NW-BYOTEK Facility Management System
Final System Implementation Report

Triton Consulting Group

Sunday, June 11, 2023

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Section 1: Management Summary

With the implementation phase nearing completion, we hope NW BYOTEK is satisfied with our efforts, and of the system being delivered. Facility Management System (FMS) incorporates a range of advanced features, such as real-time inventory tracking with the central database, live monitoring of on-site security cameras and sensors, and many other useful functions which we will discuss in depth in this report.

The design phase began on April 24th, which was followed by full-time development in May. Implementation began in August and is expected to end by the 21st of September. We have collaborated closely with stakeholders to gather feedback and incorporate their ideas into the system. Furthermore, rigorous test plans and quality assurance measures have been designed to ensure system reliability and functionality throughout the implementation and go-live phases.

Once the system implementation phase is completed on, we will continue to support NW-BYOTEK for at least the following two years to assist with system updates and maintenance. We at Triton Consulting Group are fully confident that the system we have delivered will significantly streamline NW BYOTEK's operations, improve efficiency, and enhance overall security measures.

Effort To-Date

4/3	Project scenario, functional and nonfunctional requirement review
4/14	Prototype planning
4/16	UI mockups
4/18	Storyboarding
4/18	Prototype sent to client
4/20	Database design
4/21	Dictionary and specifications
4/27	Process and network models
4/29	Feedback and review with client
5/5	Prototyping and project status report
5/18	Test plan
5/20	Training plan
5/25	Rollout plan

6/1	Maintenance plan
6/11 current	System implementation

Current Status Report

The primary objective of FMS is to enable accurate and timely monitoring of what chemicals are currently stored in the research laboratories and ensuring that chemicals are quickly restocked when necessary. Such improvements are anticipated to immensely enhance productivity alongside the updated security camera feed viewer, alert system, report generator, and the updated database.

Project Cost

The Triton Consulting Group is pleased to report that the team stayed within budget. The project was estimated to be around $43,000.00. The total amount spent for the whole project so far is $38,450.00, that covers all the tangible and intangible costs like the contracts, training, installation cost, materials, labor, warranty, support, and so on.

Benefits of the new system

Central database: The quantity and location of each chemical, in both the storage facility and labs, will be stored in a central database. As chemicals are scanned into the system by the vendors, the storage facility's inventory will be updated in real time. Similarly, as chemical delivery requests are processed by lab technicians and delivered to the laboratories, these quantities will be deducted from the storage facility's digital inventory and transferred to those specific lab's digital inventories.

Security: The system will provide an elevated level of security for the storage as requested by the Chief Security Officer.

The cameras equipped with motion detectors will detect any movement around the storage and send an alert to the Chief Security Officer and act.

Safety: The system equipped with sensors will detect any spillage and send an alert to the Chief Security Officer and the fire department. This will prevent disasters.

Save Time: The new system will save the researchers considerable time by providing reports of the chemicals that need to be fulfilled instead of doing it manually. The report will contain the location of the chemicals as well and that will allow the vendors to go straight to the locations instead of searching the 2500 square feet location and that can be time-consuming.

Issues

Maintenance and enhancements

The system is complex since it includes a database, web servers, and security cameras. To maintain the system, the employees must have experience and expertise in areas of database management systems, web service administration, and security camera systems. The employees must be able to work collaboratively to ensure the system runs smoothly while troubleshooting issues and implementing necessary upgrades and improvements. NW-BYOTEK management must be receptive toward employee requests for enhancements and fixes and provide adequate funding for the development team.

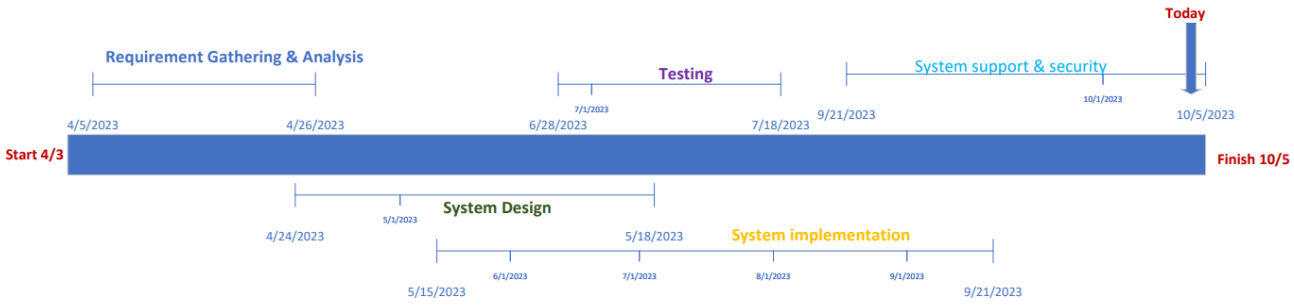
Training

The system relies heavily on the employee's ability to accurately enter data and follow safety protocols. Proper training must be provided to all employees to reduce the risk of accidents and data errors.

Security risks

The system will handle sensitive information and material which makes it prone to data breach and unauthorized access. The data is backed up at the end of every day which can leave room for a small loss of data if a failure or disaster occurs.

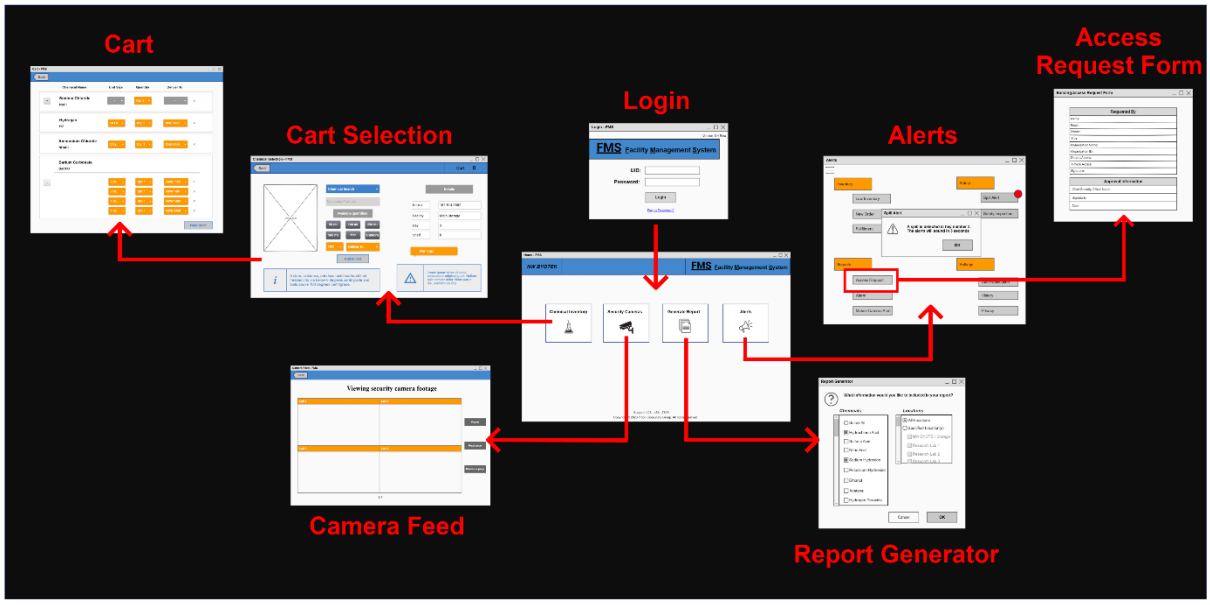
Present System implementation schedule



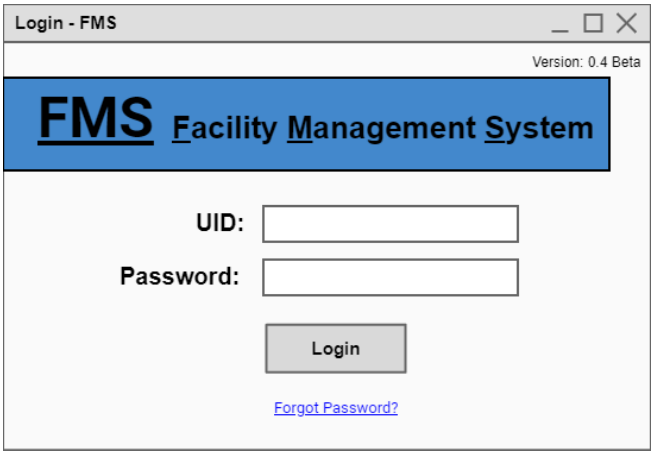
Section 2: System Components

2.1 User Interface Design

Overview

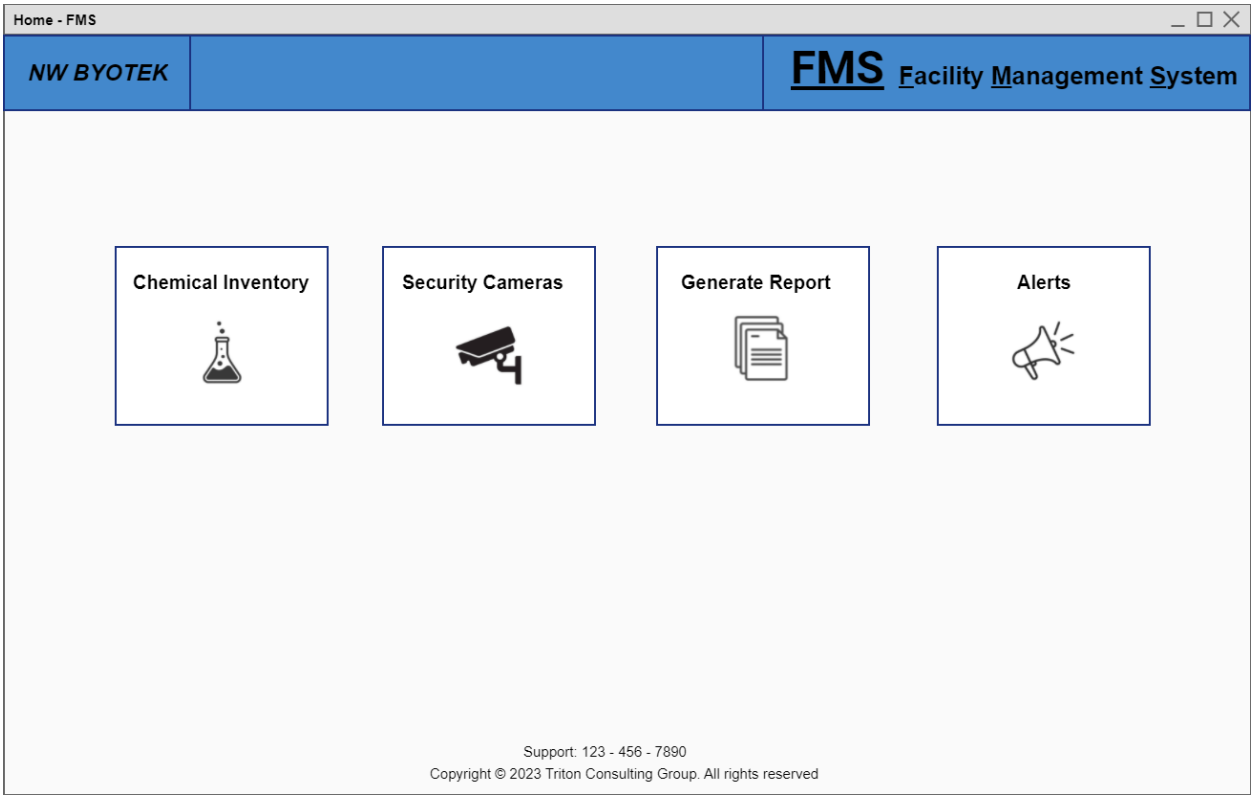


Login



Upon launching FMS, the user will enter their login credentials. FMS first authenticates the user and then loads their user access properties. User access properties determine which components of the system the user has access to.

