Kaea-Cola Project Scope and Proposal

SE 638-001 - Assignment 1 - Fall 2018

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# Part 1: Business Process Scope and Project Rationale

## 1.1 Business Overview and Process

### 1.1.1 Company Background and Operations

#### Introduction

Kaea-Cola, Inc. is a beverage company that includes 25 business units with Egypt’s subsidiary being the head office of the African region. It specializes in producing a concentrate syrup that it uses in producing its beverages; the secret recipe for the syrup is unique and differentiates this company’s products from others. The company delivers these concentrates to their operations in other African countries where they are used in making the final products. The operations then distribute these products in their respective territories and export them to the Middle East and Asian bottling territories.

The finished product is distributed to customers which include wholesalers, retail shops and outlets. This makes the product available for purchase by individual consumers. The distributors also provide the company with information about consumer preferences and feedback.

In Egypt, the food and drink exports grew after 2007 which improved the processing industry. The trade agreements in the region had an impact in such companies that allowed trading to wider markets and that reflects in reducing the customs on food products in the local area. Kaea-Cola was one of the companies affected by these new regulations, which allowed them to expand the regions that they export to.

#### How the Business Works

Kaea-Cola's business processes span multiple branches. The business headquarters and concentrate manufacturing are both located in Egypt. Tasks performed at Headquarters include central offices for marketing and development, accounting, and upper-level business management. Offices at headquarters have final determination over the budgets, and headquarters currently manages the production schedule and mix of different flavor concentrates produced at any given time.

In order to produce the concentrate, manufacturing has to order, purchase, receive and store the raw materials until their scheduled use in production. (The machinery and equipment for production must also be purchased, maintained, and sometimes replaced.) Manufacturing produces the concentrate and then sends it to our bottlers in different regions.

Our bottlers are responsible for reconstituting the concentrate (by adding still or carbonated water), packaging it into cans or bottles for consumption, preparing those cans or bottles to be shipped, and distributing the finished product to our customers, who are Distributors, Franchisees, and Retail Stores (and who then sell the product to the consumer). The bottlers are responsible for ordering, purchasing, receiving, and storing packaging materials (just as manufacturing must do these things for raw materials to make the concentrate) and may contract out for shipping. Our bottlers are also responsible for storing the finished product until it can be delivered to the customers.

In addition, the bottlers are the company's direct contact with the distributors and retailers who are its customers. Each bottler sends sales reports to HQ on a regular (daily/weekly/monthly) basis, where they are consolidated by HQ sales analysts. The local bottlers are in the position to know what amounts of what products and flavors are being ordered, where, and by whom. They are also in the position to receive information from our customers about what is and is not selling and what consumers are demanding more of. (Unfortunately, they do not always communicate this information accurately or in a timely manner to HQ, so we often do not have accurate figures about how specific products are selling.)

Marketing and development can use this information to further their market research and to design new flavors and recipes, if they have it. Similarly, this is information that would be useful to know when headquarters schedules production so that we can schedule amounts of concentrate to be produced that are appropriate to demand (thus reducing both shortages and unnecessary warehousing of product).

#### What we will change

We plan to facilitate these processes by implementing a system that allows our bottlers to accurately and seamlessly report on what has been sold and what has been delivered by incorporating the product code in all reports, labels, and RFID tags. Product can be scanned as it is delivered to the distributor or to the warehouse, instantly gathering data that the system can compile into reports.

This data, along with the data that the bottlers collect from our customers about consumer tastes, etc., can be used to predict demand and market trends. This will inform the design of new products and also influence our decision-making about the manufacturing mix and scheduling for our existing products. By also recording data about our suppliers and their past performance, and by streamlining the process by which we attach quotes to our purchase orders, we can streamline the supply chain to allow for more agile production schedules. This will allow us to not only dynamically increase or decrease production of certain products to fit demand, but will allow us to create more small-batch recipes to test or to provide limited or seasonal flavor runs, helping secure our reputation for innovation and match with customer tastes.

The following figure outlines the current high-level business processes. The red outline denotes processes that will be supported by the proposed system.

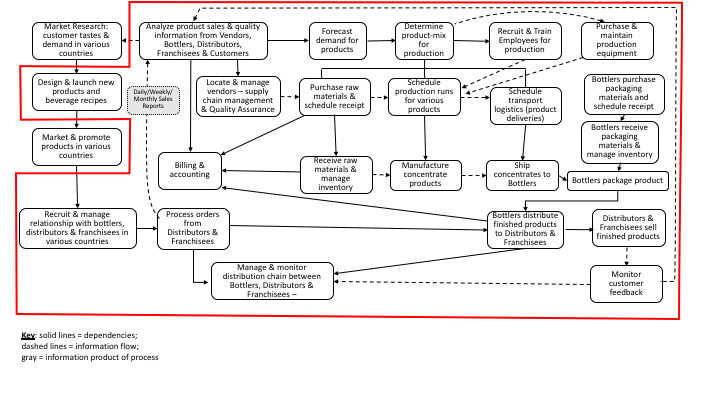


Figure 1

### 1.1.2 Business Goals, Differentiators, Core Competencies, and Performance Indicators

#### Business Goals and Differentiators

Although Kaea-Cola has an ardent following and strong brand-loyalty in the region, due to our history of being one of the longest-standing soft drink competitors in the local market, competition from a variety of new entrants to the field means that we will need to work to maintain both customer loyalty and a competitive advantage. We are noting that we need to move quickly in introducing new recipes to keep up with our competitors; it is important that we be seen as leaders and not as copycats.

In addition, Kaea-Cola has long-term ambitions to further expand into the global market, setting up additional concentrate manufacturing plants in other countries and other regions, thereby allowing us to enter additional markets and reduce transportation costs. We believe our unique flavors will quickly differentiate us in other markets, and be sought-after worldwide.

In order to accomplish this, however, we must first focus on building our core business in Africa, the Middle East, and Asia, so that we have a strong base of skills and resources necessary for expansion. To this end, our main business goals are:

* to continue to build customer loyalty through a reputation for quality and delicious flavors
* to establish quick turnaround times for creating new recipes in response to emerging market trends, enabling the company to be the first to market with new flavors
* to standardize our operations across the region and reduce recurring costs associated with lag times, warehousing, spoilage, etc.

