of our facility layouts, but that only occurs when there is a major change.

The biggest part of regulation we encounter is with our transportation services. The trucking business is tightly regulated and includes the Department of Transportation. Every driver must be properly licensed and certified. Each driver must also keep extensive driving logs and can only drive for so many hours before they must take a break. Even the amount of time between trips is heavily regulated for public safety. In addition to the regulation on our drivers,
the trucks themselves must be maintained and engines upgraded every so often to keep up with clean air laws. This is probably the most difficult because pollution and other environmental regulations differ state to state. We may be operating in full compliance of the law in Ohio, but when we get to California we, risk being heavily fined and possible lose our equipment.

While regulation can be a pain point, we understand and respect each city’s, state’s, and the federal government’s responsibility to protect public safety.

Organization Relationships

Organization Structure

ABC Logistics is a privately held company and therefore we do not have a board of directors or any shareholders. We have a Chief Executive Officer, Chief Information Officer, Chief Finance Officer, and a Chief Operations Officer. We have a President of Human Resources and a few managers and supervisors under them. We have a Projects Manager, IT Manager, Solutions Manager, Engineering Manager, and Technology Manager with analysts, technicians, and engineers working under them. The vast majority of the employees in finance and marketing work under the CFO. These groups make up the employee base at the corporate office.

At the distribution and fulfillment center level, we have a building director with an operations manager reporting to them. Reporting to each operations manager are usually about four front line supervisors who supervise approximately one hundred to two hundred hourly associates. Each facility also has a small support team of human resource, safety and quality, and IT resources.

Customers and Stakeholders

The customers of ABC Logistics are the companies that contract with us for logistics and transportation services. These are the clearest form of customers, but each internal department
has their own set of customers as well. For example, all departments are customers of the information technology department in that we are there to serve everyone in whatever capacity we can. We also have secondary customers that are the customers of our customers. An example would be Handgards, a company that manufactures latex gloves of every kind. Handgards is our direct first line customer in that we have contracted with them to provide their logistics service. We get their product from the source to the customer at an efficient and effective rate and process. Our secondary customer is the destination point for each of the shipments we process. Although technically they are the customer of Handgard’s because they purchased the product from them, we are the ones servicing the order and making final delivery. We have many customers and our goal is to ensure they are all satisfied.

Stakeholders are important and one of the main ones in our line of business is our contracted customer. They have a stake in our ability to process and ship orders efficiently and on time. If we do not, their customers are dissatisfied and could lead to a reduction in business. The customers of our customers are also a main stakeholder because without us they would not receive the product they purchased from the companies we service.

Another stakeholder group are our employees. They have an interest in seeing the company prosper and grow because it means they can continue to work for a company they enjoy. They also know that a successful company can offer more incentives and opportunities for advancement.

Lastly, the manufacturers of all the various products we ship are a stakeholder. Without us, their product would not be received and shipped. Without their product being picked and delivered, they would not have revenue. Without revenue, there would be no company. The entire supply chain, every single part of it, are stakeholders in ABC Logistics.


_Suppliers, Partners, Collaborators_

Our customers are our suppliers. We do not own anything we receive and ship. All products that pass through our facilities are either bought or made by our customers. They supply us the merchandise and they supply us with the orders to both receive against and ship.

Our customers are also our biggest and most important partners and collaborators. We work closely with each one as each one has different needs and wants. Each of our facilities is usually contracted to one specific customer and no two facilities work the same. We usually have at least one customer representative at each site during operating hours to work through issues and facilitate special requests and inventory. Third party logistics is unique in this way that our customers do most of the purchasing and inventory management where we just ensure we receive, pick, and ship according to an agreed schedule.

_Organization Situation_

_Competitive Position_

Nationwide, ABC Logistics is in the top one hundred of third party logistics companies, but in Ohio, we are in the top four of privately owned third party logistics company based on number of employees and yearly revenue.

With our increase investment in information technology and automation, we are becoming more appealing to prospective customers. Utilizing innovative technology that increases performance and productivity allows us to offer our services at competitive rates to acquire new customers or even gain a larger portion of a current customer’s business that is currently being serviced by another third party logistics company.
ABC Logistics, because of our forward thinking mentality, has put itself in a position to have a competitive edge and we continue to invest in information technology and automation to increase our advantage over our competitors.

Comparative Performance Metrics

Currently, many of our facilities are performing at noncompetitive rates. For example, most facilities have a case per hour rate of sixty-two cases per hour or less. For most contracts, this will suffice, but we have continued to work on continuous improvement projects and at some test sites, we have found some strategies that can increase that by almost double without increasing headcount or time needed. At these test sites, we are now producing at over one hundred cases an hour per associates. We are also able to measure this information and compare each facility’s metrics and see that some are performing at much better rates than others are.

We have shared this information with each director and manager and some have attempted to modify their operation to increase productivity to match their counterparts. Many are not successful and the ones who are could still do more. Comparing metrics between our various sites was a main driver of this project.

Strategic Context

Our goal is to maximize facility performance and increase productivity. Our strategy to do so is to get baselines and document what each site is currently doing. We will walk each step from the beginning of the process all the way to the loading of the product on trucks. This will allow us to compare processes and management styles to see how we could best assist operations in improving their performance.

Performance Improvement Situation
Once documented, we then know our performance improvement situation. What we know is that each facility is different and every director and manager manage differently. The best way to help performance improvement is to empower our operations management teams. To do this, we need to give them the information they need to enact the needed changes to improve performance. The question is how we do that across the organization in a way that applies to everyone. This is our performance improvement situation that we can work to solve.

**Leadership of the Organization and Efforts to Create an Environment of Success**

Over time, keeping management and labor costs low and focusing on customer satisfaction proved to be successful. ABC Logistics began to experience a spurt of growth in their market share of the logistics and transportation sector. ABC Logistics started a transportation subsidiary and began to aggressively market their third party logistics business by promoting their metrics about on time receipts and deliveries. With this rapid growth in customers and volume also came growth in personnel and eventually an IT department.