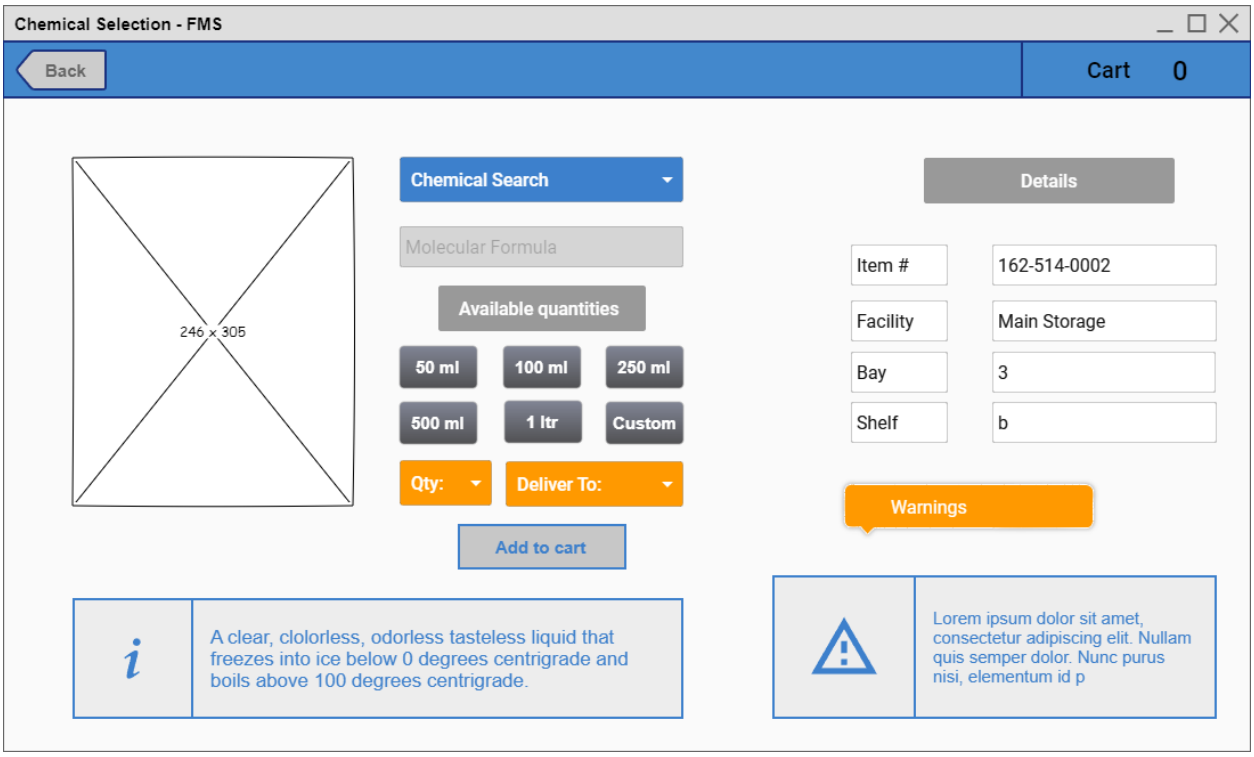
Home Page



The Home page serves as the gateway to all other UI screens, which include Chemical Inventory, Security Cameras, Report Generator, and Alerts page.

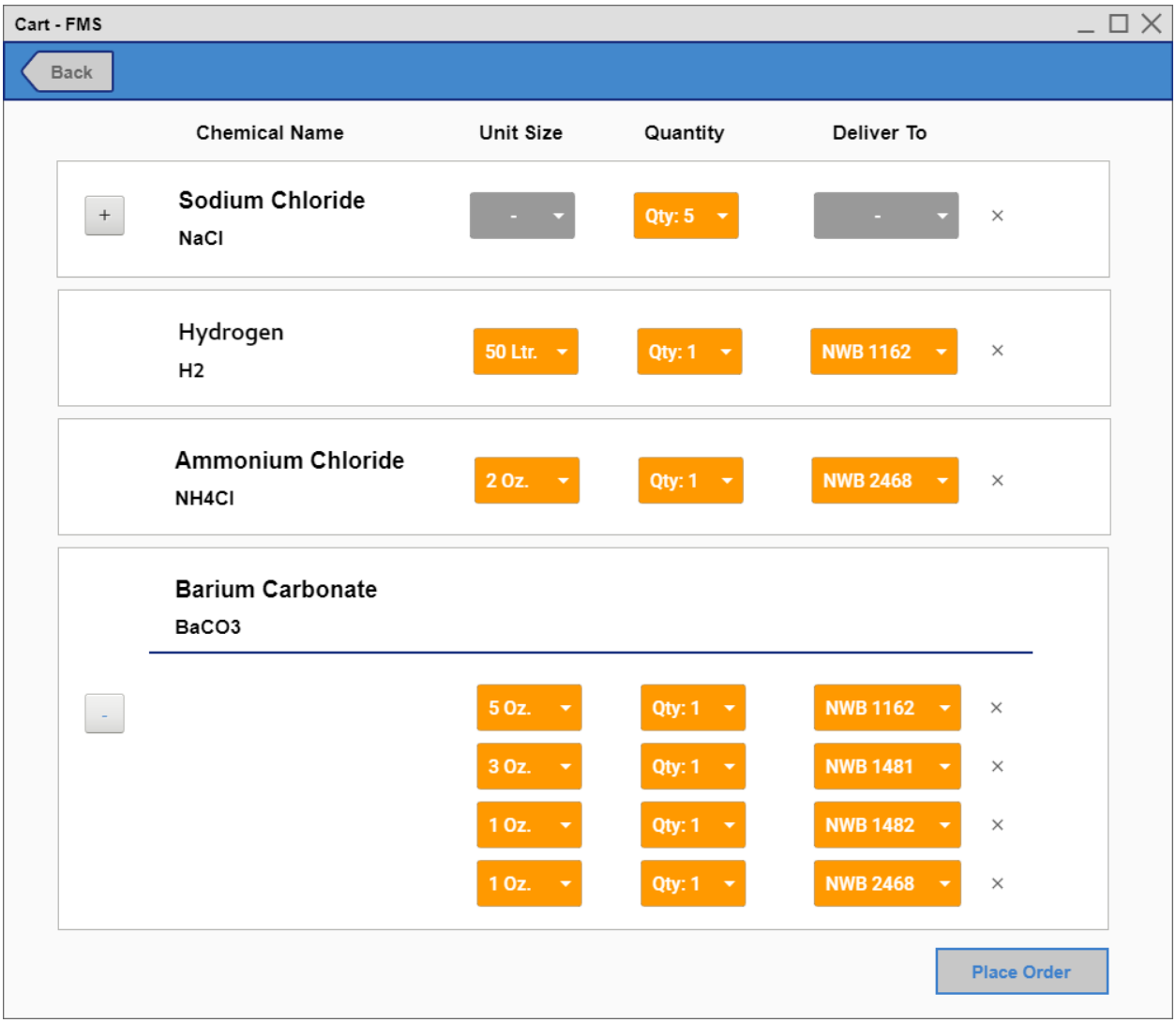
- The *Chemical Inventory* page may be accessed by lab technicians, lead scientists, and principal investigators.
- The *Security Camera Feed* may be accessed by security personnel, and the Chief Security Officer (only during normal business hours).
- The *Report Generator* may be accessed by the CSO, CFO, and admin staff.
- The *Alerts* page may be accessed by the CSO, security personnel, and lead scientists.

Chemical Selection Page



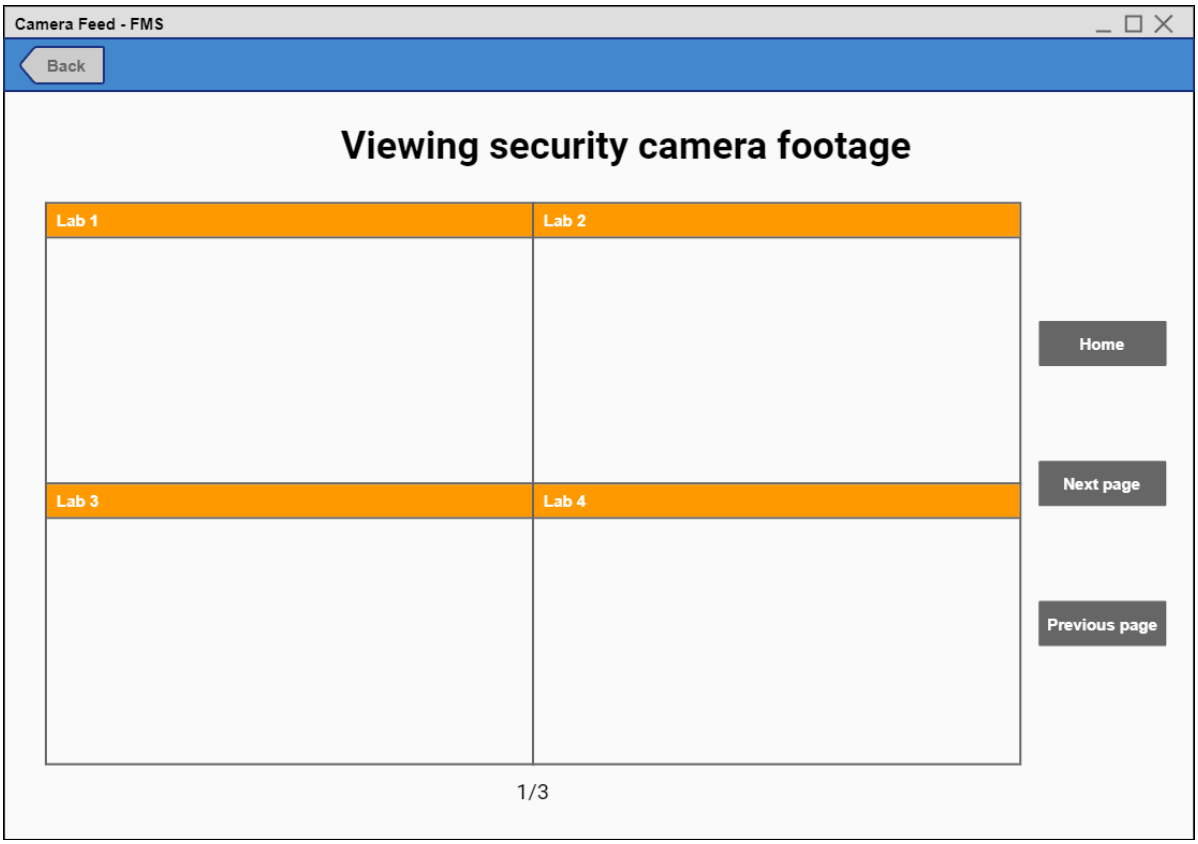
The Chemical Selection page allows principal investigators and lead scientists to browse the range of available items in NW BYOTEKs inventory and view available quantity amounts. These quantity amounts may be requested in multiples (for example, a request for two 5 oz. containers of Barium Carbonate, as well as a single 1 oz. container, all belonging to the same order, but to be delivered to different labs). This page also displays molecular formulas, storage location data, and handling/usage warnings. The user may proceed to the Cart page by clicking the cart button in the top right corner.

Cart Page



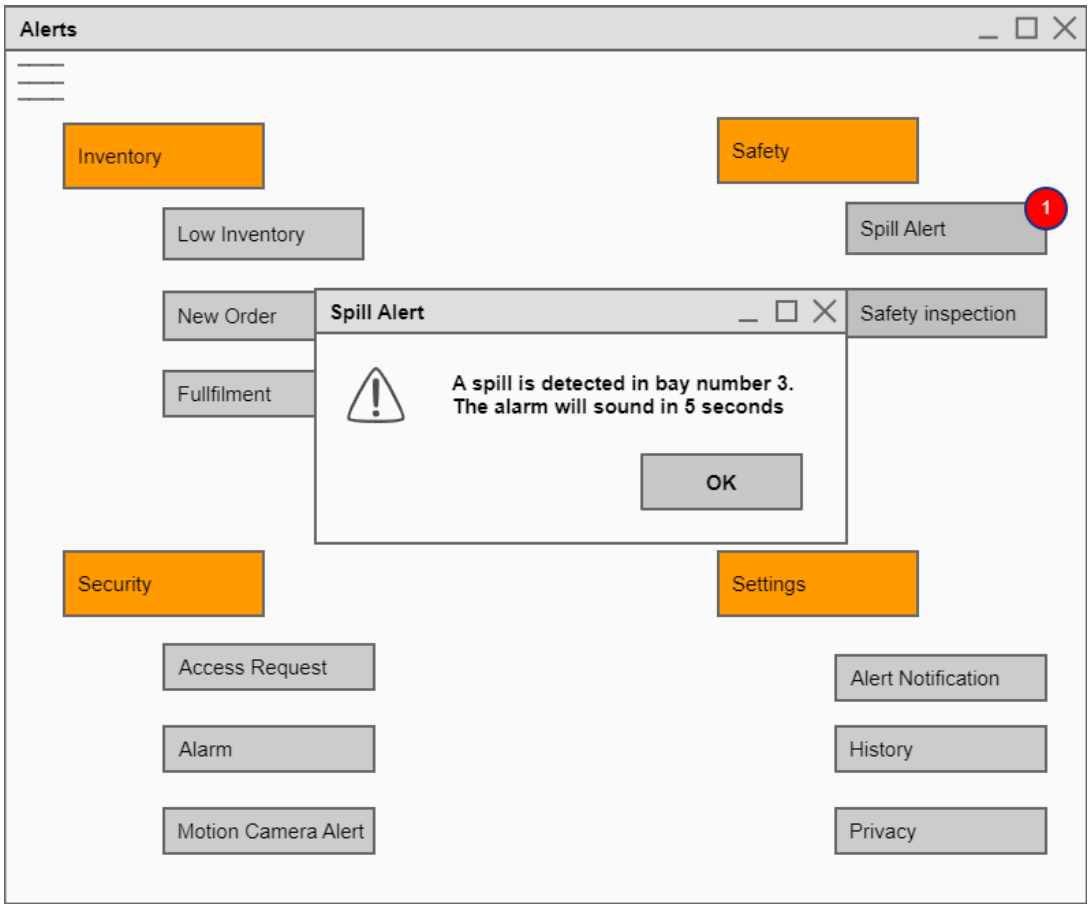
After selecting the chemicals needed on the previous page (5.3) we can see the full list of chemicals in the cart and verify it before placing the order. During the order fulfilment process, lab technicians will group items (regardless of order #) by lab # and then make the deliveries for that specific lab. This will reduce foot traffic and ensure that deliveries are made as efficiently as possible.