#### Core Competencies

To meet our goal of building customer loyalty through a reputation for quality and delicious flavors, we will need to address both quality and customer tastes. We will need to analyze and keep track of the development of consumer tastes; although there are several ways to do so, a core method of doing so will be through monitoring the popularity of our flavor and product lines. We will also need to ensure that the quality of our products remains consistent; we can address this in ways that also satisfy our goal of standardizing our operations and reducing recurring costs by standardizing production so that we can reliably reproduce any of our recipes, and by reducing the amount of time that raw ingredients and the finished product spend in our warehouses or in transit.

To meet our goal of enabling ourselves to be first to market with new flavors, we need to be able to identify emerging market trends quickly enough to adjust before our competitors. We will also need to be able to have a relatively short amount of time between when a product goes into development and when it hits the market; key abilities that would help with this include flexibility in ordering new ingredients and different ingredient amounts, the ability to flexibly allocate manufacturing processes to vary the amount of flavors as needed, and small batch processing enabling limited flavor runs. A related competency we will need is good industrial and information security so that our product recipes and planned product lines remain secret.

In addition to the aforementioned competencies of standardizing recipes and reducing the storage and transit time for materials and products, we can support our goal of standardizing operations and reducing costs by implementing and supporting well-integrated systems that increase our ability to track and monitor key processes throughout the organization, from the procurement of raw materials through manufacturing, production, sales, distribution, and inventory control. This will allow us to manage our processes in a way that is flexible and responsive to demand.

#### Performance Indicators

These core competencies correspond to business processes that will be supported by the information systems. These processes include:

*Forecasting demand* based on the sales of our product and on market conditions

*Customer and vendor relations* - tracking the capabilities and preferences of our suppliers as well as our customers, capturing feedback from our customers and recording our comments and feedback about our suppliers

*Inventory management* - tracking our materials and products from purchasing and ordering through receipt, production, transportation, warehousing, and delivery

*Product management* - tracking marketing and development of each of our products from inception throughout the lifecycle of the product, brand, or recipe

Key performance indicators for these processes that we will track include:

* turnaround time between creation of a new product/recipe through the first shipment delivered
* asset spoilage rates (for both products and raw materials)
* average warehousing time for each asset type (from receipt until use/delivery)
* product performance as measured in units purchased from each distributor
* market share percentage
* number and content of customer complaints about quality control
* distributor satisfaction with ordering and delivery turnaround time
* average turnaround time between when a customer places an order and when the order is delivered
* average turnaround time between when we start work on a purchase order for materials and when the order is delivered

We will take these differentiators, goals, competencies, and performance indicators into account when designing the project; our project objectives are designed to support these core competencies. We will also need to make sure that the system can accurately capture the metrics for each of the key performance indicators, and that we capture measurements at the beginning and end of the implementation process, as well as at the end of the time frame indicated in our Project Overview Statement.

## 1.2 Opportunity and Problem Analysis

### 1.2.1 Problems

#### Problem Analysis Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Problem** | **Affected Business Processes** | **Affected People & Groups** | **Consequences** | **Work process changes needed** | **IT Support Functions** |
| Employees are not computer literate | -Data Entry at HQ (i.e., manual entry and invoices need to be mailed)  - production and brand and distribution chain management  - delivery | -Sales Department  -consumers and distributors  - analysts | -Loss of orders  -delayed production  -delayed delivery  -More unsatisfied customers  -more time and effort for data entry at HQ  - not able to achieve real time reports  - incorrect analysis of sales  - effects the demand forecast  -analysts need to enter the data manually | - Providing online ordering system for franchisees  - Training the franchisees  - Setting up regional help desks or Technical training provided to all the staff members.  - Online support to help employees learn the new digital system instead of excel sheets for data entry.  -Middle managers accepting digital signatures to verify with the scanned handwritten. | -Training analysts providing online 24/7 assistance for the franchisees  - reviewing input-output processes of budget by accounting department.  -real time reporting  - software which contains a single copy of handwritten signature which verifies the digital signature each time. |
| currency fluctuations between $US and Egyptian pounds | Demand forecasting,  Revenues,  Budgeting, | Analysts,  Franchises,  managers, | Inaccurate  budgeting which leads to lost revenue and reduce profit.  We don't have the exact operation budget we planned. | Toggle report views in different currencies | Create a mechanism to convert the currency and view the budget in different currencies.  Tracking historical information.  Automated system to predict currency fluctuations. The system should also have currency conversion capabilities to reflect current market rate.  Automatic update of the system to reflect current market rate |
| Unable to meet the demand of wholesale vendors | Inventory management, Demand forecasting, Supply chain | Retail shops, Distributors, Vendors | Loss of revenue and decreased customer satisfaction, due to inaccurate forecasting and inventory management systems | Improved market research for more accurate demand forecasting  Utilize demand forecasting to guide inventory management  Adopt inventory management best practices, such as just-in-time inventory management to improve efficiency  Improved supply chain management. For example, plants close to a particular region may be contacted to fulfill orders | Artificial Intelligence (Prediction tool) to predict demand forecasts based on historical data, market trends, etc.  Integrate procurement, manufacturing and inventory management systems  Automatic update of inventory systems |
| Lack of real-time business performance reporting | Operations, Accounting, Forecast Demand, Management Reporting | Analysts, management | Manual upload of accounting inputs and lack of system automation/integration would lead to wrong decision making. This may negatively impact profitability, productivity, customer satisfaction, etc. | Automated update of accounting inputs based on purchase orders, etc.  Business process automation  /integration | Automate business processes/operations (order processing, billing/accounting, inventory management)  Integrate business/management reporting across all processes |
| Suppliers are still sending quotes by courier or fax | Manage relationship with bottlers, etc.  Purchase packaging materials and schedule receipt  Schedule transport logistics  Manage and monitor distribution chain  Bottlers distribute finished products | Manu-facturing  Bottlers  Distribution  Customers (Distributors) | It takes too long to associate quotes with a purchase order  It takes too long for us to fill distributor orders  Distributors get upset at delays  We lose the opportunity to make sales if our product is not on the shelf | Suppliers send quotes through web portal where they are automatically attached to PO  Train suppliers on advantages of using one of our preferred methods (e.g., we are more likely to purchase from them)  Use a secure fax-to-email service to receive faxes (less ideal, still requires marketing assistants to attach to correct PO) | Develop secure web portal for submitting quotes via PDF, where quotes can be associated with a specific PO by lookup or through using a PO-specific URL |
| Lack of communication between local suppliers and HQ/analysts about ***which*** products are being ordered (e.g., daily reports have sales volume but not necessarily broken down by product categories) | Analyze product sales  Forecast demand  Determine product-mix  Create daily/weekly/monthly sales reports | Analysts/HQ  Sales Departments  Distribution | Unable to accurately determine correct product mix based on demand  Affects our ability to analyze local tastes, thereby limiting our ability to create desired new products  Shortages of product cause customer ire  Overstock of product necessitates discounted sales and/or increases risk of warehousing costs, spoilage, and loss of quality | Standardization of reports to include breakdown by product code  Verification of amounts ordered/delivered | Product code standardization (based on flavor and other important characteristics)  Incorporate product code lookup in all sales reporting forms  Form standardization for sales reports to include product code  Have distributors use scanners to verify products and number of packages delivered |