Fast forward to the year 2019 and ABC Logistics is now a medium sized third party logistics company with a decent portion of the market share, in not only distribution, but transportation as well. Personnel has greatly increased as has the supporting departments such as human resources, finance, and marketing, sales, and information technology. While we have an out of the box system called AS400, we also have our own programmers that can modify and upgrade various features of our system. Our operations units across the country have developed various metrics and reports using the basic tools that are available to them and consists mostly of Microsoft Excel. They utilize the custom built reports our IT team created through AS400 and use Microsoft Excel to manipulate the data into something they can use to measure their effectiveness in various areas. While this rudimentary application of Microsoft Excel has
sufficed for ABC Logistics’ business model for some time, it is now outliving its effectiveness as a tool to measure performance metrics in real time and in some cases, measure them at all.

ABC Logistics is at the point where it once again wants to grow and earn a larger part of the market share. There is no doubt that “logistics plays an important role in ensuring the competitiveness of the company’s supply chain. (Bajec 157). The marketing team and sales have been working overtime to attract new customers and increase revenue. In order for operations to keep up with marketing and sales, they need new and better tools to operate more efficiently and much faster. Over the course of the past year, ABC Logistics has been investing in automation to cut labor costs by reducing headcount and other overhead costs. What we have found is that the addition of automation alone is not enough to decrease labor costs to the levels needed to continue to grow exponentially. In addition, our automated solutions by themselves are not enough to lure new customers.

**Problem Statement**

The problem is that operations cannot measure their performance to a finite level and in real time in order to be able to make real time decisions to increase productivity. If operations had this capability, marketing and sales, could use this to show that ABC Logistics has a competitive advantage over other logistics and transportation companies and fulfill the company strategy of increasing our share of the market.

Currently, total units picked for the day and bounced off the contract price we charge per unit measure performance. If we have earned more than we spent on labor, then we had a successful day in the minds of most of our operations teams. From a productivity standpoint, this is false logic and should be abandoned. We have found that this is the biggest cause for the gap
between units for being profitable and cases per hour that could be produced and would increase profits that much more.

Our customers have also asked if there are ways we can increase productivity. Currently, their sales are restricted by how much volume we can process. If we stop when we have gained, a profit based on units per day compared to labor costs, which does not help our customer increase capacity. They have requested we team up and look at ways to increase capacity, not only to serve their needs of growth, but also to increase our revenues as well.

Proposed Solution and Business Case

Our solution, from the information technology team, is to create a data driven solution that will provide our customers, operations and the marketing and sales departments, the information they need to be successful in real time. The proposed solution will be called ABC Portal.

Proposed Solution

The proposed ABC Portal system will address the lack of real time performance reporting for all our facilities across the organization. The system will take the raw data from our timekeeping systems and operational systems and use them to produce readable dashboards that can easily be interpreted that leads to actionable items that result in productivity improvements. Our customer, the operation teams, can use the information to make decisions concerning headcount, product management, employee coaching, and others that will significantly improve production performance. By doing so, operations will increase their rate of receipt and shipments while also maintaining, if not improving, their accuracy and quality. Our customer can then use these positive metrics, the marketing and sales departments, to sell our services to other external customers and show how we have a competitive advantage. External customers who are
shopping for third party logistics services are looking for experience, technological ability, and performance and productivity metrics that show how well they are able to service their customer’s needs.

Objective

The objective of the ABC Portal is to provide operational and timekeeping transactional data in real time in a format that is readable and easily understood, and that is accurate and of the highest quality that leads to action that then leads to performance and productivity improvements. This is expected to improve the attractiveness of our operations to potential customers; thereby, allowing our marketing and sales teams to grow our business and increase our presence in the logistics and transportation market. This will ultimately lead to higher profits and will allow ABC Logistics to meet their operational and strategic goals.

Business Case

The benefits of the proposed solution would allow each site to increase performance by a significant amount if each operations team utilizes the data to change processes. The costs are not an actual monetary cost but a human one. The inevitable cost of increase performance and benefiting financially by increasing revenue will also lead to a reduction in headcount. We will be able to increase volume output without additional employees and in some cases, because of the increase output we would need less employees to get the same or greater amount of volume out the door.

Technically, we already have the software and servers needed to design and implement the proposed solution. We have even settled on the free or low cost version of Power BI. We have done our due diligence on keeping out IT costs to a minimum. Personnel is already tasked
with increasing productivity so instead of trying to work with current tools which are outdated and in inadequate, we would be using easier tools and more efficient.

Operationally, the changes needed to improve performance would be a one-time cost of moving around inventory to increase volume by decreasing travel time. Many of the inefficiencies are caused by bad picking patterns or not have every item/product easily accessible for picking and shipping. At our test sites, we took over the inventory process to change pick patterns and item locations. This resulted in increased cases per hour and a decrease in headcount. This is very feasible both operationally and organizationally. An example in labor costs are what we currently pay, which is thirteen dollars an hour in California that equates to a cost of $104 a day per employee. Currently, this same facility is picking at about forty cases an hour and we charge our customer $0.45 per case picked. At this rate, our revenue per employee per day is $144. Our profit for the day is a mere $40. Now, if we can increase to one hundred cases an hour our revenue would equate to $360 a day per employee for a profit of $256. This would also lead to fewer employees needed. When we reduce headcount, we do not only save on the employee’s salary, but also their fringe benefits. The savings are significant.

**The ABC Portal System**

The ABC Portal system will have a simple and straightforward design. Currently, data is spread out in different places across the organization and in different systems. The timekeeping data such as schedules, hours worked, breaks, lunches, and labor codes are kept in Kronos that utilizes an Oracle database engine. The operational data such as transaction type, quantities, customer information, warehouse information, and other data that relates to operations is stored in an IBM iSeries database that was built in the 1980’s. As the data currently exists, it provides no real value. In order for us to create a valuable tool for operations, marketing, and sales to use,
we need to transform the data into a structured format that is easily readable and understandable. We will do this by building and utilizing an SQL Server data warehouse that will feed the formatted data to Power BI dashboards.

