Case Study

Acme Explosives

A study in Enterprise Computing

By Victor Stachura

Introduction

Acme Explosives had a long and successful history in the dynamite industry. The company was founded in 1866 just 2 years after the invention of dynamite by Alfred Nobel. An American entrepreneur (William Acme) was on vacation in Sweden when a chance meeting occurred at a local pub. Alfred Nobel was enjoying a pint and boasting of his invention – "It's a real blast" he would say, while entertaining the crowd and throwing small sticks of dynamite in the yard behind the pub. William Acme was always on the lookout for a business venture and befriended Alfred that night. After a long night of "testing" Alfred's new invention, a lifelong friendship was forged. Alfred was looking for a business partner in the United States – William Acme was it. In 1866 the United States Blasting Oil Company was formed and became the sole provider of dynamite to U.S. oil companies, mining firms and bank robbers. In 1867, on a whim of the founder, William Acme changed the name of the company to Acme Explosives – because he could.

Through the years the company grew into an international conglomerate, supplying high quality dynamite to industries and militaries across the globe. Acme Explosives expanded their product line to include over 500 dynamite related products, including C4 plastic explosives, and dynamite sticks in various shapes and sizes. Their expansive product line met the needs of an ever expanding industry base – from blasting rock for mining operations to the controlled demolition of buildings, Acme Explosives has the product.

Acme Explosives was run by Alan Acme - the great, great grandson of William Acme. Although Alan was able to grow the company to its present size and stature, Acme Explosives was starting to experience problems with costs growing faster than revenues and inefficiencies in their supply chain, causing missed deadlines and poor quality for some very large orders. When several cases of dynamite failed to detonate during a controlled demolition of a high profile building, the board, stockholders and state authorities were not happy. "You can't demolish just half a building," said the Governor in a press conference. It was clear that Alan had to be replaced. Some even said Alan could not handle the pressure of running a large international corporation – causing him to indulge in vices that may have affected his on-the-job performance.

After a lengthy executive search, Laura Confute was selected as CEO and president of Acme Explosives. While she had limited experience in the explosives industry, she had 30 years' experience successfully running large multinational companies. Within her first 60 days, Confute met with the regional and division presidents as well as middle managers and key clients and government officials – all aimed at understanding the corporation, the internal problems they're encountering and getting the pulse of their customers.

What she found was unnerving and unsettling. She even started to wonder what she got herself into. How could a company with such a long history, a great product, have so many issues?

The CEO Issues a Directive

Laura Confute was at a recent Gartner conference where every other presentation and discussion at dinner was about Artificial Intelligence and Gen AI in particular. Laura realizes there are problems with Acme that need to be fixed - maybe, just maybe AI can solve our problems.

Laura issues a directive to all her direct reports "I need you people to figure out how to implement this thing I heard about called 'Generative AI or Gen AI'. What is it? How does it work? Implement it here to solve our business problems! I want something implemented in 6 months, if not sooner. If you tell me "it can't be done",

then I'll find someone that can get it done! So, if you like your paycheck and overly large bonuses, I suggest you find a way to GET IT DONE! Understand? Good, that's what I thought!"

Organizational Structure

While much of Acme's growth was "organic" stemming from sales growth on existing product bases, expanding geographically or innovating new product lines, a larger share of the growth came from acquisitions either of competitors or an attempt to purchase Acme's way into a new market space. International expansion was driven primarily through acquisition of smaller explosives companies in country. Acme currently sells to most countries around the globe and manufacturers on five continents.

While Acme's 'growth through acquisition' model has allowed Acme to expand its marketplace geography and expand into new product lines at a pace that would have been impractical through pure organic growth, it's left the company with several challenges. Acquired companies were often left with the existing management teams, business processes and information systems in place. Centralization of shared services (Finance, HR, Procurement, etc.) at either the regional or corporate level was haphazard at best. This has left the company with multiple disparate IT systems and business processes that do not communicate well together and a burdensome cost structure - since few economies of scale exist.