### 1.2.2 Opportunities

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Opportunity** | **Affected Business Processes** | **Affected People & Groups** | **Consequences** | **Work process changes needed** | **IT Support Functions** |
| Enable small batch processing to produce limited flavor runs | Determine product-mix  Purchase raw materials & Schedule Receipt  Schedule production run  Manufacture concentrate products  Ship concentrates to bottlers  Market & promote products  Train employees for production | Accounting  Ordering  Manufacturing  Bottling  Marketing | Advantages:  - Create small batches for testing  - Supports agility needed to be first-to-market (doesn't have to be a big batch, so we don't overextend ourselves; just has to be first)  - Allows us to have limited or seasonal flavor runs, allowing experimentation with flavors with minimal risk while increasing demand for limited run products (since there is the urgency of "get it now before they run out")  Risks:  - could cause delays in large batch production  - supply chain must be managed carefully to get products in stores quickly, and must be coordinated with marketing and design so customers know about it  - additional risk of production errors due to frequent new recipes | Flexibly schedule/ allocate concentrate manufacturing resources to allow small batch production  Allow prioritization of urgent orders  Accurately communicate to bottlers the dilution ratio for each recipe  Small-run printing for packaging and labeling | Enable tracking and scheduling of flavor development so that affected departments can anticipate when a new flavor will be likely to need their attention  Support a code to distinguish between urgent and non-urgent processing and delivery orders  Standardize product code to incorporate dilution ratio |
| Increase flexibility in allocating manufacturing resources to vary the amounts produced of each flavor as needed | Determine product-mix  Purchase raw materials & Schedule Receipt  Schedule production run  Manufacture concentrate products  Ship concentrates to bottlers  Train employees for production | Ordering  Manufacturing | Advantages:  - allows flexibility in production to adapt to forecasted changes in demand  - allows us to produce more of a certain flavor when markets indicate an abundance of resources  Risks:  - requires responsiveness in supply chain *and* in manufacturing; we cannot increase batch sizes if we are short of an ingredient, and we will need to be able to handle shipping | Flexibly schedule/ allocate concentrate manufacturing resources to allow production runs of varying sizes | Automated forecasting based on seasonal and past performance |
| Risk of poor storage of products in warehouses | Inventory,  Distribution,  Manufacturing,  Supply chain, | Distributors,  Brand managers,  Analysts, | unusable products which have been affected by poor storage,  Expired product will lead to loss of revenue, quality issues,  reputation of customer satisfaction, | Keep track of stored products and rearrange them in a way that keeps them safe from damages,  Keep track of expiration date on time, | Use RFID tags |
| Automation/  Computerization of supply chain | Forecast demand, procurement of raw materials, order processing,  Inventory management, Payment processing, distribution | Analysts, Customers; Suppliers, Management | Online real-time information access on every aspect of the business | Automation of end-to-end business processes  Automated order processing and invoicing  Use of dashboard to access real-time information instead of manual data consolidation | Computer enabled delivery trucks for automated scheduling and effective routing  Integration of order processing, inventory management billing/accounting and supply chain systems  Use of RFID tags for tracking and monitoring  Real-time reporting |

### 1.2.3 Priorities for Change

As many of these problems and opportunities are interrelated, we have decided to support each of them in the system, prioritizing those most central to our core business goals. Based on our core competencies, we have decided to prioritize changes related to the areas of order processing and invoicing, billing/accounting, and inventory management.

## 1.3 Scope of Change

### 1.3.1 Scope of Impact on Business Processes

Based on the problem analysis carried out, an integrated business management system is required at Kaea-Cola. The new system would automate the end-to-end operations of the business and facilitate business/management reporting. Integrating supply chain, inventory management and business operations would ensure effective demand forecasting, business performance reporting, customer relationship management, computerized scheduling, etc.

The following diagram shows the business processes that will be supported by the new integrated business management system (outlined in red). This scope was derived from analyzing the problems and opportunities noted in section 1.2 as well as the business goals and core competencies noted in section 1.1.

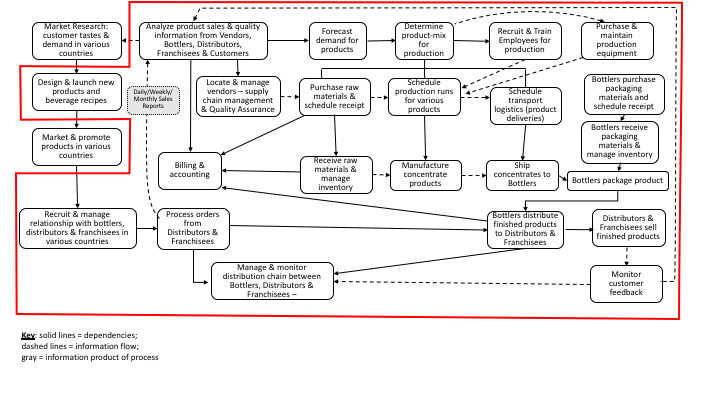


Figure 2

### 1.3.2 IT System Objectives

The following objectives were defined for a new system based on the scope of impact shown in Figure 2.