The data warehouse is being built based on previous experience and expertise my team and I have gained over the years with labor productivity measuring systems such as Red Prairie and VoCollect. The foundation is being built with our fundamental knowledge of database creation and management. “The possible set of content change operations is as follows: insertion of record, deletion of record, and update of a record in dimension tables or fact tables” (Faisal 3). One of the key requirements for the data warehouse is to ensure there are no duplicate transactions. This is vital for integrity, accuracy, and quality. Operations and our other customers must be confident that the information they are receiving and acting upon is credible. One of the techniques we will use is 4NF, also known as the fourth normal form. Our “motivation for eliminating redundancy is based on the minimal principle which aims to store each unit of information only once in a database” (Vincent 174). Another added advantage of designing in 4NF is that it “minimizes storage usage and also avoids the associated difficulty in duplicated data of having to update all occurrences of a data item” (Vincent 174). Not only does a good design improve accuracy and quality, but it also helps with managing the efficiency by improving the latency of a smaller database that only holds what it needs and nothing more.

We will utilize SQL Server Integration services to create the scripts and jobs that will manage the transfer and transformation of data from Kronos and AS400 into our newly built SQL Server database. The raw data from each system is spread across various tables. We will query each of the tables needed and transform the data into specific datasets in our data warehouse such as EMPLOYEE, CLIENT, EMPLOYEE_PERFORMANCE_METRICS,
MOVES, SHIFT, and others. From there we create views named PRODUCTIVITY_MOVES, PRODUCTIVITY_TIME, and PRODUCTIVITY_TIME_DTL. The views will be Power BI’s dashboard source of productivity data (Appendix A).

Once all is designed and fully tested in our test environment, we move on to scheduling the routine tasks that will continue to insert new records from both Kronos and AS400 in intervals of ten minutes. We measured data beforehand and learned that nothing less than ten minutes provides enough valuable data to warrant constant jobs running that would degrade database performance. This set time allows for the most effective amount of data to be collected and provide an almost real time environment for the information that is being produced.

With our data warehouse designed, developed, tested, and implemented, we can now move onto the user graphical interface. As we mentioned before, we decided on Power BI as our tool of choice to create the dashboards and minimal reporting functionality for our ABC Portal system. The report functionality will be simple with the ability to download the formatted transactional data for a given customer. Although simple, “a report is any data system output, whether it appears on paper or a screen” (Booth 30).

Implementation of Proposed Solution

Requirements and Analysis (Functional/Non-Functional Requirements; Use Case Diagram Use Case Specifications; Analysis Classes, Use Case Realization; Activity Diagrams)

Our first step in the design process is to understand what the system looks like. What use cases will we need, who are the actors, and what type of functionality will each be able to use or will be inherent to their actor type. Through brainstorming, we came up with our use case diagram (Appendix B).

Now that we know what the system should look like and function we now need to understand what our customers need and develop our functional and non-functional
requirements. The way we go about this is to hold meetings and meet with the actual end users of the system. We use surveys, questionnaires, interviews, and other methods to receive feedback about what the system should do what they want it to do, what it must do, and so on. This is how we have gathered our business requirements for our system. Through this iterative process, we have come up with the requirements (Appendix C).

Our functional and non-functional business requirements are the roadmap concerning the functionality that must be present in the system to provide our customers what they need to be successful. At this point in the design phase, we now have our use case diagram and our functional and non-functional requirements. Our next steps are to create our use case specifications and our class diagram. Again, this is an iterative process and there are changes that are made along the way. Through extensive work, we developed our use case specifications and our class diagram (Appendix D).

Our actor semantics and use case specifications comprise of actor semantics and use case specifications (Appendix E).

Design and Construction of the Prototype System

This encompasses the foundation of what our system needs to provide to our customers so they can meet their strategic objectives. With our use case diagram, functional and non-functional requirements, class diagram, and use case specifications completed we moved onto development. Power BI allowed us to create custom and very readable dashboards that provided the information our customers, operations and marketing and sales, need in an easy to read format and they can do so quickly. No need to format the data or perform any calculations. We created the dashboards with our customer’s time in mind. The dashboard page is commonly referred to as a canvas and presents all the visualizations we design. According to Booth [30], a
system is deemed successful if the “data system actually gives back—through operational, insightful, and motivational reports—its real perceived value can skyrocket”.

The metrics we chose to present to our customers are key performance indicators measured in units per hour (UPH). We analyzed and measured receiving, picking, inventory control, returns, receipt put away, building, replenishments, and indirect labor. While there is a myriad of methods to present the visualizations, we have chosen to present them with gauges. The end user is also able to select the customer they would like to see. By default, the system will show statistics for all customers until a specific customer is chosen (Appendix E). The end user is also able to choose more than one customer (Appendix F).

The user will also have the ability to download the formatted transactional data and perform additional analysis if they so choose. This is also available view the dashboard screen (Appendix G).

**Implementation**

We have now developed our data warehouse including our SQL Server Integration Services scripts and jobs that will run every ten minutes. We have tested the data and analyzed it for any redundancies or duplication. We also tested for latency and performance. We are satisfied with our results and are ready to implements its use.

We utilized the UML process and improved our design through the iterative process. We developed our Power BI dashboards and our refreshable dataset that rebuilds at least every fifteen minutes. This is done intentionally to ensure we only update when we have new data from the data warehouse. This allows us to maximize network efficiency by only updating what we need and only when we need to. We tested all the functionality and were satisfied with the results.
The development of our ABC Portal is complete and ready for implementation. As stated before, we tested the system and performed some stress tests as well. Any bugs that were encountered were documented and corrected. The next phase is user acceptance testing or UAT. While this seems redundant, it is always a good tactic to have the end user run through the functionality of the system. Repeatedly, information technology professionals have learned that what the IT tests and how they test it is usually slightly different from the novice end user. This can sometimes lead to unexpected bugs that can derail the whole project. In our case, although the functionality is vast, what is presented to the end user is quite limited. They can only select or unselect customers to filter. Their reporting ability is minimal in that they can only download the formatted dataset for the data that is being analyzed and statistically presented in the dashboard. Either cannot be modified in anyway. As expected, the UAT is successful and the end users are satisfied with what and how they are being presented important information that will help them increase their productivity and performance across the organization.