Security Camera Feed



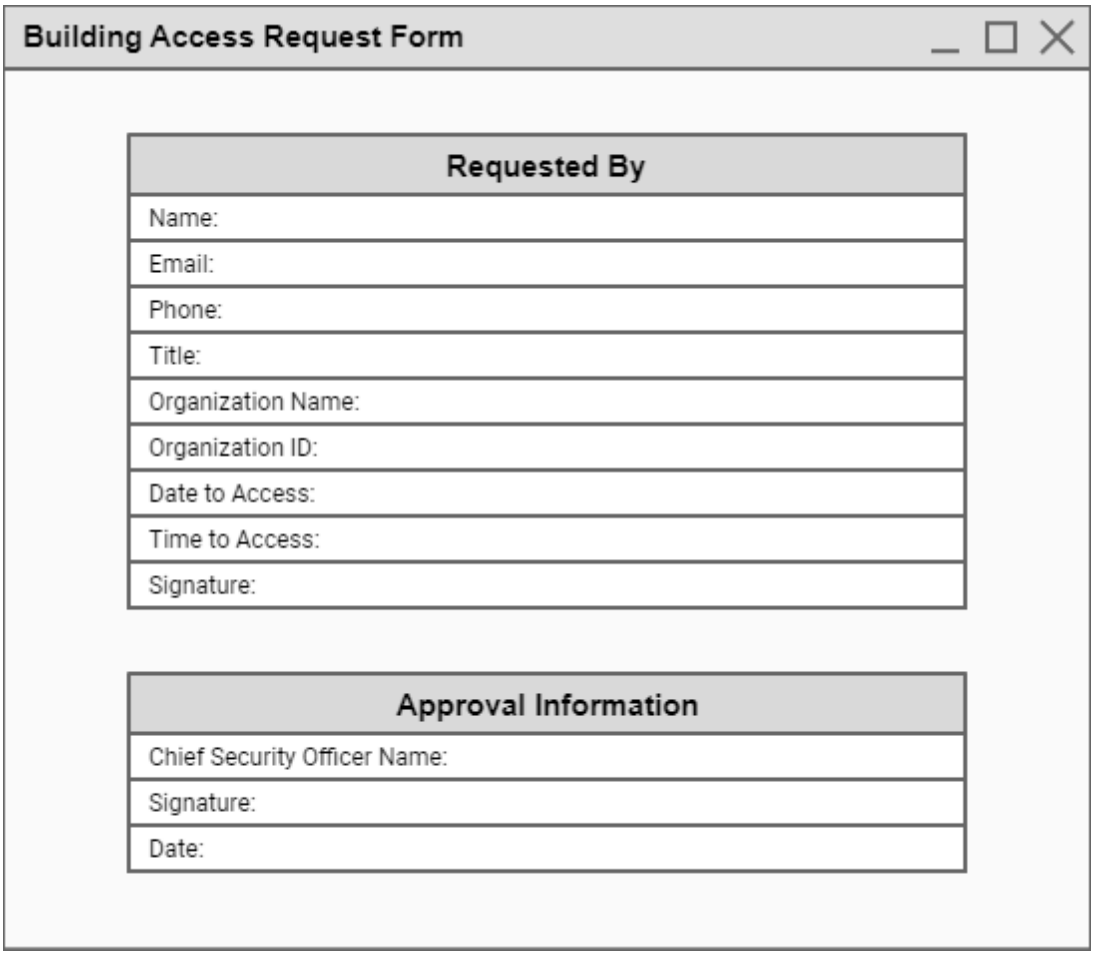
The security camera feed displays four different livestreams at once with three subpages in total amounting to the twelve cameras we have set up in the laboratories. The user may click on a specific camera feed to make it full screen if needed.

Alert Page



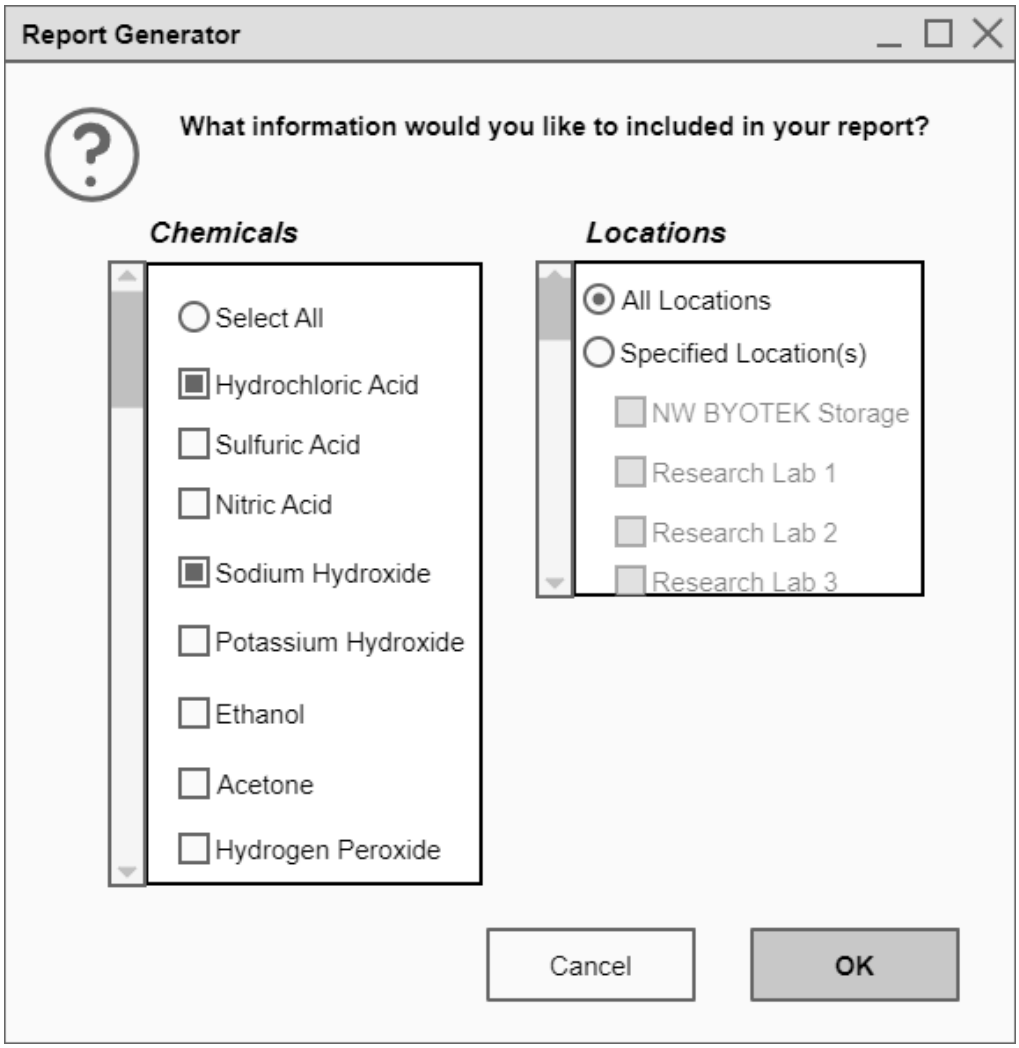
The Alert icon on the home page will display a red circle with a number inside that indicates that there are Alerts that need the users' attention. Once clicked, the next page displays a pop-up message with the type of Alert based on the account logged in. For instance, the chief security officer will only see alerts related to security and the researchers will only see Alerts related to inventory. An alert notification will be sent to the facility officer's mobile phone and the fire department for immediate attention.

Access Request Form



For lab techs to enter the chemical storage facility, their request for materials must first be approved. Once approval is given, the lab tech will be issued a pass which opens the keyless smart electronic lock.

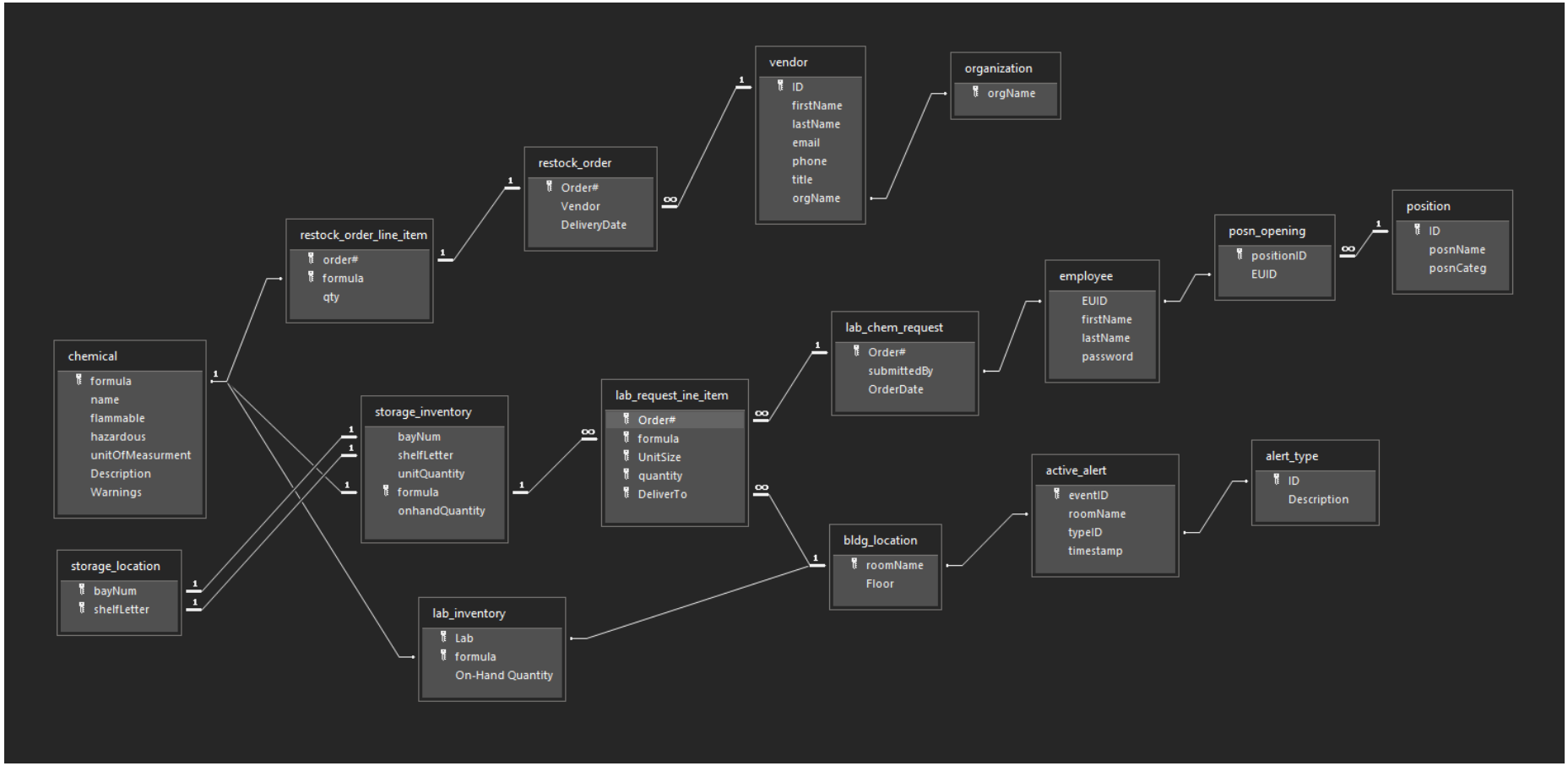
Report Generator



The Report Generator allows users to make customizable reports which contain information on chemical inventories throughout the NW BYOTEK facility.