Business Processes

A legacy of Acme's growth through acquisition model has left the organization with several operational challenges. Each part of the organization has its own way of completing basic business activities like taking and fulfilling orders, procuring raw materials, and developing new products. Oftentimes, there are different processes completing the same activities across the company, but on different systems.

Understanding the performance of different parts of the organization is nearly impossible since few standard company-wide metrics exist. For example, at least five different calculations exist for measuring customer order fulfillment.

Few organizations within Acme have even documented their business processes and there is little standardization or sharing of best practices across the company.

Information Architecture

During her research of the company, Confute was looking for sales data for a product that she knew was sold in multiple regions and countries – the 1 lb. dynamite stick. The problem was, she could not get a consolidated view of sales for this product. She was told that she had to first run reports from multiple, independent, sales systems, export the data to excel and then create the summary view that she needs.

The director of IT was happy to have someone build the report for her. The report was delivered 5 days later and contained the information she was looking for. The only problem was that she needed the sales data for a board meeting 2 days prior.

She quietly thought about firing the director of IT – but decided not to make personnel changes so early in her tenure.

Confute was also amazed at how difficult it was to search and find information on their network. "It's easier to find information on the internet, than it is within our own company," she said. In order to find anything, several tools had to be used – including the 'hunt-n-peck' method. Searching email was done using Outlook, searching databases was completed by using specialized programs from Oracle and Microsoft, searching network drives was slow and never returned the results she wanted. The same was true for corporate web sites – content was indexed, but the search results were of little value.

During her 2nd month on the job, Confute was trying to research manufacturing productivity data – she was interested in which plants manufactured which products and what were the monthly volumes for the past 3 years. To her amazement, their ERP systems (there are multiple) did not have this history nor was there one place to search for the information. The Director of IT explained it like this: "We have limited storage so we export the data and send it to each of the plant managers. They maintain the trend data on their own and store the reports on their laptops. If we need a consolidated view, we email all the plant managers and hope to get all their reports – we usually get all the data in about a week and it takes a few calls by one of my analysts to get the reports from the 'stragglers'".

Problems with data and information were more systemic than she originally thought when one day she inquired about their brand. The Acme *brand* stood for something – now their brand value was eroding in the marketplace and their internal organizations could not even agree on the definition of brand. Some business units considered 'Acme' as the brand, others thought of 'C4' as a brand and others considered each product category as a brand. To make matters worse, each internal system implemented their own definition of brand along with their own data format definition. Some systems stored brand as a short cryptic string of characters, while other systems implemented long text descriptions – making data interchange between systems nearly impossible. Corporate level reporting was also impacted – Confute was not able to report on the sales for one particular *brand* without having an analyst spend several days sifting through reports and interpreting data from multiple systems.

The IT Organization

The CIO (Charlie 'cypher' Smith) did not like the fact she was given a directive by the CEO to implement Gen AI. "Doesn't she realize Gen AI isn't ready for primetime? There's too many hallucinations and errors in the responses! Don't even get me started on the built in biases! I don't like it and will fight it as much as I can!"

Unbeknownst to the CIO, the Enterprise Architecture team has been reading and learning about Gen AI. This "sunks works" team is up-to-speed on how the technology works and even has identified several use cases or pilot projects. They've even built a small chat-bot prototype to test out basic Gen AI functionality. They're trying to figure out how to approach the CIO and show him what they've learned.

The IT departments are struggling to keep up with operating their current systems while building new systems and capabilities. Again, there is little interaction between the IT departments and business counterparts. IT deploys systems that few people use and there are rampant issues with data quality.

Every night several hundred computer programs also known as "batch jobs" run to extract, process and move data between systems. Occasionally, these jobs run without any issues. On most nights computer

operators working 3rd shift have to restart jobs, correct data or call programmers in the early hours of the morning to fix problems. The operating environment is taking a toll on the staff and people are starting to look for other jobs. This too could be a problem since most documentation of business rules and processing steps are out of date. The most critical knowledge is in the staff's heads and could easily walk out the door – putting the company even more at risk.