With the system fully tested, we move onto user training. Again, because the simplicity of the design, there is not much user testing needed. Instead of traveling around the country to each site, we settled on creating a simple video that can be shared to show how to use the Power BI dashboards.

Because it is not a standalone system, but rather a dashboard that can be accessed via a web browser, there is no need for onsite installation and verification. The implementation consisted of a coordinated email campaign to each site’s management team with the link and shortcut to the dashboard. In that same email, it provides contact information in the event they are not able to properly access and display the dashboard. The one direction it does provide is
that the browsers Chrome or Mozilla are preferred over Internet Explorer. We have found that over time, many Java based applications have trouble displaying correctly in Internet Explorer.

This is the extent of our implementation plan and with the emails sent; we concluded that implementation is complete. We expect that results will be positive, but will not have sufficient data to measure success until our system has been deployed and utilized for at least six months. At that point, we will measure productivity and performance for each site across the organization and compare key performance indicators before the implementation against those same data points after implementation.

**Conclusion and Areas for Further Improvement**

In conclusion, business intelligence is a growing field and has shown how valuable its application can be. We explained the strategic goals and objectives that ABC Logistics had set which consists of continuous improvement of its operational units and an increase in market share through the acquisition of new customers. We determined that the only way to reach those objectives and align with our strategy was through a new technology that provides near real time information that will help our operations leaders manage their units and improve performance through increased productivity and reduced labor costs. If we can achieve the operational objective, it will give our marketing and sales team a tool to market our effectiveness in supply chain processes and our ability to serve their customer’s needs. This will give us a competitive edge that will lead to the acquisition of new clients and increased volume that increases revenue and therefore profit.

Once we determined what we needed, we went on to plan, design, develop, test, and implement our solution. We called it the ABC Portal system and although encompasses many functions and systems, the final presentation to the end user is simplistic, but powerful. We took
data from two different databases, Kronos and AS400, and used SQL Server Integration Services to transform the raw data into something that can be used for our desired purposes and stored in a newly built data warehouse. We then developed the GUI, or graphical user interface, using Power BI and through a dashboard with gauges, we showed all the key performance indicators that will help each operational unit learn where they are deficient and where they are efficient and make actionable recommendations based on that information. The systems were tested and went through UAT as well and any deficiencies found were patched and corrected. Having gone through all the prescribed phases, we implemented the system and it has been in use for a short time.

The current design will stay in place for at least six months at which point we will compare before and after data to see if it made a difference and where. With that information, we will build upon our successes and make corrections where needed. A disadvantage of our current design is that there is no option for user interactivity and the report functionality is simplistic with no robust options or parameters. This was intentional to test how well this type of application is utilized and to see if the results are positive. If proven successful as expected, the next iteration will still utilize the same data warehouse and data sets, but the functionality on the front-end dashboard will be enhanced with Power BI to include gauge filters, charts, histograms, and other statistical visualizations. We will also expand the reporting functionality to include an array of reports also with additional filtering options.

This system is not complete, but I would argue that no system ever is. Just like the UML process, a system goes through iterations even after implementation. I expect this system will do the same. This project is a great example of how business intelligence can help a company meet its strategic goals and operational objectives. Technology and technology professionals will
continue to be a growing part of the engine that powers progress and continuous improvement in all businesses and not only logistics and transportation.


Appendix A

ABC Portal Data Warehouse

Appendix B

ABC Portal Use Case Diagram
## Appendix C

### ABC Portal System Functional & Non-Functional Requirements

<table>
<thead>
<tr>
<th>ID</th>
<th>Details</th>
<th>Type</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>The ABCPortal system shall register new accounts.</td>
<td>Functional User Account</td>
<td>Must Have</td>
</tr>
<tr>
<td>R2</td>
<td>The ABCPortal system shall allow users to logon.</td>
<td>Functional User Account</td>
<td>Must Have</td>
</tr>
<tr>
<td>R3</td>
<td>The ABCPortal system shall allow users to logoff.</td>
<td>Functional User Account</td>
<td>Must Have</td>
</tr>
<tr>
<td>R4</td>
<td>The ABCPortal system shall allow modification of user accounts.</td>
<td>Functional User Account</td>
<td>Should Have</td>
</tr>
<tr>
<td>R5</td>
<td>The ABCPortal system shall ensure account passwords meet the following complexity: minimum 10 characters, with at least one upper case, lowercase, number and special character.</td>
<td>Non-Functional User Account</td>
<td>Must Have</td>
</tr>
<tr>
<td>R6</td>
<td>The ABCPortal system shall allow users to reset their password.</td>
<td>Functional User Account</td>
<td>Must Have</td>
</tr>
<tr>
<td>R7</td>
<td>The ABCPortal system shall allow editing of account information.</td>
<td>Functional User Account</td>
<td>Must Have</td>
</tr>
<tr>
<td>R8</td>
<td>The ABCPortal system shall allow for the deletion of an account.</td>
<td>Functional User Account</td>
<td>Should-Have</td>
</tr>
<tr>
<td>R9</td>
<td>The ABCPortal system shall allow users to download datasets.</td>
<td>Functional User Account</td>
<td>Want to Have</td>
</tr>
<tr>
<td>R10</td>
<td>The ABCPortal system shall validate user account credentials.</td>
<td>Non-Functional Security</td>
<td>Must Have</td>
</tr>
<tr>
<td>R11</td>
<td>The ABCPortal system shall authenticate users using 256-bit encryption.</td>
<td>Non-Functional Security</td>
<td>Must Have</td>
</tr>
<tr>
<td>R12</td>
<td>The ABCPortal system shall be accessible via HTTPS only.</td>
<td>Non-Functional Security</td>
<td>Must Have</td>
</tr>
<tr>
<td>R13</td>
<td>The ABCPortal system shall provide a security audit trail.</td>
<td>Non-Functional Security</td>
<td>Should-Have</td>
</tr>
<tr>
<td>R14</td>
<td>The ABCPortal system shall remain operational 24 hours per day, 365 days per year.</td>
<td>Non-Functional Availability</td>
<td>Must Have</td>
</tr>
<tr>
<td>R15</td>
<td>The ABCPortal system shall be accessible via any device with internet access.</td>
<td>Non-Functional Availability</td>
<td>Must Have</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Functionality</td>
<td>Must Have</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------</td>
<td>------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>R16</td>
<td>The ABCPortal system shall refresh it's datasets every 15 minutes.</td>
<td>Non-Functional Availability</td>
<td>Must Have</td>
</tr>
<tr>
<td>R17</td>
<td>The ABCPortal system shall allow the changing of customer source.</td>
<td>Functional Usability</td>
<td>Must Have</td>
</tr>
<tr>
<td>R18</td>
<td>The ABCPortal system shall transform raw data from Kronos and AS400 into the data warehouse every 10 minutes</td>
<td>Non-Functional DataWarehouse</td>
<td>Must Have</td>
</tr>
<tr>
<td>R19</td>
<td>The ABCPortal system shall utilize SQL Server Database and SQL Service Integration Services to manage the data warehouse</td>
<td>Non-Functional DataWarehouse</td>
<td>Must Have</td>
</tr>
<tr>
<td>R20</td>
<td>The ABCPortal system shall ensure there are no duplicate values in the data warehouse for any transaction.</td>
<td>Non-Functional DataWarehouse</td>
<td>Must Have</td>
</tr>
<tr>
<td>R21</td>
<td>The ABCPortal system shall perform analytics on the raw transactional data.</td>
<td>Non-Functional Analytics</td>
<td>Must Have</td>
</tr>
<tr>
<td>R22</td>
<td>The ABCPortal system shall provide search results when customer source is changed within 5 seconds.</td>
<td>Non-Functional Usability</td>
<td>Must Have</td>
</tr>
<tr>
<td>R23</td>
<td>The ABCPortal system shall generate predefined monthly reports.</td>
<td>Functional Analytics</td>
<td>Should Have</td>
</tr>
<tr>
<td>R24</td>
<td>The ABCPortal system shall allow the generation customizable reports.</td>
<td>Functional Analytics</td>
<td>Want to Have</td>
</tr>
<tr>
<td>R25</td>
<td>The ABCPortal system shall provide real time transactional updates.</td>
<td>Functional DataWarehouse</td>
<td>Want to Have</td>
</tr>
</tbody>
</table>
## Appendix E