2.2 Database Design

Logical Design



Data Dictionary

Entities	*Description*
active_alert	Logs each alert which has been triggered by FMS.
alert_type	A list of all types of alerts.
bldg_location	Stores each location/room # in the building.
chemical	A list of all chemical names & formulas.
employee	A list of all employees who have access to FMS.
lab_chem_request	Logs all chemical request orders that have been submitted by a scientist/PI.
lab_inventory	A record of the quantity of all chemicals stored in any of the labs.
lab_request_line_item	Stores each line item associated with a *lab_chem_request* order.
organization	A list of all delivery vendor organizations who work with NW-BYOTEK.
position	A list of all unique positions at NW-BYOTEK.
posn_opening	Records how many of each position exist at NW-BYOTEK.
restock_order	Logs every restock order request submitted by the lab techs/inventory team.
restock_order_line_item	Stores each line item associated with a *restock_order*.
storage_inventory	A record of the quantity of all chemicals in the storage facility.
storage_location	A list of all locations in the storage facility (bayNum & shelfLetter).
vendor	A list of all delivery vendors who may need access to the storage facility and FMS.

active alert

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
eventID	Y			Long integer			Autonumber		Y	N	Simple event ID autonumber.
roomName		Y		Short Text	15			Lookup		N	The location where the alert was triggered.
typeID		Y		Long integer				Lookup		N	The type of alert being triggered.
timestamp				Date		MM/DD/YYYY ##:##:## XX	Now()			N	The time of the event/ alert.

alert_type

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
ID	Y			Long integer			Autonumber			N	The alert type ID, or alert code.
Description				Short Text	25					N	The name of alert or sensor.

bldg_location

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
roomName	Y			Short Text	15					N	The name of the room or lab.
Floor				Short Text	2					Y	The floor number or letter of the NW BYOTEK Facility.

chemical

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
formula	Y			Short Text	10				Y	N	The chemical formula in Hill System Order.
name				Short Text	30					N	The name of the chemical or element.
flammable				Yes/No			No			N	Whether or not the item is flammable
hazardous				Yes/No			No			N	Whether or not the item is hazardous

unitOfMeasurement			Short Text	5					N	The unit of measurement for the item (g, ltr, oz).
Description			Short Text	255					N	A description of the chemical/element.
Warnings			Short Text	255					Y	Any warnings about the item.

employee

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
EUID	Y			Short Text	8				Y	N	Employee universal ID.
firstName				Short Text	15					N	First name of the employee
lastName				Short Text	15					N	Last name of the employee
password				Short Text	25					N	Employee password for FMS.

lab_chem_request

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
Order#	Y			Long Integer			Autonumber		N	N	A unique identifier. Autonumber.
submittedBy		Y		Short Text				Lookup		N	The submitter of the lab chem request.
OrderDate				Date		MM/DD/YYYY				N	The day the request was submitted.

lab_inventory

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
Lab	Y	Y		Short Text	8			Lookup		N	The lab # in reference.
formula	Y	Y		Short Text	10			Lookup		N	The chemical being stored (in the lab).
On-Hand Quantity				Long Integer						N	The number of items on hand (in the lab).

lab_request_line_item

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
Order#	Y	Y		Long integer				Lookup		N	The order # associated with the line item.
formula	Y	Y		Short Text	10			Lookup		N	The chemical being requested (by the lab).
UnitSize	Y	Y		Short Text	5			Lookup		N	The unit size, measured in 'unitOfMeasurement'.
quantity	Y			Long integer						N	The quantity being requested.
DeliverTo	Y	Y		Short Text	8			Lookup		N	The lab # for items to be delivered to.

organization

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
orgName	Y			Short Text	15					N	The name of the delivery vendor company.

position

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
ID	Y			Long integer			Autonumber			N	Simple autonumber field. Unique identifier.
posnName				Short Text	15					N	The name of the position.
posnCateg				Short Text	15					N	Determines user access privileges.

posn_opening

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
positionID	Y	Y		Long Integer				Lookup		N	Associates the employee to the position they hold.
EUID		Y		Short Text	8					N	The employee ID.

restock_order

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
Order#	Y			Long Integer			Autonumber			N	Unique identifier for restock orders.
Vendor		Y		Long Integer						N	Which vendor is to fulfill the restock order.
DeliveryDate				Date		MM/DD/YYYY		Now()		N	The date of delivery/restock.

restock_order_line_item

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
Order#	Y	Y		Long Integer				Lookup		N	The order # associated with the line item.
formula	Y	Y		Short Text	10					N	The chemical being requested (from vendor).
qty				Long integer						N	The quantity being requested.

storage_inventory

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
bayNum		Y		Long integer				Lookup		N	The bay number in the storage facility.
shelfLetter		Y		Short Text				Lookup		N	The shelf number in the storage facility.
unitQuantity		Y		Short Text				Lookup		N	The unit size, measured in 'unitOfMeasurement'.
formula	Y			Short Text	10			Lookup		N	The chemical being stored (in the storage facility).
onhandQuantity				Long integer						N	The number of items on hand (in storage).

storage_location

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
bayNum	Y			Long integer						N	The bay number.
shelfLetter	Y			Short Text	1			Not numeric		N	The shelf letter.

vendor

Field	PK	FK	PII	Data Type	Length	Format	Default Value	Valid Values	Index?	Nullable?	Description
ID	Y			Long integer			autonumber			N	Unique identifier for the vendor.
firstName				Short Text	15					N	The vendors first name.
lastName				Short Text	15					N	The vendors last name.
email				Short Text	25					N	Official work email.
phone				Short Text	10	(###) ###-####		Not numeric		N	Official work contact #.
title				Short Text	15					N	The official job title of the vendor.
orgName		y		Short Text	15			Lookup		N	Which company the vendor works for.

2.3 Report Design Mockups

Chemical Inventory Reports

Chemical Inventory: Storage Facility

formula	Unit Quantity	On-Hand Quantity
(CH3)2C6H4	10 ml	500
C5H12	10 ml	425
C6H12	10 ml	35
C6H6	10 ml	753
CH3	10 ml	653
H2SO4	10 ml	4532
HCl	10 ml	45
Hg	10 ml	4532
HNO3	10 ml	10000
NaOH	10 ml	10000
Pb	5 grams	10000

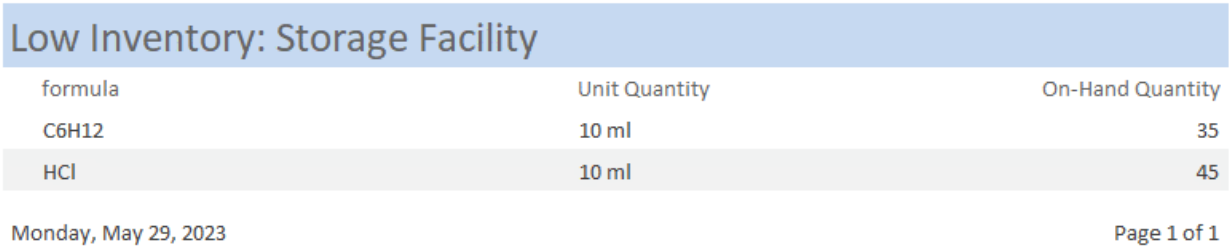
The 'Chemical Inventory: Storage Facility' report displays a list of all chemicals that are currently being held in the storage facility. For simplicity, we have shown all chemicals stored in 10ml containers, however, each chemical may be stored in various container sizes (i.e., CH3 could be stored in both 10ml and 20ml containers).

Chemical Inventory: Labs

Lab	formula	On-Hand Quantity
Lab 1		
	(CH3)2C6H4	3
	CH3	5
	Pb	25
	C6H6	10
	C5H12	20
Lab 2		
	HNO3	4
	C5H12	13
	NaOH	10
Lab 3		
	(CH3)2C6H4	2
	C6H12	4
	CH3	40

The 'Chemical Inventory: Labs' report displays a list of all chemicals stored in each of the labs, grouped by lab #.

Low Inventory Reports



Low Inventory: Storage Facility

formula	Unit Quantity	On-Hand Quantity
C6H12	10 ml	35
HCl	10 ml	45

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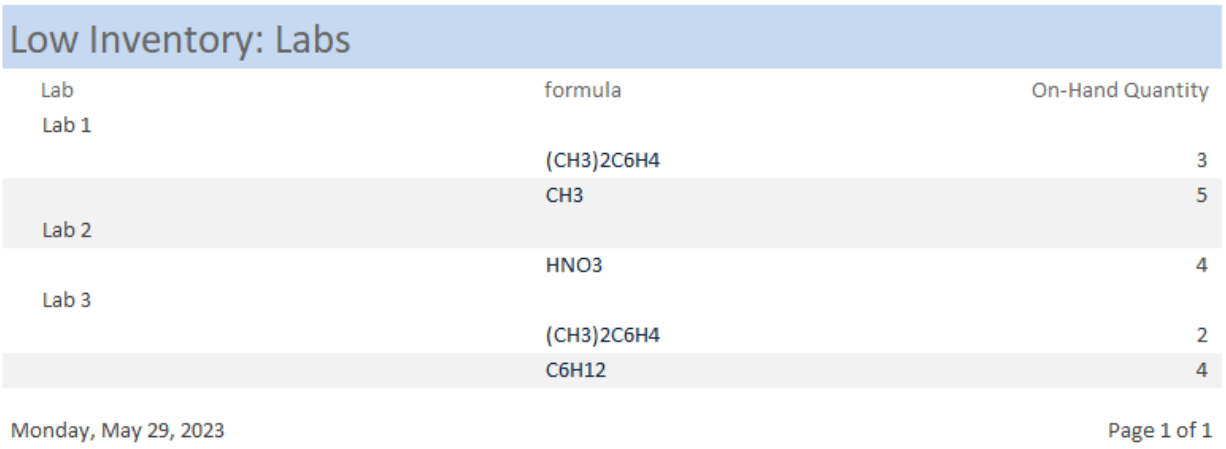
The 'Low Inventory: Storage Facility' report displays a list of all chemicals with an On-Hand Quantity of less than 100 items. Its purpose is to maintain awareness of items that will need to be re-ordered from vendors soon.



Low Inventory: Labs

Lab	formula	On-Hand Quantity
Lab 1		
	(CH3)2C6H4	3
	CH3	5
Lab 2		
	HNO3	4
Lab 3		
	(CH3)2C6H4	2
	C6H12	4

