

# Logical Organizations of Integrated Environments (LOOIE)

## Project Portfolio

Marissa Alvarez

Logical Organizations of Integrated Environments is an Internally developed web application for the Factory of the Future (FoF) initiative at Northrop Grumman. The LOOIE web application tracks and manages tools, support equipment, and material movement from receipt to deployment. By integrating with existing applications (SAP, AssetSmart, ect.) LOOIE makes information more accessible and meaningful to end users by streamlining and clarifying that data. LOOIE provides satellite production programs with easy-to-use screens custom tailored to Northrop Grumman processes. LOOIE uses an industry standard API to communicate tracked data between systems. Prior to LOOIE, asset tracking was managed across many databases, spreadsheets, manual processes and legacy applications. LOOIE integrates the functionality from all of these sources into a one stop shop. Interfacing with LOOIE an end user can track and manage material from receipt to deployment. These capabilities are crucial to Satellite Production Programs. The new LOOIE system is estimated to save \$3.1M in 2021 through reduction in labor finding data, reduction in labor physically tracking down material, and reduction in loss of property. I worked on the LOOIE application as a software developer. When I was first brought onto the project there was only one functioning screen and now the application is in full production. There are still screens being built and enhancements on the application. It is incredible to see a product come to life.

LOOIE is a very complex system. We track the movement of materials. The order of operations are as follows. The user receives an item on the manufacturing floor. We receive the item by scanning the barcode. Once, that is scanned we pull the data by using an API to the existing interface. The information is loaded and posted on our LOOIE interface. Once the user accepts and receives the item it is now in our LOOIE database. Now that it is in our database, we are able to track the part. The user is able to move the item out to another bundle, update the location of the item, edit item details, and more.

As a software developer on LOOIE I have worked on the frontend, backend, and designed mockups for the team. I became very familiar with the codebase and the .Net Core application as a whole. I worked on several parts of the application. Our frontend was written in HTML, CSS, Bootstrap, JavaScript, and jQuery. I was responsible for writing Ajax calls for the user interactions. I used JavaScript and jQuery to get the data back as a JSON object to parse it back into the user interface. I created the interfaces and added the logic for each of the screens. I worked closely with our UX/UI designer to gain experience with the workload. We gathered requirements with the customer and created mockups using Balsalmiq. I specifically worked to create mockups for the Item Management screen and Receive Items Without a Tracker Screen. In addition, I am familiar with backend development in C#. I wrote and modified RESTful web services and RESTful APIs where I utilized the HTTP methods. Throughout my time on LOOIE I was introduced to agile software development. The project uses the Lean Agile methodology - incorporating best practices for efficient, lean development in an environment

of constantly evolving requirements, customer priorities, discoveries and unknowns. We delivered valuable, working capabilities with focus on demonstrable results for each iteration(sprint). Through frequent and short iterations, there is incorporation of changes in customer requirements, priorities, and mission needs so that the team has a clear understanding of customer expectations before beginning work. An architectural runway containing technical enablers is presented to the product owner so that critical but non-functional features can be prioritized into every sprint. These enablers remove impediments that restrain the development team from implementing functional requirements. We delivered project needs within three-week sprints. I was able to collaborate and present to our customer at the end of each sprint. For code version control we used github. To track user stories, tasks, and bugs the team utilized TFS (Team Foundation Server- AzDO). I took on the task of being the lead to host QAT meetings before pushing our code to our staging environment. Lastly, I conducted AMP Scans and Fortify Scans where I documented results and remediated errors. I became familiar with Continuous Integration/Continuous Deployment (CI/CD) Pipeline. It connected developer's check-ins of newly produced code to an automated process that deploys that code to a running server. While passing through the pipeline LOOIE's automated tests are run and the new code is scanned by SonarQube (which assesses code quality and security vulnerabilities). While working on LOOIE I gained experience in many new technologies that were critical to creating this application.