### ABC Portal Actor Semantics

<table>
<thead>
<tr>
<th>Actor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User</strong></td>
<td>A generalized actor that represents common interactions for ABC Logistics system users</td>
</tr>
<tr>
<td></td>
<td>Synonyms: None</td>
</tr>
<tr>
<td></td>
<td>Homonyms: None</td>
</tr>
<tr>
<td><strong>Employee</strong></td>
<td>An employee of ABC Logistics, usually in operations, human resources, management, or finance</td>
</tr>
<tr>
<td></td>
<td>Synonyms: User</td>
</tr>
<tr>
<td></td>
<td>Homonyms: None</td>
</tr>
<tr>
<td><strong>Administrator</strong></td>
<td>An employee of ABC Logistics, usually in the IT department and has elevated system privileges</td>
</tr>
<tr>
<td></td>
<td>Synonyms: User</td>
</tr>
<tr>
<td></td>
<td>Homonyms: None</td>
</tr>
<tr>
<td><strong>System</strong></td>
<td>An internal entity that schedules, manages, and executes tasks</td>
</tr>
<tr>
<td></td>
<td>Synonyms: None</td>
</tr>
<tr>
<td></td>
<td>Homonyms: None</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Account</td>
<td>An interface where users can add and manage their data such as usernames and passwords. This user account information is stored in the ABC Portal Data Warehouse.</td>
</tr>
<tr>
<td>Log On</td>
<td>The act of authenticating with the ABC Portal system and initiating a session.</td>
</tr>
<tr>
<td>Log Off</td>
<td>The act of terminating a session with the ABC Portal system.</td>
</tr>
<tr>
<td>Data Warehouse</td>
<td>A database engine used for storing large amounts of consolidated and transformed transactional data from the production and timekeeping databases.</td>
</tr>
<tr>
<td>Kronos</td>
<td>The system based on an Oracle database that records and maintains timekeeping for all employees.</td>
</tr>
</tbody>
</table>
| **AS400** | An IBM based warehouse management system that has a black screen and the text usually in red or green and is based on various types of databases from iSeries to DB2.  
Syonyms: Mainframe, iSeries, WMS, PKMS  
Homonyms: None |
| --- | --- |
| **Report** | A page or document generated by ABC Portal at the request of the user and has optional parameters such as customer/client.  
Syonyms: None  
Homonyms: None |
| **Filtered Results** | The filtered data results, usually on a web page, that is displayed after a user defines their search parameters.  
Syonyms: None  
Homonyms: None |
| **Analyzed Results** | Data from the data warehouse that is compiled and aggregated to produce productivity statistics in Units Per Hour (UPH).  
Syonyms: None  
Homonyms: None |
<table>
<thead>
<tr>
<th><strong>Use Case</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Log On</td>
<td>All registered users can authenticate with the system and initiate a session and gain access based on their privileges.</td>
</tr>
<tr>
<td>Log off</td>
<td>All registered and logged on users can terminate their current session with the system.</td>
</tr>
<tr>
<td>UpdateAccountInfo</td>
<td>Any system user can manage their user account information such as their address, phone number, and email.</td>
</tr>
<tr>
<td>DeleteAccount</td>
<td>A user can delete their user account.</td>
</tr>
<tr>
<td>FindAccount</td>
<td>A module that is utilized by other use cases to locate the account by an account unique identifier.</td>
</tr>
<tr>
<td>RequestReport</td>
<td>A user can request a pre-generated report from the system. This report is created when it is triggered by the System actor and made available on demand.</td>
</tr>
<tr>
<td>ManageDataWarehouse</td>
<td>The System or Administrator run scheduled jobs to populate the data warehouse with updated transactional data and routine maintenance.</td>
</tr>
<tr>
<td>FilterResults</td>
<td>Filters the results based on zero or more parameters. Common parameters are customer name/id.</td>
</tr>
<tr>
<td>ModifyAccount</td>
<td>Allows the Administrator access to modify or update user account information for any registered user.</td>
</tr>
<tr>
<td>GenerateDataset</td>
<td>Every ten minutes, the data warehouse refreshes this dynamic dataset that the dashboards and report requests pull their data from.</td>