|  |  |
| --- | --- |
| Objective | How we will know when it has been achieved? |
| Online real-time business performance reporting on product performance, competition and supply chain | We can track sales for each product throughout all regions over a specific time period and compare them to those for a previous time period. We can retrieve figures for how much our competitors are selling in comparison to us. We can retrieve statistics from the system about how long order and delivery take for each asset type in each country and can identify where a particular order is while it is being shipped. |
| Faster/more seamless order processing and turnaround time for suppliers by integrating order processing, invoicing, inventory and supply chain | Turnaround time between when we start a purchase order and when the order is delivered is improved. |
| Automated tracking and monitoring of end-to-end business operations | We can identify where a particular product or order is in the development, manufacture, or distribution process |
|  |  |
| Provide a standardized method of identifying product (through a product code) that addresses flavor, dilution ratio, form factor, and amount in package | We can scan the product code on any package and accurately identify these properties from the database based on the code |
| Track and schedule flavor development process from recipe through initial delivery | We are able to identify a specific flavor in development and know when it is planned to be manufactured |
| Automate forecasting based on current and past sales, past/seasonal performance, and market trends | We can analyze each of these things individually. Reporting aligns with historical performance and market information, and experienced analysts agree that the predictions seem accurate and/or reasonable. |
| The system is user friendly, easy to learn and adapt | We can measure an increase in employee productivity in work performed on the system, and employee satisfaction with the system increases. |
| Functionality to track currency changes and view reports in various currencies | We are able to toggle the display of budgets and reports to show them in different currencies based on the amounts in the document and the exchange rate at a date and time specified in the budget/report (as selected by the business rules). |

## 1.4 Project Overview Statement

|  |  |  |  |
| --- | --- | --- | --- |
| PROJECT OVERVIEW STATEMENT | Project Name  **Kaea-Cola IBMS** | Project No. | Project Manager |
| **Problem / Opportunity**  Kaea-Cola Inc.is a beverage company that includes 25 business units in different countries including the head office for the African region, which is based in Egypt. We are currently experiencing a number of problems that are impairing our ability to adequately analyze current sales and manage our inventory. We can address many of these problems by improving communication between business units and headquarters, and between business units and our suppliers and customers. Rather than have our employees perform duplicative work re-creating reports based on data that we have already collected elsewhere, we propose an integrated system that will collect data we have already entered and use it to make the work of different business units easier and more responsive to changes in market conditions.  For example, by analyzing our sales in a particular region based on actual product delivered, we can identify which product lines are selling better than others, allowing us to adjust manufacturing in the short term (so that we have neither shortages nor oversupplies of any particular product, and product spends less time sitting on the shelves) and to adjust our marketing strategies in the longer term. This kind of analysis would also allow us to more quickly identify market opportunities and become more agile in getting new products out to market. | | | |
| **Goal**  To reduce costs by standardizing our business processes and improving communication to provide effective business management. The proposed integrated business management system will help us analyze our product sales not only in currency amounts but in terms of units and specific product lines sold. This will enable the system to forecast demand, which, in conjunction with system support for managing our inventory, will enable us to make appropriate adjustments to the supply chain and manufacturing processes. This will enable us to reduce the costs associated with shortages and oversupply of product. | | | |
| **Objectives**   1. Managers can retrieve accurate, real-time reports on product performance, competition, and the supply chain 2. Reduce turnaround time in ordering from suppliers 3. Identify where a particular product or order is in the development, manufacture, or distribution process 4. Standardize product codes to encode flavor, dilution ratio, form factor, and amount in package, such that any sales or delivery report automatically includes this information 5. Track and schedule flavor development process from recipe through initial delivery 6. Forecast demand based on current and past sales, past/seasonal performance, and market trends 7. Reduce manual entry of data and increase employee satisfaction with work systems 8. View reports in different currencies based on the exchange rate at the time relevant to the report | | | |
| **Success Criteria**  The performance and success of the system will be judged according to the following criteria:   * 15% decrease in turnaround time between initial creation of a new product/recipe through the first shipment delivered within two years of implementation * 20% reduction in asset spoilage rates (for both products and raw materials) within two years of implementation * 10% reduction in average warehousing time for raw materials (from receipt until use/delivery) * 15% reduction in average warehousing time for finished product (from production until use/delivery) * 10% increase in product performance as measured in units purchased from each distributor * 1% or greater increase in market share percentage * at least 5% decrease in number of customer complaints about quality control due to spoilage * at least 10% increase in distributor satisfaction with ordering and delivery turnaround time * at least 5% decrease in average turnaround time between when a customer places an order and when the order is delivered * at least 25% decrease in average turnaround time between when we start work on a purchase order for materials and when the order is delivered | | | |
| **Assumptions, Risks, Obstacles**  **Assumptions**  We will be able to place a contract with a service providing us a history of currency exchange rates that can be accessed via a web API.    **Risks**  Because our branches are spread out, technical staff with expertise may not always be available at the branch that is having technical trouble. This may cause delays in support and frustration on the part of our staff.  We suggest a train-the-trainers approach to allow local staff to be the first resource for technical support issues. These individuals should be the primary technical support contacts for their branches, to increase their exposure to common issues and minimize confusion.  **Obstacles**  Many of our employees (at all levels of employment, including management) are not computer-literate and may be distrustful of new technology and new ways of doing things. In addition, many of our suppliers and customers may similarly be distrustful of new technological methods.  Training and outreach will need to address this. We should also design the interfaces to be easy to use and focused on the tasks for an individual's employee role. | | | |
| Prepared by | Date  October 14th, 2018 | Approved by | Date |

# Part 2: Technical Scope

## 2.1 High-Level Requirements Analysis

### 2.1.1. High-Level Software Requirements Breakdown

**Faster/more seamless order processing and turnaround time for suppliers by integrating order processing, invoicing, inventory and supply chain**

*Areas of business operations affected:*Forecast demand, procurement of raw materials, order processing, inventory management, billing & accounting, distribution, supply chain

*Software functions indicated:*Order processing and Invoicing  
Tracking and monitoring of delivery trucks  
Tracking and monitoring with RFID tags

**Automated tracking and monitoring of end-to-end business operations**

*Areas of business operations affected:*

Forecast demand, procurement of raw materials, order processing, inventory management, billing & accounting, distribution, manufacturing, supply chain, management reporting