Figure 1: LOOIE Home Page

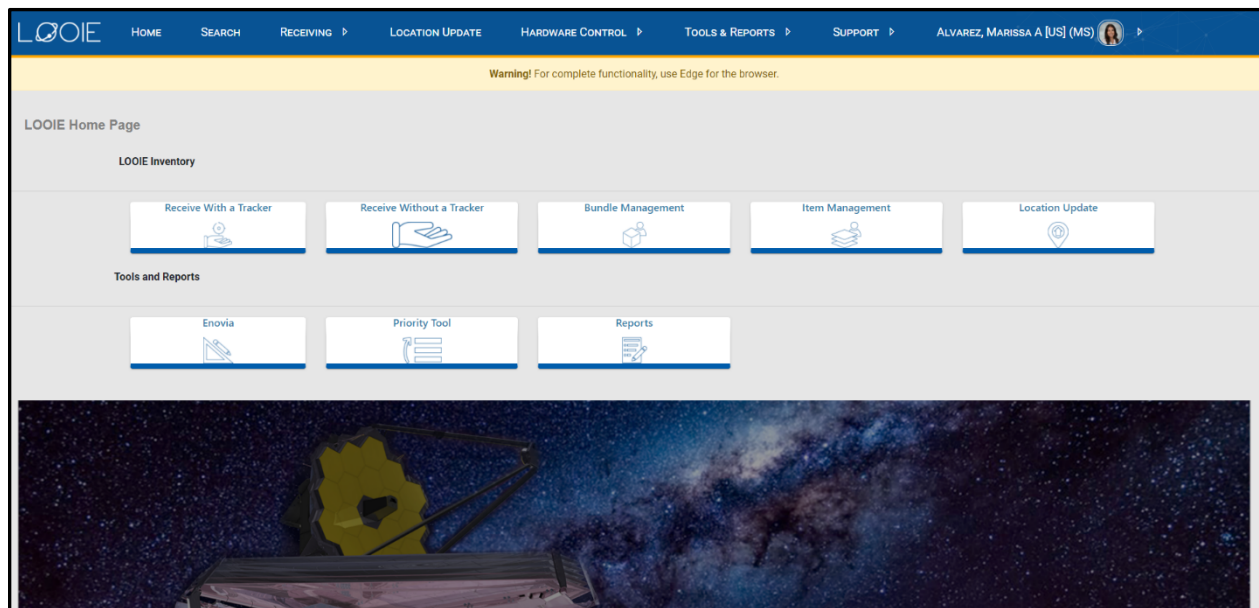


Figure 2: Receive Items Without a Tracker

LOOIE HOME SEARCH RECEIVING LOCATION UPDATE HARDWARE CONTROL TOOLS & REPORTS SUPPORT ALVAREZ, MARISSA A [US] (MS)

Warning! For complete functionality, use Edge for the browser.

### Receive Items Without Tracker

Select Item Type:

Select Receiving Location:  OR

Note: This location will apply to all items received.

Populate Item Details by Scanning or Manually Entering the Barcode:

Reservation:  Reservation Line:  Asset Tag:

Clear All Query Asset Tag Number

#### Manually Enter or Edit Item Details:

LOOIE Ticket Number:  Program:  Property Tag Number:

Part Number:  Work Order Number:  Container Tag Number:

Model Number:  Reservation:  Container Number:

Batch Number:  Serial Number:  Network Number:  Cost Center:

Part Rev:  Mand. Rev:  Planner Code:  Critical Flag: ☐ Expiration Date:  Last Performed:

SLED:  SLDD:  Cost:  Inventory Date:  Re-Cert Interval:  Months NHA:

NHA Description:  Receipt Status:  Manufacturer:

Remarks:

Undo Edits Next Item to Receive

List of Received Items:

Show 10 entries Search:

Received	Resv L/I	Part #	Part Description	Batch	Qty	Part Rev	Mand Rev	S/N	Program	Critical Flag
This table is empty - Please refine the search criteria and try again.										

Showing 0 to 0 of 0 results Previous Next

Finish Receiving Checked Items

Select Item Type that you are receiving.

Select Item receiving location. Scan or enter the barcode number.

Populate item details below by scanning a reservation/reservation line number, or an asset tag number.

Item details will populate if the item exists in the other existing application databases. Once, the data populates the user is able to make any changes to the item details fields that are enabled. Different fields became enabled/disabled depending on the item type that you are receiving.

Undo any changes that you made in the item details before selecting "Next Item to Receive" button.

An option to receive more than one item.

Datatable will populate once you have received an item.

The button will become enabled once the user has received at least one item. Once the user clicks the "Finish Receiving Checked Items" button we store the item in our LOOIE Database. We generate a unique Bundle ID number and a unique LOOIE Ticket number for each item. The screen redirects to the Bundle Management screen. The user will be able to see the Bundle Id number created and all the items associated with that bundle.