</tr>
<tr>
<td>AnalyzeData</td>
<td>Analyzing data includes the aggregation of data and the manipulation of data through statistical methods in order to generate useful productivity information.</td>
</tr>
<tr>
<td>DownloadData</td>
<td>A user requests to download a report that accesses the data from the dynamic dataset.</td>
</tr>
<tr>
<td>Use Case: LogOnUser</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td>Use Case ID: 1</td>
<td></td>
</tr>
<tr>
<td>Brief Description:</td>
<td></td>
</tr>
<tr>
<td>The User can authenticate to the system gaining access based on their user privileges.</td>
<td></td>
</tr>
<tr>
<td>Primary Actors:</td>
<td></td>
</tr>
<tr>
<td>User, Employee, Administrator</td>
<td></td>
</tr>
<tr>
<td>Secondary Actors:</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Preconditions:</td>
<td></td>
</tr>
<tr>
<td>1. The User is not logged on into the system.</td>
<td></td>
</tr>
<tr>
<td>Main Flow:</td>
<td></td>
</tr>
<tr>
<td>1. The User selects “log on”.</td>
<td></td>
</tr>
<tr>
<td>2. The User enters their username and password.</td>
<td></td>
</tr>
<tr>
<td>3. While the User credentials are invalid</td>
<td></td>
</tr>
<tr>
<td>3.1 The User is required to re-enter the username and password.</td>
<td></td>
</tr>
<tr>
<td>3.2 The User credentials are validated</td>
<td></td>
</tr>
<tr>
<td>4. The User is logged onto the system</td>
<td></td>
</tr>
<tr>
<td>Postconditions:</td>
<td></td>
</tr>
<tr>
<td>1. The User is logged into the system and their account.</td>
<td></td>
</tr>
<tr>
<td>Alternative flows:</td>
<td></td>
</tr>
<tr>
<td>InvalidUserName</td>
<td></td>
</tr>
<tr>
<td>InvalidPassword</td>
<td></td>
</tr>
<tr>
<td>Cancel</td>
<td></td>
</tr>
<tr>
<td><strong>Alternative flow:: LogOnUser:InvalidUserName</strong></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Use Case ID:</strong> 1.1</td>
<td></td>
</tr>
<tr>
<td><strong>Brief Description:</strong> The User has entered an invalid username to login and receives notification.</td>
<td></td>
</tr>
<tr>
<td><strong>Primary Actors:</strong> User, Employee, Administrator</td>
<td></td>
</tr>
<tr>
<td><strong>Secondary Actors:</strong> None</td>
<td></td>
</tr>
<tr>
<td><strong>Preconditions:</strong></td>
<td></td>
</tr>
<tr>
<td>1. The User has submitted an invalid username.</td>
<td></td>
</tr>
<tr>
<td><strong>Main Flow:</strong></td>
<td></td>
</tr>
<tr>
<td>1. The alternative flow begins after step 3.1 of the main flow.</td>
<td></td>
</tr>
<tr>
<td>2. The User receives a message that they have entered an invalid username.</td>
<td></td>
</tr>
<tr>
<td><strong>Postconditions:</strong></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td><strong>Alternative flow:: LogOnUser:InvalidPassword</strong></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Use Case ID:</strong> 1.2</td>
<td></td>
</tr>
<tr>
<td><strong>Brief Description:</strong></td>
<td></td>
</tr>
<tr>
<td>The User has entered an invalid password to login and is notified.</td>
<td></td>
</tr>
<tr>
<td><strong>Primary Actors:</strong></td>
<td></td>
</tr>
<tr>
<td>User, Employee, Administrator</td>
<td></td>
</tr>
<tr>
<td><strong>Secondary Actors:</strong></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td><strong>Preconditions:</strong></td>
<td></td>
</tr>
<tr>
<td>1. The User has submitted an invalid password.</td>
<td></td>
</tr>
<tr>
<td><strong>Main Flow:</strong></td>
<td></td>
</tr>
<tr>
<td>1. The alternative flow begins after step 3.1 of the main flow.</td>
<td></td>
</tr>
<tr>
<td>2. The User receives a message that they have entered an invalid password.</td>
<td></td>
</tr>
<tr>
<td><strong>Postconditions:</strong></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>
Use Case ID: 1.3

Brief Description:
The User cancels the logon verification process.

Primary Actors:
User, Employee, Administrator

Secondary Actors:
None

Preconditions:
None

Main Flow:
1. The alternative flow begins when the user initiates the cancellation.
2. The User cancels the logon process.