There was little strategic planning below the corporate level. Yes – high level plans were developed and eventually communicated to the regions & divisions. The divisions rarely spent the time to develop specific, actionable strategic plans and when they did, each division was only interested in their domain. There was little or no "roll-up" or consolidation of divisional business plans. Divisions and especially project teams repeatedly made technology and purchasing decisions that impacted the entire organization. For example, some divisions selected Oracle as the preferred database system while others selected MS SQL Server and others went the open source route. The problem was worse when it came to Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) systems – multiple products were selected through the corporation, all requiring a support staff, licensing costs and separate infrastructure. None of these systems were integrated - relying on the old "sneaker not" method to move data from one system to another. Employees would run reports in one system and then manually key in the data into another system. Labor intensive, expensive and slow - there was no "real-time" information.

The legacy IT environment was clearly impacting business performance. With so many disparate and redundant systems, base data such as customer and product information records often had to be interfaced or replicated in multiple systems. This created constant data errors and delays. For example, a recent explosives industry benchmarking study concluded that new product development (from idea to commercialization) averaged 180 days (cycle time). Acme on the other hand required an average of 240 days to develop and commercialize a new product. Much of this increased cycle time was simply due to the challenges in getting the right product information into the right systems.

Another impact for Acme was the business's ability to respond to new regulatory directives since so many systems needed to be changed.

The IT environment was ripe for a rationalization effort – something that Confute has done in the past and knew could bring some 'order' out of the system chaos.

Support for Government Regulations

Each region & division has their own regulatory group – focusing on the regulations for the countries in their region. Each year the regulations change and there is significant money spent on lobbying efforts with local & state officials.

The divisional IT departments have a hard time keeping up with all the regulatory changes and new reporting requirements that have to be implemented. Typically people in the business groups are talking with officials and are alerted of any regulation changes. There is little interaction between the IT and business groups – development managers are notified (if at all) late in the year of regulatory changes. There have been many cases where Acme Explosives has filed for extensions because they could not

meet state mandated deadlines. On several occasions, the company has been fined by the state for missing implementation requirements.

Customers

The Chief Customer Officer (Sally Smith) was very enthusiastic about the CEO's directive. "I've been educating myself on Gen AI and think there's lots of potential in my department. Our customer service is fragmented and a sore point with our customers. I wonder if Gen AI can help?"

Acme Explosives enjoys a large and diverse customer base. The Industrial and Commercial divisions have large customers that span the globe and as well as industries. About 25% of sales are to various military organizations around the world.

Coordinated account planning across regions and divisions is fragmented at best. Oftentimes, a customer is contacted by several Acme sales teams representing different parts of the Acme organization. This confuses customers and there is never a 'Single point of contact' for a customer. More distressingly, different parts of the company give different answers to the same customer questions.

There are separate customer service groups for the various customer types. Customer support is inconsistent at best and often frustrates customers.

Sales & Marketing

The Chief Sales Officer (Bill Smith) is cautious but somewhat optimistic about Gen AI. All my CSO friends at the golf club are talking about their "Gen AI pilot projects" and they have 'high hopes' for their success. I'm not so sure about Gen AI, but I like my bonus and want to be a team player. I'll fund a small project, but I don't want to be the first!"

The sales and marketing groups are always looking for information about their products, customers and current sales. The problem is the data in the corporate systems is either incomplete, isn't up-to-date, or could be flat out wrong. Systems are not integrated and multiple systems need to be consulted in order to get *all* the information needed to get a complete answer.

There is little trust in the data and people spend a lot of time importing data into excel and doing their own updates and calculations.

Supply Chain

The Director of Supply Chain (Sam Smith) is dead set against Gen AI. "Well, I'm going to pretend to be "all for it", but I'm going to drag my feet and quietly not participate for as long as possible. I feel Gen AI is too risky of a technology right now and will probably go away next year. I jumped on the blockchain bandwagon and was burned! Look where that got me! Nowhere! I'm not falling for another fad".