Inventory management  
Supply chain management  
Management reports  
Demand forecasting  
Order processing and invoicing

*Software functions indicated:*Inventory management  
Supply chain management  
Management reports  
Demand forecasting  
Order processing and invoicing

**Automated linking of Supplier quotations to purchase orders**

*Areas of business operations affected:*

Purchase packaging materials and schedule receiptSchedule transport logisticsBottlers distribute finished products to distributors

*Software functions indicated:*Web upload of files associated with specific POPO lookup for web upload

**Provide a standardized method of identifying product (through a product code) that addresses flavor, dilution ratio, form factor, and amount in package**

*Areas of business operations affected:*Sales and analysis: Process orders from distributors and franchisees; Analyze product sales & Quality information from Vendors, Bottlers, Distributors, Franchisees, and CustomersBilling and AccountingManage and monitor distribution chain between Bottlers, Distribution, and FranchiseesManufacturing: Determine product mix for production; Ship concentrates to bottlers; Bottlers package product; Bottlers distribute finished product

*Software functions indicated:*Product code creation/encoding, lookup, and deactivationIntegration of product code lookup in order forms, sales reports, and labeling/tags

**Track and schedule flavor development process from recipe development through initial delivery**

*Areas of business operations affected:*Analysis: Forecast demand for productsMarketing: Design and launch new products and beverage receipesManufacturing: Determine product-mix for production; Schedule production runs; Purchase raw materials; Receive raw materials and manage inventory; Manufacture concentrate products; Ship concentrates to bottlersManage and monitor distribution chainRecruit and train employees

*Software functions indicated:*Create flavor development codesIntegration of flavor development codes in design and testing records, order forms, production schedule forms, purchasing and receiving forms, manufacturing orders, and taggingTrack and monitor flavor development process

**System is user friendly, easy to learn and adapt**

*Areas of business operations affected:*All processes in scope

*Software functions indicated*Report interface includes easy-to-use formatOnline training manual

**Automate forecasting based on current and past sales, past/seasonal performance, and market trends**

*Areas of business operations affected:*Determine product-mix for productionRaw materials purchaseManufacture and distribution Warehouse managementInventorySupply chain management

*Software functions indicated: (link the following)*Sales reportingTrack market trends Demand forecasting

**Functionality to track currency changes and view reports in various currencies**

*Areas of business operations affected:*Forecast demand,   
Purchase equipment and raw materials,  
sales reports,   
supply chain management,   
Billing & accounting,   
Order processing.

*Software functions indicated:*Predict the currency fluctuations.report the budget in different currencies. Foreign exchange conversion

**Online real-time business performance reporting on product performance, competition and supply chain**

*Areas of business operations affected:*Quality Assurance, Locate & manage vendors, supply chain management, Forecast demand for products, Analyze product sales & quality information from Vendors, Bottlers, Distributors, Franchisees & Customers,Schedule product deliveries and productionSales ReportsBilling & accountingMonitor distribution chain.

*Software functions indicated:*Order processing, billing/accounting, inventory management

## 2.2 Component Dependencies Analysis

### 2.2.1 Component Dependencies Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component** | **Dependency** | **Priority** | **Difficulty** | **Risk** |
| 1. System Management, GUI, User-Admin, Security | All | Critical | Medium | Low |
| 2. Currency prediction and conversion | - | Important | Medium | Low |
| 3. Order processing and Invoicing | - | Critical | Medium | Medium |
| 4. Billing/accounting | 2,3 | Critical | Medium | Medium |
| 5. Inventory Management | - | Critical | Medium | Medium |
| 6. Operations Management and Reporting | 2,3,4,5 | Important | Medium | Medium |
| 7. Forecasting and Analysis | 2,3,5,6 | Important | Medium | High |
| 8. Supplier interface | - | Nice to have | Low | Low |
| 9. Product code database and lookup | 3 | Important | Medium | Medium |
| 10. Product management | 9 | Important | Medium | Medium |
| 11. Knowledge management and training module | All | Nice to have | Low | Low |

#### Component Rollout Plan

*This analysis provides the following roll-out (ordering) of functional components:*

**Component:**

Order Processing and Invoicing

***1st roll-out phase***

Billing/Accounting

Inventory Management

System Management, GUI, User-Admin & Security

***Baseline*** *– features above this line are committed (critical) features*

Currency Prediction and Conversion

***2nd roll-out phase***

Operations Management and Reporting

Forecasting and analysis

Product code database and Lookup

System Management, GUI, User-Admin & Security *(updated to support phase 2 components)*

***Important*** *– features above this line are probably going to be implemented*

Product Management

Supplier Interface

***3rd roll-out phase***

Knowledge Management and Training Module

Operations Management and Reporting (updated)

System Management, GUI, User-Admin & Security *(updated)*

***Nice-to-have*** *–features above this line may be implemented if budget & schedule estimates allow*

Note: Although the product management subsystem is an important component, this system would be implemented in Phase 3 to allow for completion of the major components that would inform the development of this system.

### 2.2.2 High-Level Work-Breakdown Structure (WBS)

**Develop initial System Management Component**

**Develop forecasting and analysis component**

**Develop operations management & reporting**

**Phase III: Develop IBMS**

Integrated Business Management System (IBMS)

**Phase I:   
Develop Basic IBMS**

**Develop order processing and invoicing component**

**Develop inventory management component**

**GUI & front-end menu implementation**

**Develop billing/accounting component**

**Phase II:   
Develop Advanced IBMS**

**Develop enhancements to operations mgt & reporting**

**Develop currency prediction and conversion component**

**Develop interface and security for supplier interface**

**Develop enhancements to system mgt. (user access rights checking), GUI & database management, Phase II**

**Develop enhancements to mgt. reporting,   
system mgt. (security & audit trail), GUI & database management,   
Phase III**

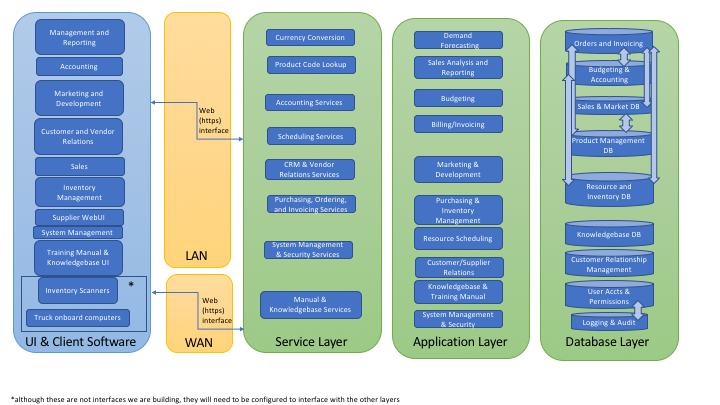
**Develop product code database and lookup function**