Postconditions:
1. The user does not get logged on to the system and their account.
<table>
<thead>
<tr>
<th><strong>Use Case: LogOffUser</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use Case ID:</strong> 2</td>
</tr>
<tr>
<td><strong>Brief Description:</strong></td>
</tr>
<tr>
<td>A user can terminate their current system session.</td>
</tr>
<tr>
<td><strong>Primary Actors:</strong></td>
</tr>
<tr>
<td>User, Employee, Administrator</td>
</tr>
<tr>
<td><strong>Secondary Actors:</strong></td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td><strong>Preconditions:</strong></td>
</tr>
<tr>
<td>1. The user is logged into the system.</td>
</tr>
<tr>
<td><strong>Main Flow:</strong></td>
</tr>
</tbody>
</table>
| 1. The user selects “log off”.
  2. The user is logged off the system. |
<p>| <strong>Postconditions:</strong>     |
| None                    |</p>
<table>
<thead>
<tr>
<th><strong>Use Case: UpdateAccountInfo</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use Case ID:</strong> 3</td>
</tr>
<tr>
<td><strong>Brief Description:</strong></td>
</tr>
<tr>
<td>The User can updates their account information.</td>
</tr>
<tr>
<td><strong>Primary Actors:</strong></td>
</tr>
<tr>
<td>User, Employee, Administrator</td>
</tr>
<tr>
<td><strong>Secondary Actors:</strong></td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td><strong>Preconditions:</strong></td>
</tr>
<tr>
<td>1. The User is logged into the system.</td>
</tr>
<tr>
<td><strong>Main Flow:</strong></td>
</tr>
<tr>
<td>1. include(FindAccount)</td>
</tr>
<tr>
<td>2. The User selects “update account information”.</td>
</tr>
<tr>
<td>3. The User chooses what information to update.</td>
</tr>
<tr>
<td>4. The User account information is updated.</td>
</tr>
<tr>
<td><strong>Postconditions:</strong></td>
</tr>
<tr>
<td>1. The User account information is updated.</td>
</tr>
<tr>
<td><strong>Alternative flows:</strong></td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Use Case: DeleteAccount</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>Use Case ID: 4</td>
</tr>
<tr>
<td>Brief Description:</td>
</tr>
<tr>
<td>The User deletes their active user account.</td>
</tr>
<tr>
<td>Primary Actors:</td>
</tr>
<tr>
<td>User, Employee, Admin</td>
</tr>
<tr>
<td>Secondary Actors:</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Preconditions:</td>
</tr>
<tr>
<td>1. The User is logged into the system.</td>
</tr>
<tr>
<td>Main Flow:</td>
</tr>
<tr>
<td>1. include(FindAccount)</td>
</tr>
<tr>
<td>2. The User selects “delete account”.</td>
</tr>
<tr>
<td>3. If the User selects “yes” to confirm deletion, then</td>
</tr>
<tr>
<td>3.1. The User deletes their account</td>
</tr>
<tr>
<td>4. If the User select “no” to deleting their account, then</td>
</tr>
<tr>
<td>4.1. The User account is not deleted</td>
</tr>
<tr>
<td>Postconditions:</td>
</tr>
<tr>
<td>1. The User account is deleted from the system</td>
</tr>
<tr>
<td>Alternative flows:</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Use Case: FindAccount</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>Use Case ID: 6</td>
</tr>
</tbody>
</table>

**Brief Description:**
The system locates the user account.

**Primary Actors:**
User, Employee, Administrator

**Secondary Actors:**
None

**Preconditions:**
1. The user is logged into the system.

**Main Flow:**
1. This use case starts when a User selects “Update Account” or “Delete Account”.
2. If the user is an MCI Employee.
   2.1. The system requests the account number.
   2.2. The system locates the account related to the account number.
3. Else
   3.1. The system locates the account based on the users that is currently logged in.

**Postconditions:**
1. The system has found the user account.
<table>
<thead>
<tr>
<th><strong>Use Case: RequestReport</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use Case ID:</strong> 7</td>
</tr>
</tbody>
</table>

**Brief Description:**
The employee can request a pre-generated report from the system. This report is created when it is triggered by the System actor and made available to the employee on a request basis.

**Primary Actors:**
Employee

**Secondary Actors:**
None

**Preconditions:**
1. The user is logged into the system.

**Main Flow:**
1. This use case starts when a User selects “Get Productivity Report”.
2. If the user is an employee, then:
   2.1. The system locates the latest reports.
3. Else
   3.1. The system notifies the user that their account doesn’t allow report downloads.

**Postconditions:**
None
<table>
<thead>
<tr>
<th><strong>Extension Use Case: FilterResults</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use Case ID:</strong> 8</td>
</tr>
<tr>
<td><strong>Brief Description:</strong></td>
</tr>
<tr>
<td>Segment 1: The results are filtered based on parameters provided.</td>
</tr>
<tr>
<td><strong>Primary Actors:</strong></td>
</tr>
<tr>
<td>System</td>
</tr>
<tr>
<td><strong>Secondary Actors:</strong></td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td><strong>Segment 1 Preconditions:</strong></td>
</tr>
<tr>
<td>1. A list of parameters are defined within the customer information</td>
</tr>
<tr>
<td><strong>Segment 1 Flow:</strong></td>
</tr>
<tr>
<td>1. The results are filtered based on the customer parameters</td>
</tr>
<tr>
<td><strong>Segment 1 Postconditions:</strong></td>
</tr>
<tr>
<td>1. The new set of filtered results are returned</td>
</tr>
<tr>
<td><strong>Use Case: ModifyAccount</strong></td>
</tr>
<tr>
<td>-----------------------------</td>
</tr>
<tr>
<td><strong>Use Case ID:</strong> 9</td>
</tr>
<tr>
<td><strong>Brief Description:</strong></td>
</tr>
<tr>
<td><strong>Primary Actors:</strong></td>
</tr>
<tr>
<td><strong>Secondary Actors:</strong></td>
</tr>
<tr>
<td><strong>Preconditions:</strong></td>
</tr>
</tbody>
</table>
| **Main Flow:** | 1. include(FindAccount)  
2. The User selects “modify account information”.  
3. The User chooses what information to modify.  
4. The User account information is modified. |
<p>| <strong>Postconditions:</strong> | None |</p>
<table>
<thead>
<tr>
<th>Extension Use Case: AnalyzeData</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use Case ID:</strong> 10</td>
</tr>
<tr>
<td><strong>Brief Description:</strong></td>
</tr>
<tr>
<td>Segment 1: The dataset results are aggregated and analyzed.</td>
</tr>
<tr>
<td><strong>Primary Actors:</strong></td>
</tr>
<tr>
<td>System</td>
</tr>
<tr>
<td><strong>Secondary Actors:</strong></td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td><strong>Segment 1 Preconditions:</strong></td>
</tr>
<tr>
<td>1. A set of results are available to analyze</td>
</tr>
<tr>
<td><strong>Segment 1 Flow:</strong></td>
</tr>
<tr>
<td>1. The results are processed through the Analyzation algorithm and presented through Power BI</td>
</tr>
<tr>
<td><strong>Segment 1 Postconditions:</strong></td>
</tr>
<tr>
<td>1. The analyzed results are returned</td>
</tr>
</tbody>
</table>
**Use Case: GenerateDataset**