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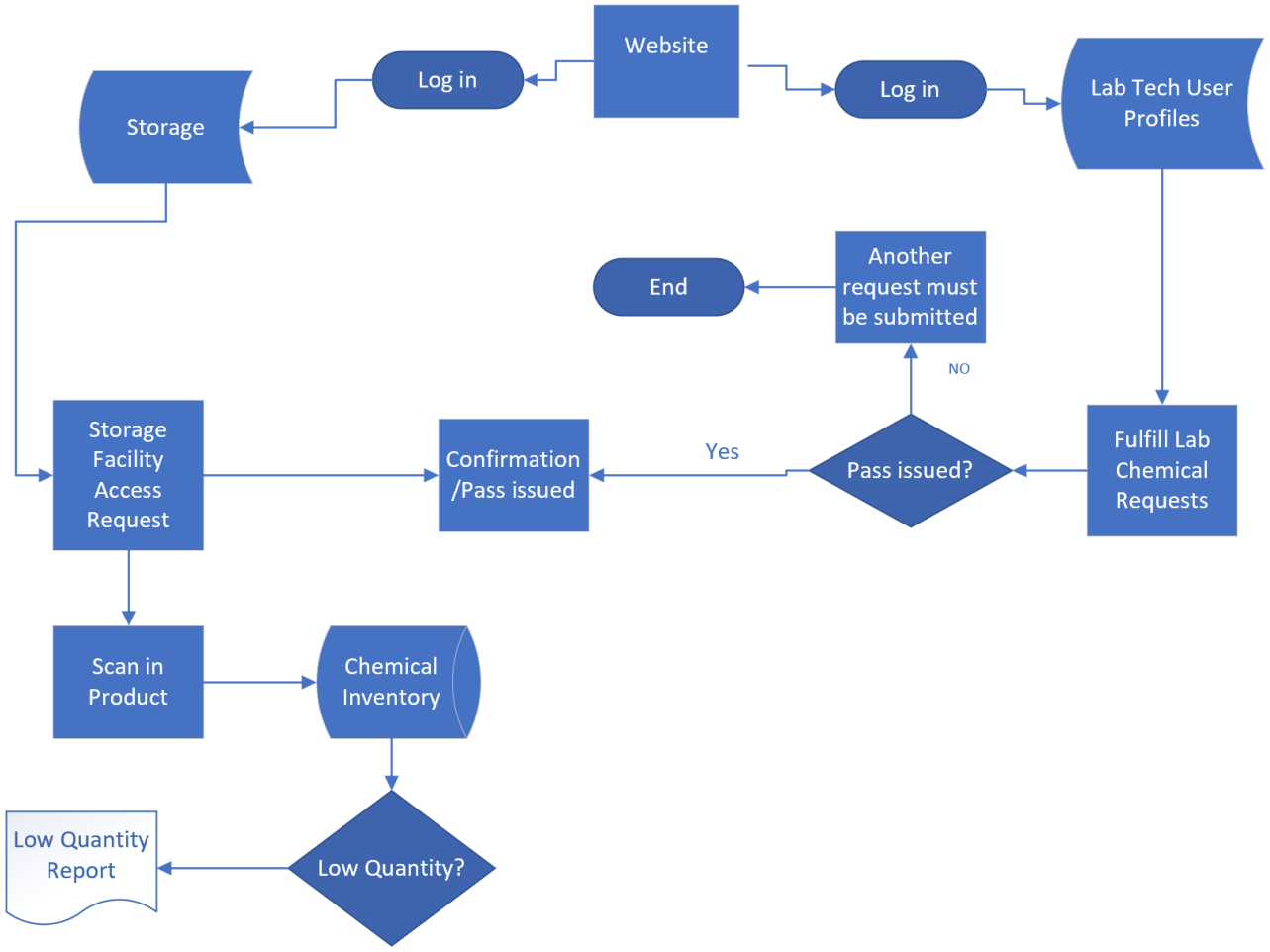
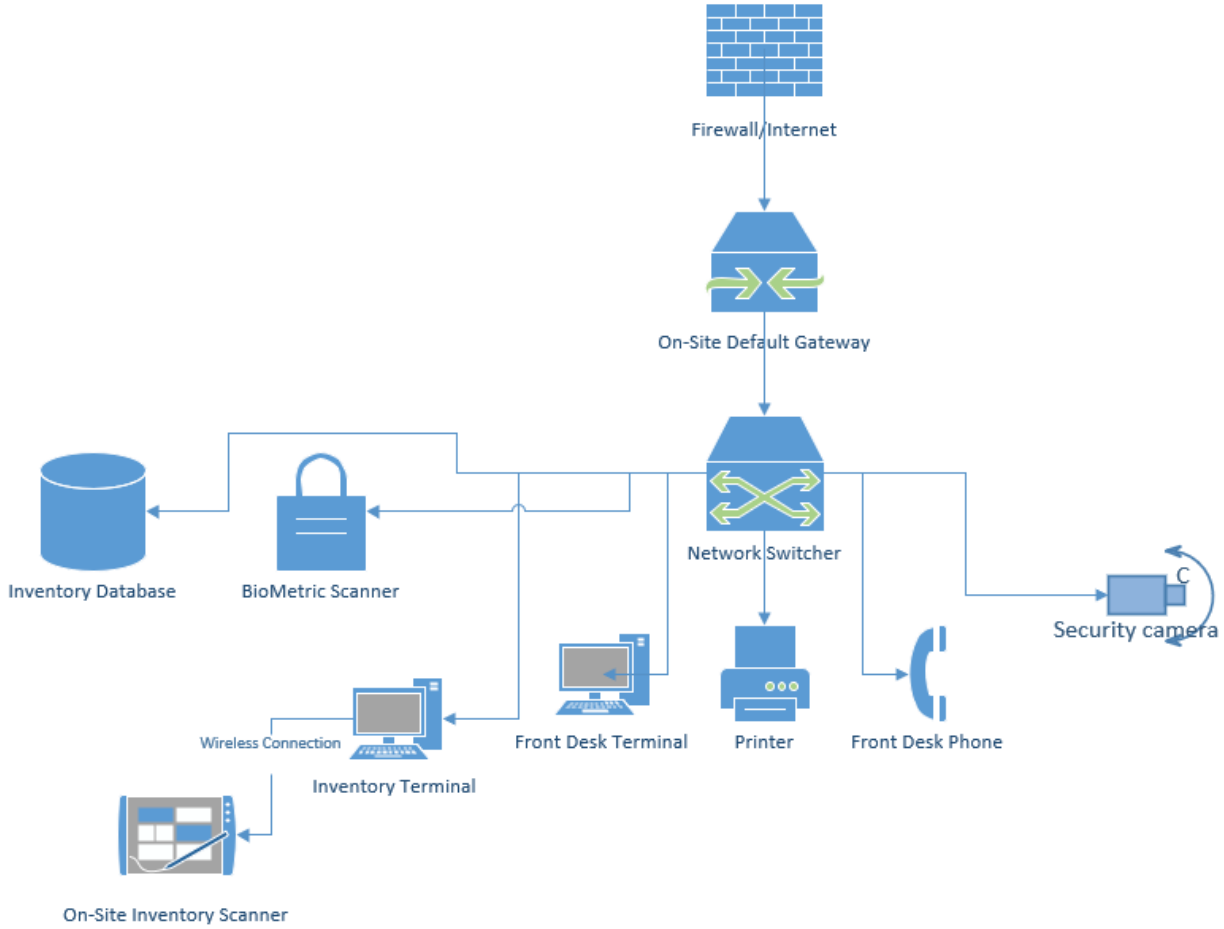
The 'Low Inventory: Labs' report displays a list of all chemicals with an On-Hand Quantity of 5 or fewer units, as it pertains to each of the labs. This will help lab researchers keep track of which items they should request from the main inventory. This will help lab researchers keep track of which items they should request from the main inventory.

2.4 System Architecture

Process architecture



Network architecture



Section 3: System Environment

The system environment of NW-BYOTEK is based around what type of facility it is, a biotech research facility with twelve laboratories, security monitoring rooms, and rooms for work PCs. Because of this, there are some constraints and obstacles we have had to deal with to make the system run as optimally as possible. To make it so that all the NW-BYOTEK employees can use the computers when needed, the database stores employee information and log ins that differ depending on the employee type. Scientists have clearance for computer stations outside of the laboratories to do paperwork and further research, while guards can access security footage and vendors keep track of laboratory storage.

The workstation computers at NW-BYOTEK are capable machines, so it will have no issue running custom software designed with said computers in mind. Said software has been designed with Windows 10 and 11 in mind since NW-BIOTEK is planning to upgrade from 10 to 11 very soon. Every computer at NW-BYOTEK has an SSD that is around 500 gigabytes. The web application was designed to be quick, easy to understand immediately, and have no response time errors or other bugs due to the real time nature of the inventory tracking and security camera footage. Every few months the scientists must turn in progress reports about how their current work is going and what needs to be further researched. To help offset some of the workload, the software comes with a section for generating reports that each scientist can plug information into, though it is expected that each scientist will use the generated reports as a basis rather than the entire report.

The NW-BYOTEK security system has security cameras running in all twelve laboratories as well as outside of the facility, all of which are connected to the central security system, the database, and the cloud. Speaking of the database and cloud, precautions have been taken so that important data is not lost if there is a catastrophic system failure. Both the system database and the cloud are backed up at the end of every day so that if the system fails, there will not be much if any data lost to said failure. The facility also has a backup power generator, since electricity is required to run everything in the building which includes the system and database, if the power cuts out from a storm or for some other reason the backup generator will kick in to keep everything running.

Finally, everything with the BIOTEK facility as well as the system we are designing for it is compliant with the Health Insurance Portability and Accountability Act. This is because even if the scientists do not directly work with any patients, the materials that are used to make the cures/medicine need to be handled with proper safety and caution so that when in the future these materials can be used by doctors for patients it is safe and does not cause common major side effects.

Section 4: Implementation Requirements

4.1 Test Plan

We have created this testing plan as a detailed guide for the testing team to thoroughly test the new system. The goal is to introduce our goals, objectives, and contractions so that the testers can successfully follow through with the testing. This document is subject to changes along the way as a part of the system development life cycle.

This plan is intended to include:

- Features to test
- Features not to test
- Testing Approach
- Test cases
- Test Level / Test Case Matrix

Features to test

Inventory tracking – Ensure each function required for the inventory is working in real-time. This includes names of chemicals, quantities, dates, add, delete.

Spill alert – Alter message sent out when a chemical is spilled.

Storage Access – Certain employees can access the storage facility.

User access – Users need to have their personal logins to get into the system.

Search function – Search for chemicals and display chemical information.

Add chemical to cart – Add to cart function to be able to check out chemicals.

User interface – User interface must satisfy the user by being easy to navigate and including necessary buttons.

Security – The system must be secured to protect data and privacy and sensitive information from unauthorized people or programs.

Low quantity alert – This function must notify the system when a chemical goes below the expected quantity.

Input data – Ensure that data is successfully input into the inventory system, both valid and invalid.

Reports – Generate reports of inventory level, low quantities, dates, etc.

Data backup – Data is saved and stored.

Features Not to Test

Security cameras – The security cameras that control the storage facilities have their own system and need to be tested by their own team.

Testing Approach

Level	Method	Type	Description
Unit	Whitebox testing	Functional testing	Whitebox testing is testing the code and logic of the software, combined with the functional testing type we can test the internal structure and the intended functionality of the system.
Integration	Blackbox testing	Non-functional testing	The Blackbox method is when the tester does not have any pre-knowledge of the internal structure or design of the system. This helps the tester to find missing functionality and interface and other performance errors. The non-functional testing type is used for performance and usability
System	Blackbox testing	Regression	The tester is using the black box method where he has no pre-knowledge of the system while using the regression testing type. Regression testing goes back to test functions that have been altered or enhanced to make sure they are functioning.
Acceptance	Blackbox testing	Manual Testing	The tester is using the black box method where he has no pre-knowledge of the system while manually using the program without following a script. This is like how the end user will be using the system.

Test Cases - document 5 test cases individually

Test case 1

Test Case Summary	Test inventory tracking
Prerequisites	Tracking feature is implemented and contains available data in the database
Test Procedure	Test the tracking feature to find inventory items. Test add, delete, and alter data and check that the inventory gets updated.
Test Data	Data included chemical names, quantity, hazardous information, etc.
Expected Result	The inventory should update accordingly in real-time when adding, deleting, and altering data.
Actual Result	

Status	
Remarks	
Executed by	
Date of Execution	

Test case 2

Test Case Summary	Test search function
Prerequisites,	Search function is implemented, and data is in the database.
Test Procedure	Start typing a chemical name in the search bar. Click on the chemical to get chemical information.
Test Data	Data including chemical names, quantity, hazardous information etc.
Expected Result	When starting to type for in the search bar the chemical matching the typed letters should show up. When clicking on a name the chemical information should be displayed.
Actual Result	
Status	
Remarks	
Executed by	
Date of Execution	

Test case 3

Test Case Summary	Low-quality alert
Prerequisites,	Inventory needs to be implemented and contains data.
Test Procedure	Remove quantity from an item in the inventory below the minimum accepted number. See if the alert gets sent out.
Test Data	Data including chemical name, quantity, hazardous information, etc.
Expected Result.	When the quantity is dropped below the minimum number an alert message is sent out.
Actual Result	
Status	
Remarks	
Executed by	
Date of Execution	

Test case 4

Test Case Summary	Produce necessary reports in the Report Generator

Prerequisites	Inventories need to be implemented and contain data
Test Procedure	Access the Report Generator, and choose report (inventory status, low quantity, expiration dates, etc.)
Test Data	Data including chemical names, quantity, hazardous information, dates etc.
Expected Result	
Actual Result	
Status	
Remarks	
Executed by	
Date of Execution	

Test case 5

Test Case Summary	Data backup
Prerequisites	The system is implemented, and the database contains data
Test Procedure	Use the data backup function. Verify that the data is backed up and saved where the backup should be stored.
Test Data	Data including chemicals, employee information, and other sensitive information.
Expected Result	The data is backed up and stored.
Actual Result	
Status	
Remarks	
Executed by	
Date of Execution	

Test Level / Test Case Matrix

Test case 1 – June 28th, 2023
Test case 2 – June 30th, 2023
Test case 3 – June 6th, 2023
Test case 4 – July 10th, 2023
Test case 5 – June 11th, 2023

4.2 Training Plan

Training requirement

For this training plan, we will be using the user training type. All employees are required to have access to the training material. It is the instructor's responsibility to provide all employees with their training access. The employees need to have access to a computer and internet to be able to successfully complete the training.

Audience

The audience is any employee who will be working in the laboratories, operating in the inventory system, and/or the system which would be managers, employees, and IT staff.

This includes but is not limited to:

- Scientists
- Researchers
- Lab technicians
- Vendors
- Suppliers

Audience characteristics

The characteristics of the audience vary as they include different genders, ages, demographics, and educational backgrounds. The characteristics that stand are the most significant are the following:

- Directly involved in inventory or lab
- Medium to high experience using different software
- Familiarity with chemicals, lab equipment, and safety protocols regarding hazardous substances.

Current knowledge, skills, abilities

Scientists and Researchers:

- High level of expertise in their respective scientific fields.
- Strong analytical and problem-solving skills.
- Used to working with complex data and analysis tools.

Lab Technicians:

- Knowledge and hands-on experience in lab operations.
- Skills in following protocols and guidelines.

Vendors and Suppliers:

- Skills in inventory systems

- High technical knowledge

Preferred modes of training delivery

The preferred method is to start with a workshop where the instructor will go over the training course in a PowerPoint to show what material will be taught. The instructor should then go over all aspects of the system and demonstrate the functionalities and features.