Acme manufactures products in 42 plants on five continents. Manufacturing operations report into geographic regions. While the products manufactured and sold around the globe are relatively common,

the manufacturing IT systems and data are not. For example, the same dynamite stick made and sold around the globe will have a similar formula and manufacturing process but a different internal material code depending on which region manufactured it. This makes it cumbersome to track inventories around the globe and supply one region from another.

Acme explosives is having a quality control issue and not sure of the source of the problem. Several suppliers are used to provide the raw materials (sulfuric acid, nitric acid, glycerin, etc.)

Many of the supplies track their product using various systems - some paper, many with disparate systems that don't talk to each other. Finding the source of a problem is a time consuming process and often error prone. Acme prides itself on the process they use to produce the dynamite. After many years of research & experimentation, a formula was developed which produced the largest explosive yield per ounce of product.

Dynamite is typically made from synthesizing nitroglycerin, which is composed of sulfuric acid, nitric acid and glycerin. While the ingredients are few, the supply chain can be "long & complex".

One method to produce Nitric Acid is by causing a reaction of approximately equal masses of any nitrate salt such as sodium nitrate with 96% sulfuric acid (H2SO4), and distilling this mixture at nitric acid's boiling point of 83 °C. A nonvolatile residue of the metal hydrogen sulfate remains in the distillation vessel. -

Wikipedia https://en.wikipedia.org/wiki/Nitric_acid#Laboratory_synthesis

Sodium Nitrate Manufacturer: "Chemicals are US", Boise, Idaho

Sodium Nitrate shipper (specially outfitted trucks) - "We ship anything", Waco, TX

Sulfuric Acid Manufacturer: "Acid for All", Irving, California

Sulfuric Acid shipper (specially outfitted trucks) - "Bill's trucking Co.", Wheeling, West Virginia

Distilled water (manufacturer and shipper) - "Clean Water USA", Flint, MI

Glycerin (Manufacturer and shipper) - "Chemicals are US", Boise, Idaho

Table 1.0 List of Suppliers

Nitric acid is a key ingredient and must meet strict quality control guidelines. While most commercial grade nitric acid solutions are between 52% and 68% nitric acid, acme requires a higher standard of 65% to 68% nitric acid. "A higher concentration, allows for a bigger boom," said Billy Blast, lead scientist in the R&D department. "The problem we have is verifying the product we received is actually the concentration we require". While our suppliers may *say* a

batch is within tolerance, we see the difference as soon as we mix a batch and test a few sticks. “We can’t have this level of variability in our product and ultimately it's bad for business”.

“We’re not sure if there’s an issue at the supplier’s plant, temperature variation during shipping or is it one of the ‘supplier’s supplier’”. “All I know is that we need help," said Billy.

Finance

The CFO (Suzie Smith) is all for Gen AI. “Like some of us, I’ve been reading and learning about this technology and am very excited to give it a try. My team has also been using tools like ChatGPT and Gemini ai and I’ve seen productivity improve! I’d like to know how other CFO’s are using Gen AI and how can I *really make a difference* in my operations!”

Suzie further laments during one happy hour: “Change at this company is awful! We want to adopt a change, but there’s no real sponsorship or support from the leadership team. We tried putting in a Service Bus, but could not get the buy-in from business units. We tried blockchain, but the developers said “it was too difficult to learn”. So what are the chances Gen AI will work?”

Each region maintains its own financial reporting structure. There is no common chart of accounts and financial reporting at the corporate level is simply a roll-up of regional and country level P&L’s with little underlying data.