**Use Case ID:** 12

**Brief Description:**
A customized report is created for each request based on the selected parameters.

**Primary Actors:**
System

**Secondary Actors:**
None

**Preconditions:**
1. 15 minutes have passed since the last dataset was generated

**Main Flow:**
1. This use case starts at last 15 minutes after the last job run.
2. For each job run
   2.1. Search for selected parameters such as customer
   Extension point: FilterResults
   Extension point: AnalyzeData
   2.2. Generate a report

**Postconditions:**
1. A new report is made.
<table>
<thead>
<tr>
<th><strong>Use Case: ManageDataWarehouse</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use Case ID:</strong> 13</td>
</tr>
<tr>
<td><strong>Brief Description:</strong></td>
</tr>
<tr>
<td>The transactional data from Kronos and AS400 are transformed into the data warehouse.</td>
</tr>
<tr>
<td><strong>Primary Actors:</strong></td>
</tr>
<tr>
<td>System</td>
</tr>
<tr>
<td><strong>Secondary Actors:</strong></td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td><strong>Preconditions:</strong></td>
</tr>
<tr>
<td>1. The transactional insert job has not run for at least 10 minutes.</td>
</tr>
<tr>
<td><strong>Main Flow:</strong></td>
</tr>
<tr>
<td>1. The use case starts when 10 minutes have passed after the last job run.</td>
</tr>
<tr>
<td>2. The system parses Kronos and AS400 system and inserts only new unduplicated records into the data warehouse.</td>
</tr>
<tr>
<td>3. The data warehouse is updated with historical and the latest transactional data.</td>
</tr>
<tr>
<td><strong>Postconditions:</strong></td>
</tr>
<tr>
<td>The data warehouse is up to date.</td>
</tr>
<tr>
<td>Use Case: CreateAccount</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>Use Case ID: 14</td>
</tr>
<tr>
<td>Brief Description:</td>
</tr>
<tr>
<td>The User creates a new account in the system.</td>
</tr>
<tr>
<td>Primary Actors:</td>
</tr>
<tr>
<td>User, Employee, Admini</td>
</tr>
<tr>
<td>Secondary Actors:</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Preconditions:</td>
</tr>
<tr>
<td>1. The User is not logged into the system.</td>
</tr>
<tr>
<td>2. The User is not registered as a new user.</td>
</tr>
<tr>
<td>Main Flow:</td>
</tr>
<tr>
<td>1. The use case begins when the User selects “create new account”.</td>
</tr>
<tr>
<td>2. The User enters details such as a username and password.</td>
</tr>
<tr>
<td>3. While the User information is invalid</td>
</tr>
<tr>
<td>3.1 The User enters a unique username that is at least 10 characters long, a password with a minimum of 12 characters in length including an uppercase, lowercase, numeric, and special character, and then re-enter to confirm username and password.</td>
</tr>
<tr>
<td>3.2 The User’s information is then validated.</td>
</tr>
<tr>
<td>4. The User has created a new account.</td>
</tr>
<tr>
<td>Postconditions:</td>
</tr>
<tr>
<td>1. A new account has been created by and for the User</td>
</tr>
<tr>
<td>Alternative flows:</td>
</tr>
<tr>
<td>InvalidUserName</td>
</tr>
<tr>
<td>InvalidPassword</td>
</tr>
<tr>
<td>Cancel</td>
</tr>
</tbody>
</table>
**Alternative flow:: CreateAccount:InvalidUserName**

**Use Case ID:** 14.1

**Brief Description:**
The User is notified they have used an invalid username when creating their account.

**Primary Actors:**
User, Employee, Administrator

**Secondary Actors:**
None

**Preconditions:**
1. The User has entered an invalid username.

**Main Flow:**
1. The alternative flow begins after step 3.1 of the main flow.
2. The User receives a message that they have entered an invalid username.

**Postconditions:**
None
<table>
<thead>
<tr>
<th><strong>Alternative flow:: CreateAccount:InvalidPassword</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use Case ID:</strong> 14.2</td>
</tr>
<tr>
<td><strong>Brief Description:</strong></td>
</tr>
<tr>
<td>The User has entered an invalid password to create an account and is notified.</td>
</tr>
<tr>
<td><strong>Primary Actors:</strong></td>
</tr>
<tr>
<td>User, Employee, Administrator</td>
</tr>
<tr>
<td><strong>Secondary Actors:</strong></td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td><strong>Preconditions:</strong></td>
</tr>
<tr>
<td>1. The User has submitted an invalid password.</td>
</tr>
<tr>
<td><strong>Main Flow:</strong></td>
</tr>
<tr>
<td>1. The alternative flow begins after step 3.1 of the main flow.</td>
</tr>
<tr>
<td>2. The User receives a message that they have entered an invalid password.</td>
</tr>
<tr>
<td><strong>Postconditions:</strong></td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Alternative flow:: CreateAccount:Cancel</td>
</tr>
<tr>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>Use Case ID: 14.3</td>
</tr>
<tr>
<td>Brief Description:</td>
</tr>
<tr>
<td>The User cancels the new account creation process.</td>
</tr>
<tr>
<td>Primary Actors:</td>
</tr>
<tr>
<td>User, Employee, Administrator</td>
</tr>
<tr>
<td>Secondary Actors:</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Preconditions:</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Main Flow:</td>
</tr>
<tr>
<td>1. The alternative flow begins when the User initiates the cancellation process.</td>
</tr>
<tr>
<td>2. The User cancels the account creation process.</td>
</tr>
<tr>
<td>Postconditions:</td>
</tr>
<tr>
<td>1. The new User account is not created.</td>
</tr>
</tbody>
</table>
Appendix E

ABC Portal Dashboard (all customers)
Appendix F

ABC Portal Dashboard (filtered by customer)
Appendix G

ABC Portal Report Generation Dataset View