Figure 3: Bundle Management Screen

The screenshot shows the LOOIE web application interface. The top navigation bar includes links for HOME, SEARCH, RECEIVING, LOCATION UPDATE, HARDWARE CONTROL, TOOLS & REPORTS, and SUPPORT. A user profile for ALVAREZ, MARISSA A [US] (MS) is visible in the top right. A yellow warning banner states: "Warning! For complete functionality, use Edge for the browser." Below the navigation bar, there are three main sections: "Move Items to" (with options for New Bundle and Existing Bundle), "Print" (with options for Print Bundle Label, Print LOOIE Ticket, and Print Bundle Inventory), and "Location" (with a Location Update option). The central "Bundle Management" section features a "Bundle ID" field with a search icon and a text input field labeled "Scan or Enter a Bundle Number...". A note below this field states: "A Bundle ID consists of PB followed by 12 digits". A callout box points to the search field, explaining: "The Bundle ID field manually populates if you received an item. This screen allows you to search on other Bundle by entering the bundle ID number in the search field. The search pulls the data from our LOOOIE Database." Another callout box points to the search field, stating: "Once a valid ID number is found a data table appears and displays all of the associated items within that bundle." At the bottom, there are links for Privacy Policies and Support, and application details: Application ID: 61454, Version: 4.3.0.0. A copyright notice for Northrop Grumman Corporation is also present.

**Bundle Management Menu Bar Explanation:**

**Move Items to:** Move Certain items to a new bundle or to an existing Bundle.

**Print:** Print labels, tickets, or inventory slips of the bundle or of the certain items in the bundle.

**Location:** Update the location of the whole bundle.

Figure 4: Location Update Screen

The screenshot shows the LOOIE Location Update screen. The title "Location Update" is at the top. The "Part Bundle ID:" section includes a barcode icon and a text input field labeled "Scan or Enter a Barcode Number...". A "Bundles Scanned:" label is to the right. Below this is the "Current Location" section, which includes "Last Bundle Entered:" and "Location:". The "Destination Location" section has a "New Location" subsection with a barcode icon and a text input field labeled "Scan or Enter a Barcode Number...", followed by "OR" and a "Select a Location..." dropdown menu. A callout box points to the "Select a Location..." dropdown, stating: "Select a new location." Below this is the "Location Details (Optional):" section with a text input field. At the bottom right, there are "Clear" and "Save" buttons. A callout box points to the "Save" button, stating: "Save new location of the bundle." The "Bundle(s) to Move" section includes a note: "All these bundles will be moved to the destination location." It has a "Show" dropdown set to "10" and a "Search:" field labeled "Search in table". Below this is a "Bundle ID" section with a text input field and a "This table is empty." message. A callout box points to this section, stating: "Once you click the 'Save' button the Bundles to Move table will populate with the part bundle number. Then the user will be able to enter another Part Bundle Id." At the bottom, there is a status bar showing "Showing 0 to 0 of 0 results" and "Previous" and "Next" navigation links.

Figure 5: Item Management Screen

### Item Management

#### Scan or Manually Enter Search Parameters

**Bundle Id:**

**Property Tag #:**

**Part Number:**

**Program:**

**Item ID#:**

**Work Order #:**

**Batch:**

**Description:**

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#### Manually Enter or Edit Item Details

**Item Id:**

**Item Type:**

**Property Tag Number:**

**Part Number:**

**Program:**

**Container Tag Number:**

**Model Number:**

**Work Order Number:**

**Container Number:**

**Description:**

**Reservation:**

**Resv Item Number:**

**Parent Tag Number:**

**Alternate Description:**

**OBOM Number:**

**A/R:**

**Child Tag Number:**

**QTY:**

**Withdrawn:**

**UOM:**

**WBS:**

**Contract:**

**Part Rev:**

**Mand. Rev:**

**Planner Code:**

**Critical Flag:**

☐

**Expiration Date:**

**Last Performed:**

**SLED:**

**SLDD:**

**NHA:**

**Cost:**

**Inventory Date:**

**NHA Description:**

**Receipt Status:**

**Re-Cert Interval:**

**Manufacturer:**

**Remarks:**

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**Item Records Table:**

Show  entries

Search:

LOOIE ID	Property Tag #	Part #	Part Description	Batch	S/N	WO #	Program	Bundle ID	Location
This table is empty - Please refine the search criteria and try again.									

Showing 0 to 0 of 0 results

Previous Next

Enter certain parameters to query and find the details of the item.

The user can save their changes if they have edited any of the fields.

Contents of the data table populates if records were found.

The item management screen allows users to edit items within a bundle. The user can edit and save item details.

#### Outcomes:

The LOOIE web application has increased and assisted the tracking of materials on the manufacturing floors. The web app is now in production and is being used with real user data. More screens are being developed and bugs are being worked to perfect the web application. The new LOOIE system is estimated to save \$3.1M in 2021 through reduction in labor finding data, reduction in labor physically tracking down material and reduction in loss of property. Lastly, the LOOIE team was awarded with a President's Award for Excellence (one of the company's highest honor's) in September 2020.