Exhibit A. Company Organization

Acme Explosives is organized in several Regions and Divisions

Regions: The Americas
Europe, Middle East & Africa
Asia / Pacific

Each Region was organized by the following divisions:

Industrial Explosives
Military Explosives
Commercial Explosives

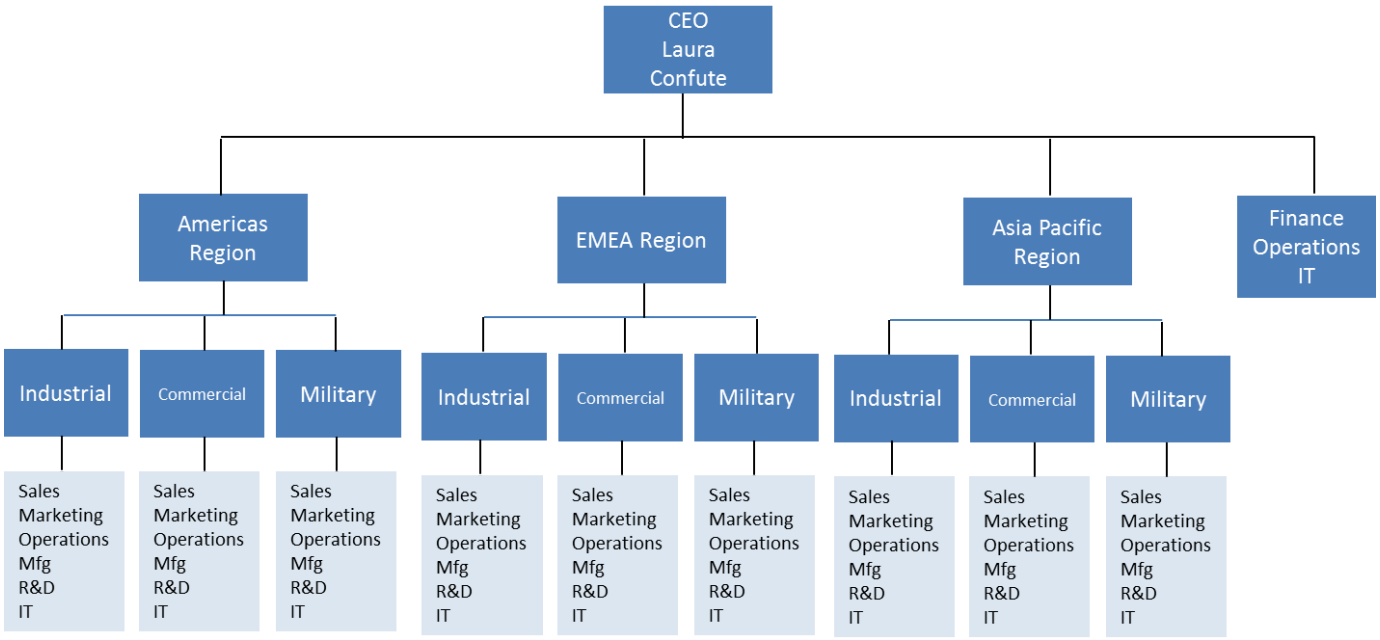
Each Division also contained:

Sales
Marketing
Finance
Operations
Manufacturing & Supply chain
R & D
Legal & Regulatory

Information Technology
HR

Corporate Functions:

Corporate IT
Finance
Operations
HR



Fact Finding Report #1 – Information Architecture Detailed Analysis

After Laura's initial explosive reaction to the state of the corporation, she calmed down and commissioned a detailed study of the company's Information Architecture. "I want no stone unturned,'' she roared at her staff! "Find out what types of systems, data and integration technologies that we have in place. Then deliver me a set of recommendations to fix this mess and give me the information that I need to grow this company!" Her staff (fearing for their jobs), launched a task force to study this problem – this is their story.

America's Region

The task force found the America's region did have some robust Information capabilities – while not widespread, there were a few bright spots. The Industrial division has implemented a robust set of reports and analytic jobs designed to optimize their manufacturing capabilities, eliminate waste, maximize production and control energy costs. Their Big Data platform was able to predict manufacturing output & quality based on inputs such as shift time, staff assigned to a particular line and current sporting events. They also accurately forecast the maintenance needs of their equipment, allowing them to achieve a near zero downtime due to staggering the scheduling of necessary repairs.

The Industrial division also had a full-time Information Architect on staff and Enterprise Architecture team, whose focus was to implement Information Architecture practices. Administration of their databases was fairly automated and required little hands-on involvement from their database administrators.