When the workshop is completed, each employee will be provided with training material for the specific area they will be working in. They will have 2 weeks to complete their online training. The training material will include:

- Online training in the system
- E-learning material
- User manuals

Project training timeline

The training is projected to be completed in 2 weeks from the start. While the workshop is completed in one day, the employees then have 4 additional weeks to work on their coursework and complete training.

Prerequisite knowledge

- Basic knowledge of inventory management
- Basic knowledge of safety protocols
- Basic Technical knowledge
- IT staff need to have advanced technical knowledge

Training Design

The training will start with an instructor-led workshop, including a PowerPoint presentation, one for users and one for the IT department. This is followed up by self-phased online training modules. This is designed to let each employee work through the course and get the expected training done regardless of schedule and/or other obstacles. The training material will include video tutorials, user manuals, and tests by the end of each module.

Learning objectives

Users

- Learn about the inventory's functionality and features
- Learn about the UI
- Learn how to navigate and use the inventory system.
- Develop skills to manage inventory
- Learn how to generate reports
- Learn how to handle low inventory alert

It Staff

- Learn how backup and recovery procedures work
- Learn how to install and maintain the system
- Learn how to manage user accounts and permissions
- Learn how to troubleshoot common issues in the system

Managers

The managers have the same learning objectives as both users and IT staff although they do not need to gain a deep level of understanding. However, their skills in using the inventory system should be more significant than the technical aspects.

Estimated course duration

The estimated course duration is 2 weeks.

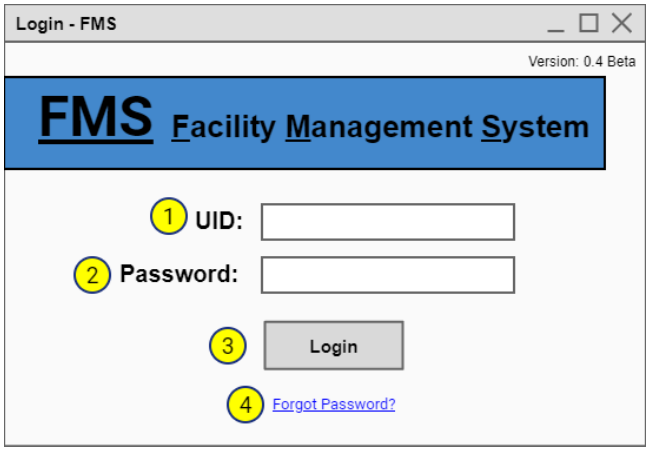
The workshop will take place in one day. The self-paced training should be completed 2 weeks after the workshop takes place.

Course Curriculum

- Introduction to lab inventory system
- System overview and navigation
- User roles and permissions
- Responsibilities
- Safety protocols
- Inventory management
- Reporting and analytics
- System maintenance and troubleshooting
- Database recovery

4.3 User Manual

First time logging in into the system



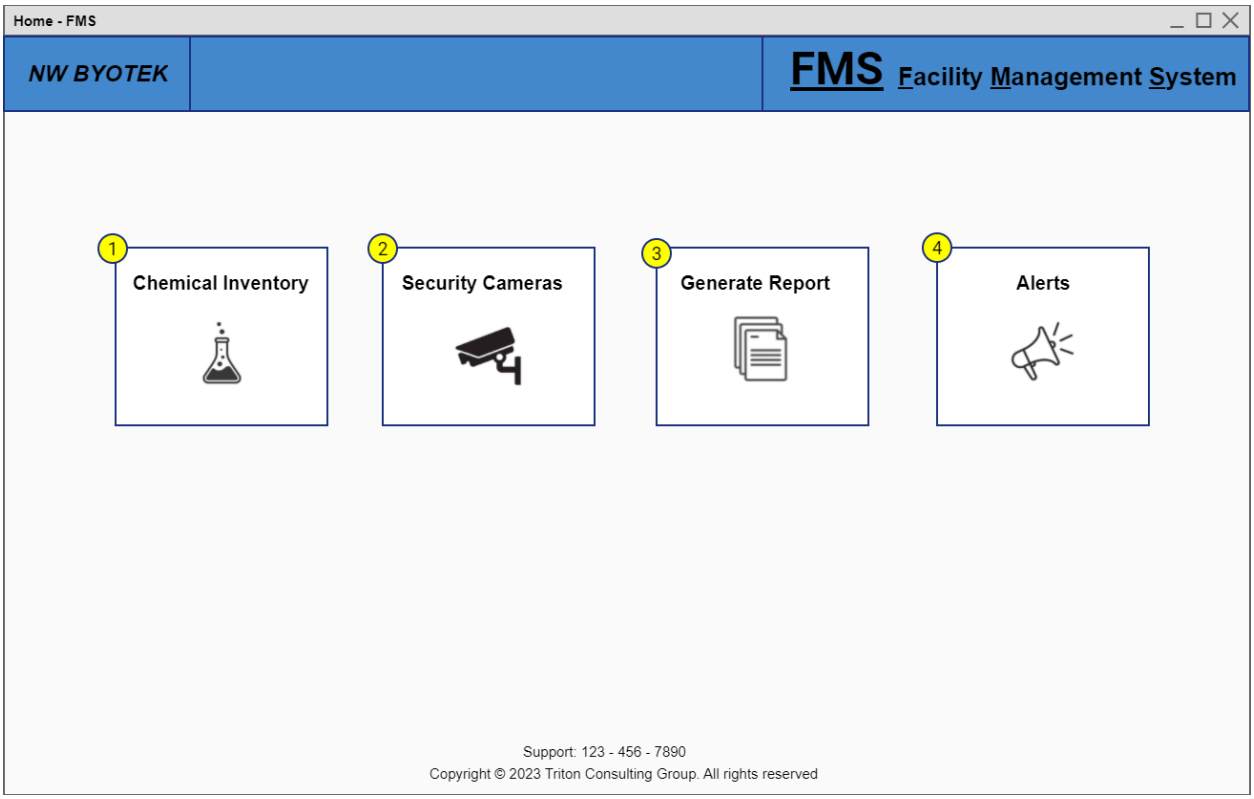
1. Enter your UID.
2. Enter your password.
3. Click on login.
4. Forgot password option for those who need it.

If this is the first time you are logging in on the new system, you must change your password.

Password Requirements:

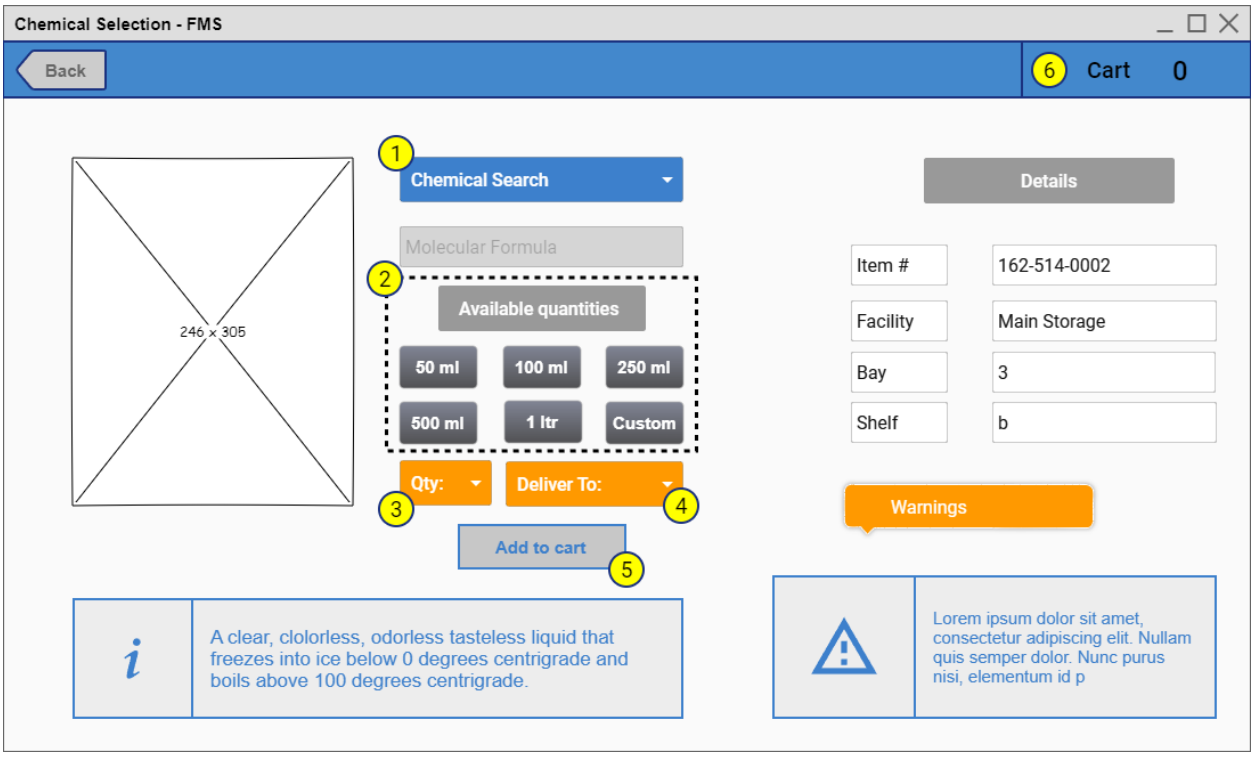
- At least eight characters.
- Contains at least one Uppercase, one number, and one character.

Home page



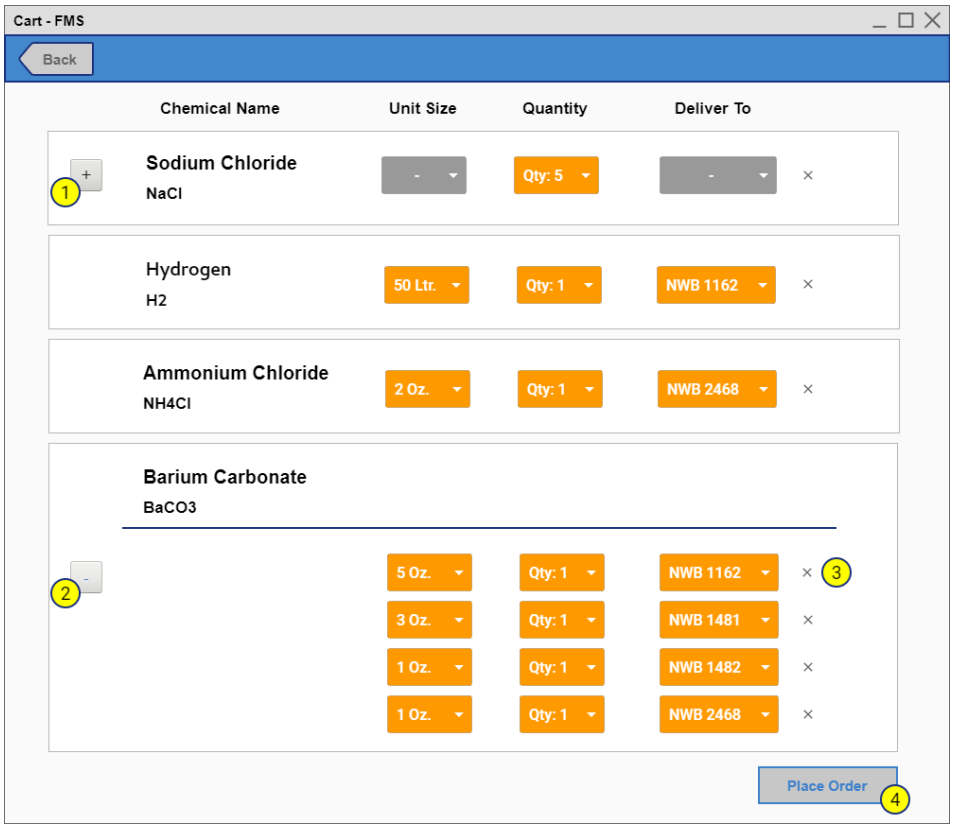
1. Click on chemical inventory to access real-time inventory checking for any chemical in the facility with options to buy new stock.
2. Click on security cameras to view a live feed of all the laboratory cameras in the facility.
3. Click on generate report to create a report on a specific chemical.
4. Click on alerts to view alerts relating to inventory, security, safety, or settings.