**Develop product mgt component**

**Develop knowledge management and training module**

## 2.3 Architectural Model

### 2.3.1 Analysis of the Architectural Model

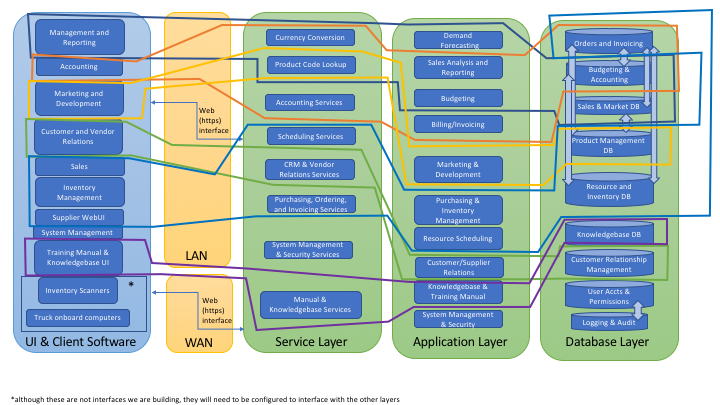


Figure

In developing our architectural model, we separated the user interfaces based on anticipated user roles, with the idea that each user should be presented with a view of the software that makes sense for the tasks that they are trying to achieve at the time. However, this will be a web-based client that uses task-based views -- users will see only the tasks that they have permissions to interact with. A single user may therefore have access to multiple UIs in this diagram, and will be able to go back and forth between them; they will not be experienced as completely separate applications.

Each client-server application has associated services that facilitate the dissemination of related information between applications, but there are also two services that are not associated with a single client-server application. These are the currency conversion service and the product code lookup service, which provide services to multiple applications.

In the application layer, there are multiple server-side applications, which may not always have a 1:1 relationship to the client applications. The budgeting application, for example, needs to communicate with both the management and reporting interface and the accounting interface, which use it in related but distinct ways. The relationships between user interfaces and the server-side applications that support them are shown in Figure 4 below. Note that system management and security services are not fenced, but the system management UI is the interface for configuring the system management and security application. In addition, the inventory scanners and truck-board computers, called out separately, are part of the inventory management group.



Figure

\*although the inventory scanners and truck onboard computers are not interfaces we are building, they will need to be configured to interface with the other layers

## 2.4 Mid-Level Work-Breakdown Structure (WBS)

### 2.4.1 Mid-Level Components and Dependencies

#### Client-Server Applications

Integrated user-interface and client software

*Purpose:* This component manages user access to system; provides front-end (web GUI) for client-server apps., to provide a consistent set of menus and presentation screens.   
*Depends on:* User Accounts and Permissions  
*Used by:* Provides a front-end to all other client-server apps.

Management and Reporting

*Purpose:* High-level analysis, budgeting, Market forecasting, Inventory utilization  
*Depends on:* Sales and Market, Budgeting and Accounting  
*Interacts with:* Demand forecasting, Sales analysis and reporting

Accounting

*Purpose:* Billing/invoicing and budgeting  
*Depends on:* Budgeting and Accounting DB  
*Interacts with:* Billing/Invoicing, Accounting services

Marketing and Development

*Purpose:* Demand Forecasting, tracking of flavor development, develop marketing assets  
*Depends on:* Product Management DB  
*Used by:* Product code lookup service

Customer and Vendor Relations

*Purpose:* Tracking feedback, sending feedback, contact details for both customers and suppliers  
*Depends on:* CRM DB  
*Interacts with:* Marketing and Development, CRM and vendor relation services, Inventory Management

Sales

*Purpose:* Order processing from retailers and distributors, invoicing  
*Depends on:* Sales & Market DB, Orders and Invoicing  
*Interacts with:* Billing/Invoicing application

Inventory management

*Purpose:* Purchase orders to suppliers, receiving, inventory tracking, scheduling for manufacturing runs  
*Depends on:* Resource and Inventory DB  
*Used by:* Purchasing and Inventory Management  
*Interacts with:* demand forecasting, inventory tracking application, resource scheduling

Training Manual and Knowledgebase

*Purpose:* Training employees, first-level help resources  
*Depends on:* Knowledgebase database  
*Used by:* Manual and Knowledgebase services

Supplier WebUI

*Purpose:* Attaching quotes to purchase orders  
*Depends on:* Orders and Invoicing  
*Used by:* Purchasing and Inventory

#### Other interfaces

Inventory Scanners  
*Purpose:* Interface with inventory management  
*Depends on:* Resource & Inventory DB  
*Interacts with:* Inventory Management, Product code lookup

Truck onboard computers

*Purpose:* Tracking movement of supply chain  
*Depends on:* Resource & Inventory DB  
*Interacts with:* Inventory Management, Product code lookup

#### Services Layer

Currency Conversion

*Purpose:* API connects to current conversion market rate and transmit that to the database; service also performs currency conversions as other software requests it  
*Depends on:* API to vendor currency database  
*Used by:* Accounting, Management and Reporting, Sales

Product Code Lookup

*Purpose:* lookup and integration of product code  
*Depends on:* Product Management DB  
*Used by:* Sales, Inventory Management, Management and Reporting, Marketing and Development

#### Server Applications

Demand Forecasting  
*Purpose:* Forecast demand based on market data and sales  
*Depends on:* Sales & Market DB, Resource and Inventory DB, Orders and Invoicing DB  
*Used by:* Management and Reporting UI

Sales Analysis and Reporting

*Purpose:* Track and monitor sales performance, process sales reports  
*Depends on:* Sales & Market DB, Orders and Invoicing DB  
*Used by:* Management and Reporting UI

Purchasing/Inventory

*Purpose:* Track and manage purchase orders for materials from our suppliers  
*Depends on:* Resource and Inventory DB, Orders and Invoicing  
*Used by:* Inventory Management