The Military division (due to government regulations) implemented a multi-tiered information security scheme. The formulas for military grade explosives are a closely guarded secret and fall under the Munitions Security Act of 1984.

The commercial division employs several data scientists that develop algorithms to predict the amount of demolition explosives needed based on the state of key real estate markets in the region. Their bet on Big Data is starting to pay-off. Based on their analysis of real estate demand in large cities, Acme was able to increase sales by 15% and add an additional $22 million in revenue in 2012.

Asia Pacific Region

Unfortunately the Asia Pacific region did not have mature Information Architecture practices in place. Their Military division was under investigation by the International Tribunal for the Illegal Manufacture and Distribution of Explosives (ITIMDE) as well as the U.S Government for potential security breaches involving their C12 product line of plastic explosives. C12 is a lightweight, semi-edible explosive that needs very little material to cause serious damage. "It's just like bubble gum, but with a kick,'' said Pete Moss, President of their Military Division. "You take a small piece of material and chew it to start the chemical reaction. Place the soft wad of material on a door or whatever and run like hell. In 30 seconds, it explodes.'' While this is a very popular item for Special Forces units of various military regimes and governments, there was an alleged security breach where the formula was stolen and posted on the internet.

Records of database access were not kept and access logs were deleted on a nightly basis due to there not being enough storage available. Budgets were cut and something had to go – the storage team was not able to purchase more disks to meet the growing demand of their databases. The Military ERP system was already 16 TB in size and growing at a rate of 1.3 TB every 6 months. The EMC disk array was at capacity and another was sorely needed and

has a list price of $320,000 for 100 TB's of storage. Pete was sure they were able to get a discount of 20% off the list price.

The database software used by the Military division was several versions behind current releases and was soon going out of maintenance. Pete estimated 8 months before an upgrade was needed.

All regions

The team discovered (no surprise) that email was the predominant collaboration "tool" used in the organization. Each person would create their own "library" of documents either using MS Outlook or storing documents on their PCs. While many people created efficient library schemes and were able to find their own documents, the team felt this was not a good long term information strategy for the corporation.

This being the age of Social Media, many employees have created Facebook, LinkedIn and Twitter accounts. A number of workgroups and project teams have set-up Facebook and Yammer accounts to facilitate collaboration. Unfortunately implementation of these collaboration tools was fragmented at best.

Fact Finding Report #2 – Technology Landscape

Wall Street Journal Article - "Acme Explosives deemed a dud - ATF probe initiated"

Seattle – The long standing reputation of Acme Explosives was tarnished recently with the latest in a series of spectacular demolition failures occurring on Sunday morning. Controlled Demolition Inc. (CDI) was awarded the contract to demolish the King Dome in Seattle, Washington – a project that was complex and required considerable demolition engineering and the use of only the highest quality products. On Sunday, things did not go according to plan. After months of planning and prep work, after the area was cleared and the warning siren fired and the detonation button was pressed – nothing happened. Nothing happened for approximately 23.5 seconds. At 11:00:23 am a series of seemingly random explosions took place in a feeble attempt to bring down the big King Dome. "It was unbelievable," said Jack Loizeaux, the founder of Controlled Demolition, Inc. "We thought we were dealing with the best supplier of explosives – Acme Explosives. I guess we were wrong". Witnesses reported seeing only a fraction of the dynamite placed on support beams, actually exploding. "Most of them were duds", said Pete Moss, a witness at the scene. Unnamed sources involved in the demolition indicated that the materials used for the project were late in arriving and demolition engineers were forced to scramble to get the dynamite in place. Unconfirmed reports indicate that the detonators shipped with the dynamite may not have matched CDI's specifications but demolition engineers had insufficient time to inspect the materials prior to placement.

The city of Seattle is now left with an even larger mess to clean up, since the King Dome is only partially demolished. "It's too risky to re-wire and try another controlled demolition," said Jack. "Conventional methods will now have to be deployed to remove the rest of the building".