Chemical Inventory



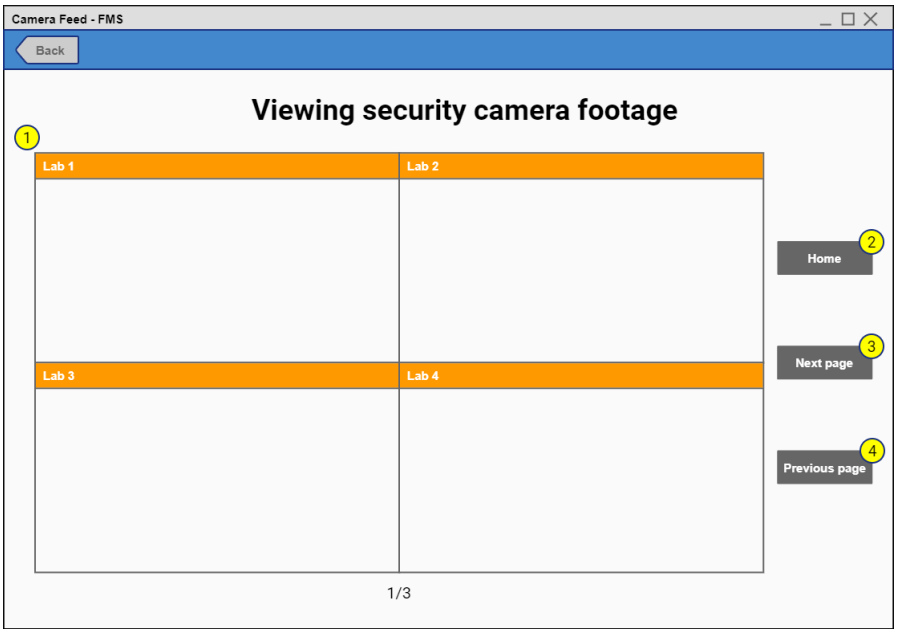
1. Choose chemicals/supplies from the Chemical Search drop down box.
2. Select the unit quantity under ‘Available quantities.
3. Select the number quantity if more than one instance of that quantity is needed.
4. Select the delivery location using the ‘Deliver To’ drop down box.
5. Press Add to Cart
6. Proceed to the cart page by clicking on the cart button in the top right corner.

Cart page



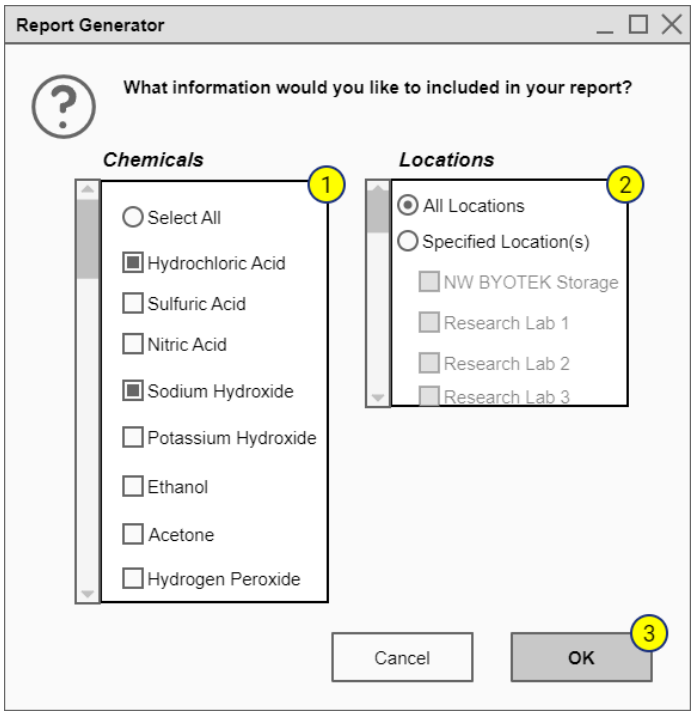
1. Expand item widgets by clicking the plus icon.
2. Minimize them by clicking the button again.
3. Remove items from cart by clicking the X icon on the right side of the page.
4. After verifying the contents of the order, click submit.

Security Cameras



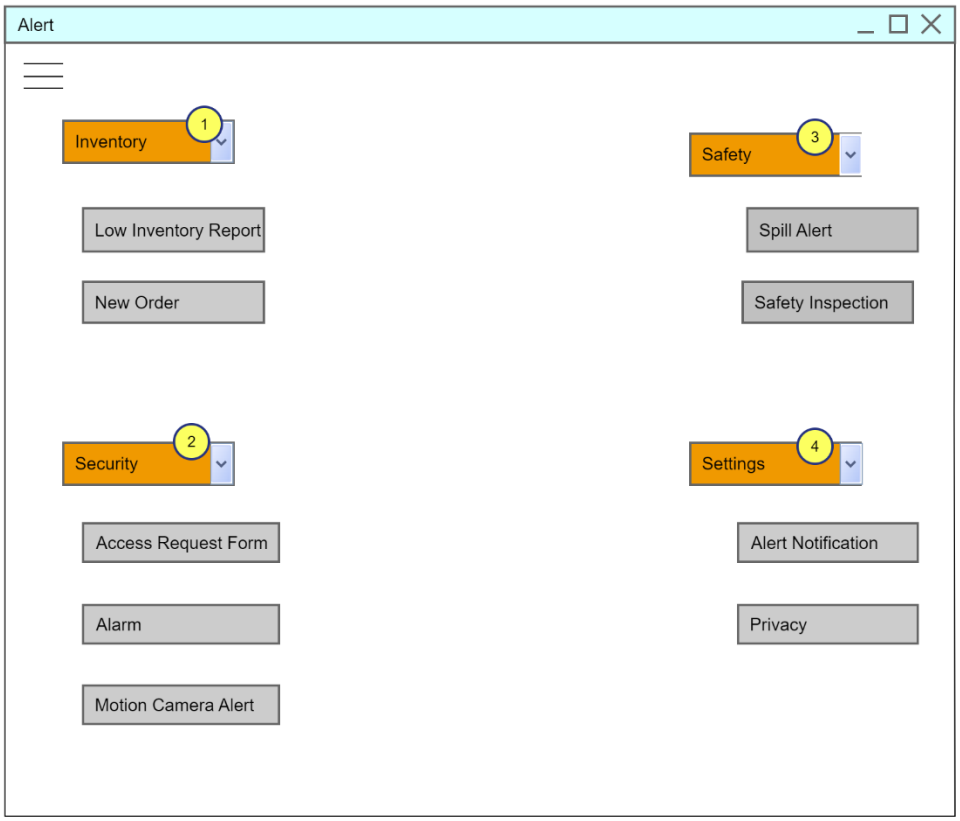
1. Click Security Camera on the Feed Page
2. Click the Home button or Back button to go back to Home Page
3. Click the Next Page/Previous Page to view more cameras.

Report Generator



1. Use the scrollbar to view all chemicals with there being choices of selecting all or only specific chemicals
2. Select all to select all or specified locations
3. Click ok to confirm your selections

Alert Page



1. Click the inventory drop-down menu
- Select Low Inventory Report to display the report

Low Inventory: Storage Facility

formula	Unit Quantity	On-Hand Quantity
C6H12	10 ml	35
HCl	10 ml	45

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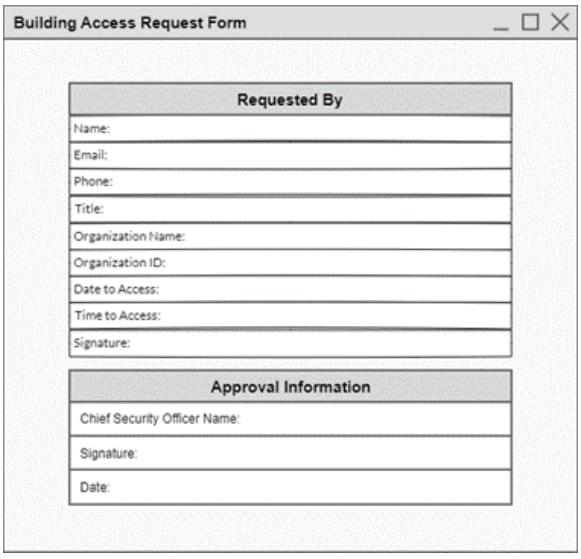
- Click New Order to display the Order.
2. Click the Security drop-down menu
- Select the Access Request form to display the form.



- Select the Alarm to turn ON/OFF
- Select Motion Camera Alert to see any motion detection

3. Click the Safety Drop down menu

- Select the Spill Alert to see any spillage alerts
- Select Safety Inspection to see any inspection scheduled

4. Click the Settings drop-down menu to:

- Change the Alerts Notification
- Change the privacy settings.

Further Development

Sections needing further development after System Implementation Report completion:

- System Requirements: This section should provide information about hardware and network requirements to use the Inventory Management System. Specifications include OS compatibility, minimum processor and memory requirements, and all supported web browsers.
- Installation Instructions: This section should guide users through the software's installation process.
- User Registration: This section should teach inexperienced users how to create their accounts and receive login credentials.
- User Roles and Permissions: This section should detail various user roles such as admins, managers, and regular users. It should also explain specific permissions and system functionalities only available to certain users.
- Troubleshooting and Support: This section should provide information on common errors and how and detailed instructions on where to obtain assistance if certain issues arise while using the system.
- FAQ: This section should contain answers to frequently asked questions.

- Glossary: This section should include a glossary of key terms and acronyms used in the user manual.

Time Estimates for Additional Developments

Item	**Estimated Hours**
System Requirements	**10**
Installation Instructions	**2**
User Registration	**2**
User Roles and Permissions	**2**
Troubleshooting and Support	**4**
FAQ	**1**
Glossary	**5**
TOTAL:	**26**

4.4 Rollout Plan

Summary

The Rollout Plan outlines key implementation steps for a successful launch of NW-BYOTEK's Facility Management System. In this document we cover the installation, release, and post-release phases. We also discuss a pilot program which will precede staff onboarding and user training.

Implementation Activities

Installation

All computer workstations in the NW-BYOTEK facility will receive the same version of the software. User access controls will limit functionality based on the individual's role, rather than the device they are using.

Handheld barcode scanners will be installed with a portable version of the app.

Release

In the release/go-live phase, we will ensure that users are trained in the new system, the data is accurate, and any errors can be addressed to establish a smooth rollout.

User Training: Staff will conduct training according to the training plan. This is essential to ensure that all users have the knowledge and skills to properly operate the new system.

Data quality: Real data needs to be migrated into the new system to ensure accuracy.

User Acceptance Testing (UAT): Users should use the system to experience real work scenarios to report on any issues.

Post-Release

System Performance Monitoring: We will continue to monitor the performance and reliability of the system. Regular system audits and reviews will be conducted to ensure the system adheres to high standards.

User Feedback: Stakeholder feedback, difficulties, and suggestions for the system will be collected and evaluated to enhance system functionality.

Continuous Improvement: Regular updates, bug fixes, and new features will be delivered to ensure consistent system performance and to meet stakeholder needs.

Rollout/System Changeover Method

Our changeover method will be a piloted cutover. Managers and leads from each department will be responsible for testing each component of the system and ensuring that the product

meets requirements. All members of the pilot program must reach unanimous approval before NW-BYOTEK can begin training of regular staff. All issues that are not resolved during this phase will be their responsibility to address later, which could be more difficult and consequential under normal operations.

4.5 Maintenance Plan

Introduction

Triton Consulting Group has been tasked with developing a system application to provide inventory management functionality, security and chemical spill alerts, camera feed monitoring, and building access code provisioning for NW-BYOTEK Inc. The system, known as FMS, or Facility Management System, is scheduled to be delivered on August 16th, 2023. For additional information regarding the program's functionality, please see our System Demo Document from May 29th.

Maintenance Timeline

Triton Consulting Group has agreed to provide two full years of support as per the terms of our contract. Support covers repairing the system when there has been a major failure, new security issue or glitch found, and other kinds of general maintenance when user reports are sent in. We can also make changes to how the system handles inventory, security, and reports if necessary. Negotiations can be made if NY-BYOTEK wants the support period to be extended.

The maintenance timeline will be divided into three phases.

1. Introduction Phase
2. Joint Development Phase
3. Consulting Phase

The *Introduction phase* started back during user testing and design, as collaboration on these efforts meant that the transfer of knowledge about the system was already being made. From a functional and operational standpoint, NW-BYOTEK is already familiar with the system, but their internal development team has yet to receive access to the official test environment during this phase.

The *Joint Development phase* grants NW-BYOTEK access to the FMS test environment. They may begin collaborating on future build releases which will be tested by TCG and approved by the System Administrator.

The *Consulting phase* is where NW-BYOTEK receives full control over the production environment and should by that point in time have adequate personnel to manage and maintain the system. TCG steps away from the development role while NW-BYOTEK steps in.

Maintenance Team

Lydia Stoutah will be transitioning from Project Manager to interim System Administrator until NW-BYOTEK finds an internal replacement. TCG analysts may be reassigned at the company's discretion.

Triage

Bug Identification and Reporting

Bugs can be identified by users while they are using the system. When they run into issues, they can report it to the maintenance team. Bugs can also be identified by our maintenance routines such as regular code review, system testing and defect tracking software. The reporting should include relevant information about the bug so the maintenance team can easily assess the issue. Each bug should be documented to ensure they are thoroughly tackled.