Budgeting  
*Purpose:* Manage budgets  
*Depends on:* Budgeting and Accounting DB  
*Used by:* Accounting, Management and Reporting

Billing/Invoicing  
*Purpose:* billing, invoicing  
*Depends on:* Orders and Invoicing  
*Used by:* Sales, Accounting

Resource Scheduling

*Purpose:* scheduling resources, reporting on existing scheduling to UIs and applications including Inventory Management  
*Depends on:* Resource and Inventory DB  
*Used by:* Inventory Management

Knowledgebase and Training Manual

*Purpose:* scheduling resources, reporting on existing scheduling to UIs and applications including Inventory Management  
*Depends on:* Knowledgebase DB  
*Used by:* Training Manual and Knowledgebase UI, Training Manual and Knowledgebase services

System management and security

*Purpose:* manages system access, security, audit trail – tracks access to applications and services  
*Depends on:* Integrated UI and user access controls  
*Used by:* All UIs  
*Interacts with:* Tracks access to all other functions on the server

#### Database Management Services

Product Management

*Purpose:* product code, research and development  
*Depends on: Marketing and development application*  
*Used by:* Marketing and development UI, Product code lookup

Sales and Market Database

*Purpose:* sales, market information  
*Depends on:* Sales analysis and reporting application  
*Used by:* Management and Reporting UI

Budgeting and Accounting  
*Purpose:* budgets, financial transactions, receipts  
*Depends on:* Billing/ Invoicing application  
*Used by:* Accounting UI, Management and Reporting

Orders and Invoicing  
*Purpose:* orders, invoices, chargebacks (note that this covers both orders that we are placing with suppliers and orders that we are supplying to other people)  
*Depends on:* Billing/Invoicing application, Purchasing/Inventory  
*Used by:* Sales UI  
*Interacts with:* Supplier Web UI

Resource and Inventory  
*Purpose:* manufacturing equipment, product inventory, materials inventory, resource scheduling  
*Depends on:* Purchasing and Inventory Management   
*Used by:* Inventory Management UI

Knowledgebase  
*Purpose:* knowledgebase, training materials, templates  
*Depends on:* Knowledgebase and Training Manual  
*Used by:* Training Manual and Knowledgebase

CRM  
*Purpose:* contacts, communication, feedback (both customers and vendors)  
*Depends on:* Customer/Supplier Relations  
*Used by:* Customer and Vendor Relations

Users Accounts and Permissions  
*Purpose:* user roles and permissions, individual user accounts   
*Depends on:* System Management and Security  
*Used by:* System Management UI

Logging and auditing  
*Purpose:* audit trail   
*Depends on:* System Management and Security  
*Used by:* User-navigation/access

### 2.4.2 Mid-Level Work-Breakdown Structure (WBS)

Phase 1: **Develop Basic Integrated Business Management System**

*Develop order processing and invoicing component*

Client App: Sales

Server App: Billing/Invoicing

DBMS: Orders and Invoicing Database

*Develop billing/accounting component*

Client App: Accounting

Server App: Billing/Invoicing

DBMS: Budgeting and Accounting Database

*Develop inventory management component*

Client App: Inventory Management application

Server App: Purchasing & Inventory Management

DBMS: Resource and Inventory Database

*GUI & front-end menu implementation*

Client App: Integrated user-interface (UI) and client software support

Web client: Provide integrated GUI to implement basic access for all client apps. In Phase 1

Web client: Provide advanced GUI to implement user menus and login form for UI client app.

*Develop initial System Management Component*

Server App: System management and security application

DBMS: User Accounts and Permissions

DBMS: Logging & Audit Trail for Phase I functions.

#### Phase II: Develop Advanced Integrated Business Management System

*Develop currency prediction and conversion component*

Service: develop API for Currency conversion service

*Develop operations management & reporting*

Client App: Management and Reporting

Server App: Sales analysis and Reporting

DBMS: Sales and Market Database

*Develop forecasting and analysis component*

Client app: Management and Reporting (demand forecasting)

Server App: Demand Forecasting application

DBMS: update Sales and Market Database with forecasting and analysis tables

*Develop product code database and lookup function*

Client app: Marketing and Development (functions related to product code)

Service: Product code lookup service

Server App: Marketing and Development (functions related to product code)

DBMS: Product Management Database (tables related to product code development and lookup)

*Develop enhancements to system mgt. (user access rights checking), GUI & database management, Phase II*

Client App: UI and Reporting Support for Phase II Functions

Client App: System management and security integration

Server App: Upgraded system management and security management

DBMS: User permissions for Phase II functions

DBMS: Logging & Audit Trail for Phase II functions.

#### Phase III: Develop Integrated Business Management System

*Develop product management component*

Client App: update Marketing and Development

Server App: update Marketing and Development

DBMS: Product Management Database (continue development)

*Develop Customer and Vendor Relations component*

Client app: Customer and Vendor Relations

Server App: CRM & Vendor Relations

DBMS: Customer Relationship Management

*Develop interface and security for supplier WebUI*

Client App: Supplier WebUI

Server App: Purchasing and Inventory Management (update to associate quotes)

DBMS: Orders and Invoicing (update to associate quotes with purchase orders)

*Develop knowledge management and training module*

Client App: Training Manual and Knowledgebase UI

Server App: Manual and Knowledgebase Service Application

DBMS: Knowledgebase Database

*Develop enhancements to operations management & reporting*

DBMS: Logging & Audit Trail for Phase III functions.

Client App: UI and Reporting Support For Phase III Enhancements

Client App: Upgraded system management and security management

Server App: Upgraded system management and security application for Phase III functions

*Develop enhancements to mgt. reporting, system mgt. (security & audit trail), GUI & database management,*

*Phase III*

Web client: Provide integrated GUI to implement basic access for all client apps. In Phase 3

Web client: Provide advanced GUI to implement user menus and login form for UI client app.