City, state and federal officials were not pleased at the botched job and an investigation was immediately started by the Bureau of Alcohol, Tobacco, Firearms and Explosives. The focus of the investigation is on Acme Explosives, the supplier of the dynamite and detonators used in the demolition. Acme, led by Allen Acme, has been implicated in a series of demolition failures. Sources within the company report widespread dysfunctional behavior including infighting, finger pointer and CYA activities. "There are no business processes in our commercial division," said one unnamed source. Other sources within the company cite problems with formula development, quality control, and inaccurate and delayed shipments. While Laura Confute could not be reached for comment, Alan Acme was seen at a local Applebee's with a tall, frosty beverage in his hand.

Introduction

Laura learned of the King Dome demolition disaster from CNN within minutes of the incident. While she knew business processes were ad-hoc throughout most of the organization, she had no idea how explosive the problem

could become. She planned to standardize and optimize the organization's business processes over time. But with the King Dome incident, she realized some immediate problem solving was in order.

It was obvious Acme needed to move fast. Concerned that Acme's existing management team was not up to the task of getting to the root cause of the issues and addressing them quickly, Laura engaged a team from Runupthebill Consulting. Laura has had a longstanding relationship with Runupthebill from working in past organizations. Laura knew that while not cheap, Runupthebill was extremely proficient in understanding business processes and driving efficiency and effectiveness through business process redesign and recommendation of appropriate IT system changes.

Background

Technology Portfolio

You can see from the organizational chart, each division has their own IT department and more importantly, *their own set of applications*! Which means, each is an island to themselves. These applications are not integrated and do not talk to each other. This poses a significant problem for the executive leadership team when they need to see and analyze data from *all* divisions. Regional management also has the same problem due to the lack of integration.

Region: America's

Division: Industrial

List of applications owned and supported by Acme:

Organizational Area	**Application**	**Description**
HR	Workday	Human resource management system - Allows managers to create job postings, manage the hiring process, employees can view pay stubs and manage their performance (objectives & goals). All systems in the portfolio use Workday to verify personnel are employees of Acme. Workday is a SaaS application hosted on AWS.
Mfg	SAP	Enterprise Resource Planning System. Tracks raw material received, products through the manufacturing process and finished goods. SAP sends completed goods information to the MyInventory system. SAP is hosted on-prem in the Acme data center and runs on their IBM z990 mainframe, which is based on IBM's z/architecture. The mainframe was recently upgraded to support TCP/IP and socket connections.
Mfg	MyInventory	Inventory and warehouse management system.

		MyInventory runs on an old IBM RS/6000 running the AIX operating system. The systems glBalance and Ariba all use information from MyInventory.
Finance	glBalance	A general ledger system that receives payments and keeps the books. glBalance runs on Windows server 2019 on intel hardware glBalance uses information from SAP, MyInventory and Ariba.
Finance	Ariba	The procurement system that issues purchase orders and communicates with 3rd party suppliers. Ariba is a SaaS application hosted in Microsoft Azure. Due to budget constraints, the Ariba API module was NOT purchased. A landing zone is provided for Acme to store data files. Ariba receives information from MyInventory and SAP. Ariba also sends information to ShippingForYou and Ariba.
Operations	ShippingForYou	Manages the shipping of products and receipt of raw materials. ShippingForYou is hosted on-prem in the North America data center and runs on virtualized intel hardware running Windows Server 2019. Receives information from SAP, Ariba and MyInventory
Mfg	BarcodePrint	A system to print barcode labels. BarcodePrint is a very old system that runs on an old Apple Mac desktop computer running an old MacOs operating system. BarcodePrint integrates with SAP and ShippingForYou.

All applications run on computers in the North America data center except the SaaS applications. Some applications use physical servers and others use virtual servers. All applications are on the same network segment. There is no integration software in the environment. All current integration occurs manually. Extra staff exists to look up information in one system and then type that same information into another system. Acme experiences quite a significant lag-time in data being propagated between systems. The manual data entry does cause data quality issues. Mistakes are made and many times no one knows which system has the “correct data”.