Critical Crashes

A critical (crash) issue will be addressed with priority level 1. The maintenance team will immediately respond to the issue followed by troubleshooting. The team will then temporarily work to fix the basic system functionalities so that the system can still operate to some or full extent until it is permanently fixed. An analysis will be conducted to find the root cause of the crash and prevent future issues.

A backup policy is created which contains detailed instructions and procedures on how to protect the data if a crash occurs.

Backup media: The data is stored on an off-site in a cloud.

Backup type: Incremental type backs up files that are new or changed since the last backup and are backed up daily or more often.

Retention period: Data is stored for 12 months. Overly sensitive or critical data may be saved longer.

Bug Prioritization

Assessment

Each bug will be assessed to determine the severity and impact of the system functionality and security. This 3-level ranking framework will be used to determine the severity of the bug.

Priority	Impact	Time Frame
Level 1	Significant impact on IT operations, security, or business activity that requires immediate attention.	Implement patch as soon as possible.
Level 2	Some impact on IT operations, security, or business activity. Requires prompt attention, but operations can continue.	Patch as necessary and begin implementation prior to next release.
Level 3	Little or no impact on current IT operations, security, or business activity	Implement in the next release

When prioritizing bugs, factors such as severity, impact, how often the bug occurs, user impact, available resources and if the system is dependent on another system are all considered. This procedure will help to balance new development and necessary maintenance work to provide the highest level of support for the stakeholder's requirements and priorities.

Authority

The System administrator and the maintenance team will have the authority and ability to make decisions on which bugs are worked on and which are not.

Section 5: Time and Cost Estimates

Detailed schedule

Our team alongside the IT team accomplished all the coding, testing, documentation, and training. We were able to go live on time without issues. The two teams spent ten days doing all the necessary maintenance needed for the system to perform as planned.

The next and last step of the SDLC is System Support and Security. The next Gant chart summarizes all the accomplished phases, the time spent, and the budget spent vs the budget estimated.

	Task Mode	Task Name	Duration	Start	Finish	Predeces	% Complete	Actual Cost	Cost1
1		**Requirement Gathering and Analysis**	**16 days**	**Wed 4/5/23**	**Wed 4/26/23**		**100%**	**$1,400.00**	**$2,700.00**
2		Case Study	4 days	Wed 4/5/23	Mon 4/10/23		100%	$300.00	$200.00
3		Highliting the functional and non-functional requirement	6 days	Tue 4/11/23	Tue 4/18/23	2	100%	$300.00	$250.00
4		User Interface Requirement(Team Review)	4 days	Wed 4/19/23	Mon 4/24/23	3	100%	$300.00	$400.00
5		Prototyping Requirement(Team Review)	2 days	Tue 4/25/23	Wed 4/26/23	4	100%	$300.00	$400.00
6		**System Design**	**19 days**	**Mon 4/24/23**	**Thu 5/18/23**	**5**	**100%**	**$9,300.00**	**$10,300.00**
7		User Interface design	4 days	Mon 4/24/23	Thu 4/27/23	5	100%	$2,500.00	$1,800.00
8		Report Design Mockups	5 days	Fri 4/28/23	Thu 5/4/23	7	100%	$2,500.00	$1,600.00
9		Database Design	7 days	Thu 5/4/23	Fri 5/12/23	8	100%	$2,300.00	$2,600.00
10		System Architecture	7 days	Wed 5/10/23	Thu 5/18/23	9	100%	$2,000.00	$1,300.00
11		Process Flow	4 days	Wed 5/10/23	Mon 5/15/23	9	100%	$0.00	$0.00
12		Network Models	3 days	Wed 5/10/23	Fri 5/12/23	9	100%	$0.00	$0.00
13		**System Implementation**	**94 days**	**Mon 5/15/23**	**Thu 9/21/23**		**100%**	**$22,500.00**	**$20,000.00**
14		Coding	25 days	Mon 5/15/23	Fri 6/16/23	12	100%	$5,000.00	$0.00
15		Testing Plan (Final)	7 days	Mon 6/19/23	Tue 6/27/23	14	100%	$1,000.00	$0.00
16		Testing	10 days	Wed 6/28/23	Tue 7/11/23	15	100%	$5,000.00	$0.00
17		Documentation Plan	20 days	Wed 7/19/23	Tue 8/15/23	16	100%	$3,500.00	$0.00
18		Installation/ Go Live	10 days	Wed 8/16/23	Tue 8/29/23	17	100%	$2,000.00	$0.00
19		Training	7 days	Wed 8/30/23	Thu 9/7/23	18	100%	$3,000.00	$0.00
20		Operation and Maintenance	10 days	Fri 9/8/23	Thu 9/21/23	19	100%	$3,000.00	$0.00
21		**System Support and Security**	**10 days**	**Thu 9/21/23**	**Thu 10/5/23**	**20**	**45%**	**$0.00**	**$10,000.00**
22		System support and security plan	2 days	Thu 9/21/23	Mon 9/25/23	20	45%	$0.00	$0.00

The next section is a detailed schedule of the project.

Requirement Gathering and Analysis: Before starting any design, our team spent two weeks studying the case, understanding the functional and non-functional requirements, and studying the user interface and prototype requirements.

Design: The team was able to design the user interface in four days, a report design mockup in five days, a database design in seven days, and a system architecture (Process flow and Network Models) in seven days. The team spent a total of twenty-three days in the design phase.

System implementation: With the help of the Triton Consulting Group, the programming team succeeded in finishing the implementation phase on time. Here are the steps in more detail:

Programming: The programming team transformed the logical design into the code statement. It was completed on June 16, 2023.

Testing Plan: Our team developed a testing plan to test the new system. The plan took our team seven days to complete (6/19/2023-6/27/2023). See section 4.1 for a detailed test plan. It includes:

- Features to test
- Features not to test
- Testing Approach
- Test Case
- Test Level/Test Case Metrix

Testing: The two teams finished testing the new system in ten days. (6/28/2023-7/11/2023).

User Documentation/ User Manuel: The IT team put twenty days developing the User Manuel. It was completed from 7/19/2023-8/15/23. See section 4.3 for more details on the user manual.

Installation/ Go Live: After the testing was complete, the IT team presented the results to the management and got approval on performing the next step which is *installation*. Before going live, a training plan and a roll-out plan were developed by the Triton Consulting Group in collaboration with the IT team.

Release: The 16th of August was day one of the installations. In the next seven days, the staff conducted training according to the training plan, the data was migrated to the new system, and the users reported any issues while using the system.

Post-Release**:** Our team kept monitoring the new system, checking its performance, collecting feedback from users, and bringing continuous improvement for ten days (8/16/2023-8/29/2023). See section 4.4 for more details.

Maintenance Plan: Triton Consulting Group developed a maintenance plan to help NW-BYOTEK with any issues with the FMS. The plan was worked on and delivered in ten days (9/8/2023-9/21/2023).

Maintenance: Triton Consulting Group has agreed to provide two full years of support as per the terms of our contract.

System Support and Security: System Support and Security is the last step in the SDLC. Before completely delivering the new system, our team developed a security plan to follow in case of issues related to security and support. This was developed in ten days. See section 4.3 for more details on the maintenance plan.

Cost Estimate

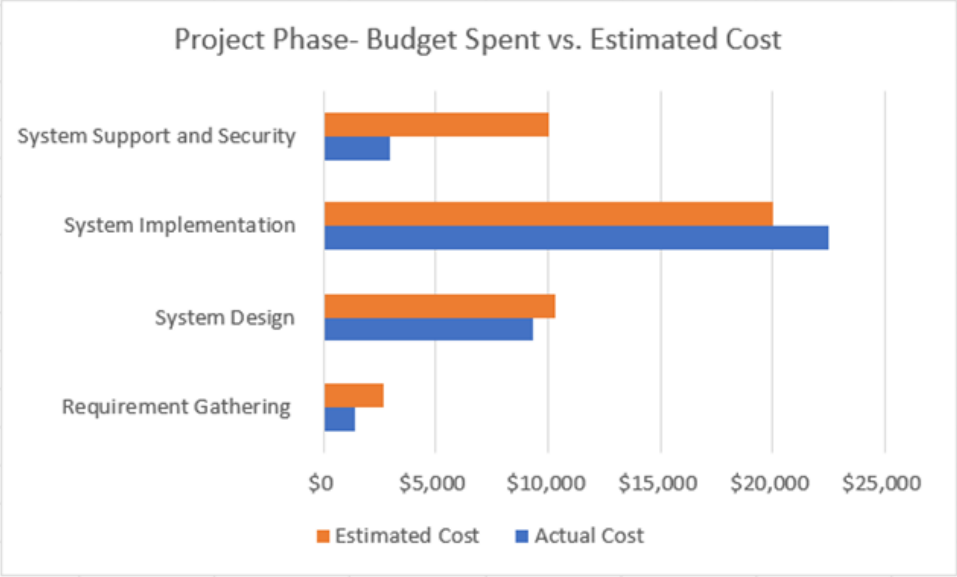
The total cost of the NW-BYOTEK system was estimated to be $43,000.00 total.
$2,700.00 is the cost our team estimated for the requirement gathering and analysis.

$10,300.00 is the amount predicted to be spent in the system design phase.
$20,000.00 will cover the programming team contract, the training, installation cost, materials purchased, labor, and warranty.
$15,000.00 will cover the operation and maintenance expenses.
$10,000.00 will be spent on system security and system support.

Total Costs-to-date for the project

The project stayed within budget in most phases.
In the Requirement Gathering and Analysis, $1,400.00 out of 2,700.00 was spent.
In the design phase, $9,300.00 out of $10.300.00 was spent, allowing the team to stay within budget.

The system implementation is considered the longest and the most expensive phase. The team encountered some issues with the testing and had to go over the budget planned for this phase. We spent $22,500,00 instead of $20,000.00. This should not be an issue since we had some savings from the first two phases.
The cost to develop the System Support and Security Plan was $1,000.00. We still have a $9,000.00 budget if needed to provide any support for the system. Next figure is a comparison between the budget spent vs the estimated cost.



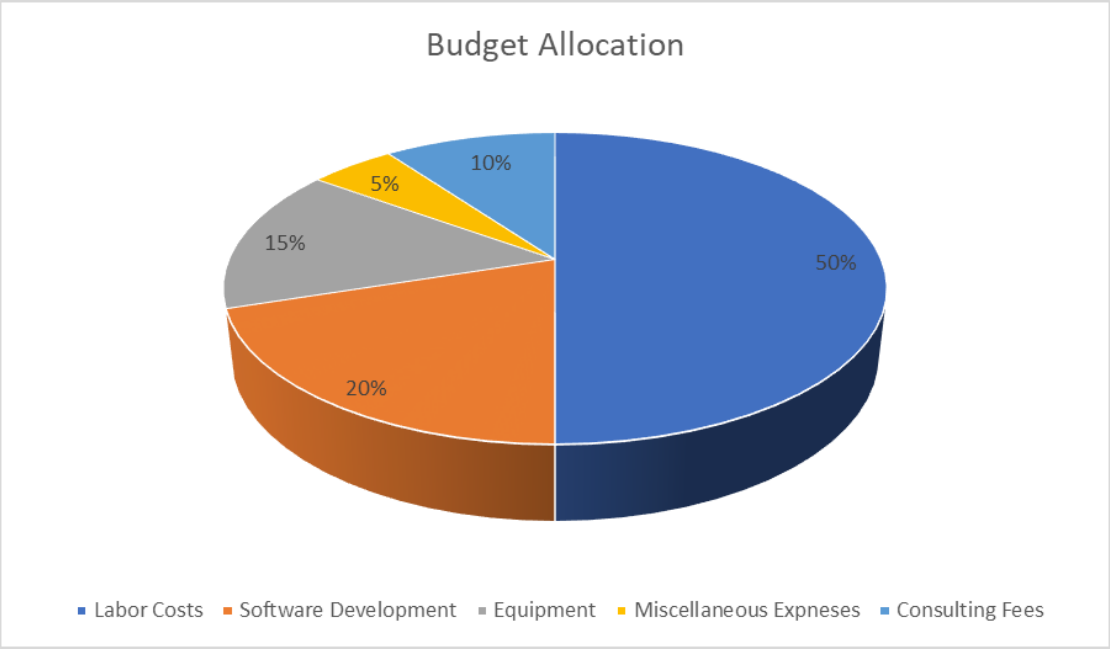
Staffing Requirements

The Triton Consulting Group along with the IT team will be available remotely if help is needed. The users can send reports/requests describing the type of issue and our system administrators will decide if the request is justifiable or not. We will provide support for the system for a duration of two years.

Section 6: Additional Materials

Budget Allocation:

Team Members and Project Roles



Section 7: Team Members and Project Roles

Lydia Stoutah – Project Manager (Time and cost tracker)

Nathan Willet – Database Designer

Will Strickland – Communications and Editor

Grayson Giles – Document Review and Editing

Fanny Schoenbeck – User Interface Design and Developer

Jamsheed Mereness – Note Taker