## 2.5 Task-Level Work-Breakdown Structure (WBS)

### 2.5.1 Work Breakdown Structure

#### **Phase 1: Develop Basic Integrated Business Management System**

##### Develop Initial System Management Subsystem

DBMS: Install & Configure DBMS Engine & SQL Interface

* Install & Configure DBMS engine
* Install and test SQL interface software

DBMS: User Accounts and Permissions

* Design database
* Implement and test database structure

Server App: System management and security application

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: System management application

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Integrated User Interface: Provide integrated GUI to implement basic access stubs for all client apps. In Phase 1

* User navigation requirements analysis
* UI design & scripting
* UI documentation and acceptance test

##### Develop Order Processing & Invoicing subsystem

DBMS: Orders & Invoicing Database – Full implementation

* Design database
* Implement and test database structures

Server App: Billing/Invoicing

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: Sales

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

##### Develop Billing/Accounting subsystem

DBMS: Budgeting and Accounting

* Design database
* Implement and test database structures

Server App: Billing/Invoicing

* Software requirements analysis
* Software design & code
* Unit test
* Module documentation and acceptance test

Client App: Accounting

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

##### Develop Inventory management subsystem

DBMS: Resources & Inventory Database

* Design database
* Implement and test database structures

Server App: Purchasing & Inventory Management

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: Inventory Management

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

##### Develop System Management Subsystem (advanced functions)

DBMS: Logging & Audit Trail for Phase I functions.

* Design database
* Implement and test database structures

*GUI & front-end menu implementation*

Client App: Integrated user-navigation/access

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: Provide advanced GUI to implement user menus and login form for UI client app.

* User navigation requirements analysis
* UI design & scripting
* UI documentation and acceptance test

##### Phase I Delivery Activities

Phase I Integration Test

* Integration test of Phase I software components
* Redesign and rework following integration tests
* Phase I software documentation and acceptance test

#### **Phase II: Develop Advanced Integrated Business Management System**

##### Upgrade System Management Subsystem (Basic)

Server App: Upgraded system management and security management

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: System management and security integration

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: Provide integrated GUI to implement basic access stubs for all client apps. In Phase II

* User navigation requirements analysis
* UI design & scripting
* UI documentation and acceptance test

##### Develop Operations Management & Reporting subsystem

DBMS: Sales and Market

* Design database
* Implement and test database structures

Server App: Sales Analysis and Reporting

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: Management and Reporting

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

##### Develop Forecasting and Analysis subsystem

DBMS: Update Sales and Market Database – add forecasting & analysis table

* Design database
* Implement and test database structures

Server App: Demand Forecasting

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: Management and Reporting - add demand forecasting

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

##### Develop Product code database and Lookup subsystem

DBMS: Product Management (only product code-related tables)

* Design database
* Implement and test database structures

Server App: Marketing and Development (functions related to product code)

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: Marketing and Development Application (functions related to product code)

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Service: Product code lookup service

* Software requirements analysis
* Software design & code
* Integration testing
* Documentation and acceptance test

##### Develop Currency prediction and Conversion subsystem

Server App: API to Vendor currency database

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

##### Upgrade System Management Subsystem (advanced functions)

DBMS: Logging & Audit Trail for Phase II functions.

* Design database
* Implement and test database structures

DBMS: Permissions for Phase II functions.

* Update database
* Implement and test database structures

Server App: Upgraded system management and security application for Phase II functions

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: user-navigation/access and reporting for Phase II Enhancements

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client app: Provide advanced GUI to implement user menus and login form for UI client app. (Phase II)

* User navigation requirements analysis
* UI design & scripting
* UI documentation and acceptance test

##### Phase II Delivery Activities

Phase II Integration Test

* Integration test of Phase II software components
* Redesign and rework following integration tests
* Phase I software documentation and acceptance test
* Integration with vendor database/API test

#### **Phase III: Develop Integrated Business Management System**

##### Upgrade System Management Subsystem (Basic)

Server App: Upgraded system management and security management

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: System management and security integration

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client app: Provide integrated GUI to implement basic access stubs for all client apps. In Phase II

* User navigation requirements analysis
* UI design & scripting
* UI documentation and acceptance test

##### Develop Product management subsystem

DBMS: Product management - continue development

* Design additional tables
* Implement and test database structures

Server App: Update Marketing and Development Application

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: Update Marketing and Development Application

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

##### Develop Customer and Vendor Relations subsystem

DBMS: Customer Relationship Management

* Design database
* Implement and test database structures

Server App: CRM & Vendor Relations

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: Customer and Vendor Relations

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

##### Develop Interface and Security for Supplier Web UI

DBMS: Update Orders and Invoicing Database – add quotations table

* Design database
* Implement and test database structures

Server App: Purchasing/Inventory

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: Supplier Web UI

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

##### Develop Knowledge Management and Training subsystem

DBMS: Knowledgebase database

* Design database
* Implement and test database structures

Server App: Knowledgebase and Training Manual

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: Training Manual and Knowledgebase application

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

##### Upgrade Operations Management & Reporting subsystem

DBMS: Sales and Market Phase III functions

* Design database
* Implement and test database structures

Server App: Upgraded Sales Analysis and Reporting for Phase III functions

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: Management and Reporting for Phase II and III enhancements

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

##### Upgrade System Management Subsystem (advanced functions)

DBMS: Logging & Audit Trail for Phase III functions.

* Design database
* Implement and test database structures

Server App: Upgraded system management and security application for Phase III functions

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Client App: user-navigation/access and reporting for Phase II Enhancements

* Software requirements analysis
* Software design & code
* Module documentation and acceptance test

Web client: Provide advanced GUI to implement user menus & login form for UI client app. Phase III

* User navigation requirements analysis
* UI design & scripting
* UI documentation and acceptance test

##### Phase III Delivery Activities

Phase III Integration Test

* Integration test of Phase III software components
* Redesign and rework following integration tests
* Phase III software documentation and acceptance test.

### 2.5.2 Summary of Changes for Task-Level Work Breakdown Structure

The following components were added to the task level WBS:

Customer and Vendor Relationship subsystem: This system is dependent on the development and integration of other critical and important components. The customer and vendor relationship system would be developed and tested upon completion of other components.

System Management Upgrade: This component controls access/audit and is developed in two major parts. The first part includes the basic system management and the second part is the advanced level system management, which includes the final UI and permission features.

Operations Management and Reporting Upgrade: This system covers analysis and reporting across multiple components. In phase two we will develop functions to cover components that have been implemented in phases one and two and in phase three we will develop functions that cover the rest of the components.

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