Software

Requirements Specification

of the

Unloaded Shipping Container

Display Pages

Extension of Acme’s WMS System

Prepared for Acme, Inc.

Version 1.0.0

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Revision History

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# Introduction

## Purpose

The purpose of this document is to enumerate and describe detailed requirements specific to the Unloaded Shipping Container Display application extension of Acme’s WMS system. This Software Requirements Specification (SRS) defines the requirements for the entire first release of the sub system.

## Intended Audience

This document is intended for users and designers/programmers of the WMS system. It describes the exact functionality the system will provide. It also describes the high level technical requirements of the system but it is not a technical design.

## Product Scope

The Unloaded Shipping Container Display application extension is a set of two webpages and supporting pieces that extend Acmes’ existing internal WMS application. These pages provide operators and managers easily accessible information about shipping container contents as they were unloaded and palletized for storage in the warehouse. As a note, container number is really just an identifier of a set of pallets stacked and wrapped. It is one of several possible values of a field called reference type. These reference types tell us the source of the goods on the pallet. Therefore as a byproduct of this effort and just a little more work users will be able to look at data about other product besides shipping container. For example, product that was palletized as a result of manufacturing. Most of the requirements are written using shipping container as the reference type because that is what was requested. This makes the document easier to read. At key points in requirements documents there will be reference to displaying other reference types.

## References

This document references and/or should be used in conjunction with the following documents:

* Use case and activities diagrams document for this project. They will help provide clarity to this document. U28475331\_CEN4031\_RequrementsUseCase.docx
* Acme Custom Programming Guide which is conventions and standards for all development.
* Various standards and conventions documents Acme IT has assembled about the WMS application web pages and WCF service methods
* Tools – Visual Studio, Internet Information Service, ASP.NET and C#

# Overall Description

## Product Functions

The product shall support:

* The request and display of Shipping Container and other Reference Type data such as date palletization began, purchase orders and other such data. The data will display on web pages as is common in the WMS system.
* The ability to select criteria on how much historical data to return on the Unloaded Shipping Container webpage. The criteria is number of days previous to the current date
* The ability to select various reference types available in the system including Shipping Container which was the request purpose for the page.
* Details on palletization of the goods can be displayed on a second web page.

## User Classes and Characteristics

* There is only one actor role in the design of this system. It is shared by the people described below.
* Warehouse operators and managers are the primary users of the system. They need quicker access to the data these screens present than today’s methods which use the ERP system. The screens improve visibility over current data screens because the current method needs to wait for an asynchronous replication to the ERP system to complete. Users will be able to browse to the new Unloaded Shipping Container page URL or select a link from an existing system “menu page” to view data about the containers and pallets. These personnel are already well trained and experienced on the maintenance screens and information screens of the system. These new pages will follow existing patterns of screen design and user controls.
* The pages will also be useful to Acme Technical Support to diagnose issues developing with the data generated by the modules of the system that record container contents and palletization data. They will be able to view data as it is generated quickly and easily. Currently they must use direct database queries or wait for the same asynchronous replication to ERP to complete.
* Technical support cases with these new web pages will be filtered to be sure there are not browser issues. Cases that are issues with the new screens will be escalated directly to the developers for diagnosis. Defects will be fixed or issues with understanding the data will be explained to the users.

## Operating Environment

The webpages will become part of the existing WMS website which is an IIS website hosted on Windows Servers at each location. The page technology is ASP.NET with JavaScript client side scripting as necessary. The web pages provide the presentation layer but the data on the pages are provided by the WMS system’s business layer which is based on WCF web services.

The pages shall be fully tested to display properly on Internet Explore versions 9 and up; using compatibility mode if necessary depending on the version. The software shall be tested with cycles that exercise the criteria controls, i.e. does the presented data match the selected data and ensures the data displays as it should and within performance requirements. Other cycles will ensure the data presented on the screen is accurate, i.e. is every pallet unloaded from a container displayed and if the record’s particular data (license plate, quantity, item number, etc.) correct. Throughout all cycles, colors, table alignment, control placement and performance will be monitored.

## User Documentation

Before the new functionality is deployed at a site it will be announced in an email to managers and operators including a light explanation of how to access and use the webpage. This email shall be backed up with a white paper on how to use the pages that will be stored in the usual SharePoint folder for the WMS system documentation. This is common practice for such functionality at Acme.

## Assumptions

This document assumes the reader is familiar with Acme’s WMS system, especially the parts of the system that are used for unloading shipping containers. The plan also assumes a heathy and installed WMS system exists to add this subsystem to.

# System Functional Requirements

This section details the main features of each page of the system. Each page has a section which starts by describing the layout of each page. The section will then describe how the controls on the screens will work, what they are for and the results of using the controls. At the end of the section a sample page is included.

Note: the new pages are called Unloaded Shipping Container Display because this is the requested and intended use of the pages. Shipping container is just one of the reference types of pallets at Acme therefore with very little extra work these pages can display the other reference types.

## Unloaded Containers Web Page Requirements (UCP)

* **UCP-01**: The layout of the page is a header across the top, a horizontal area of controls underneath, a data display area for the shipping container data (or other reference types) then a footer area at the bottom. See sample page at end of this section.
* **UCP-02**: The standard WMS system page color scheme will be used unless as noted here.
* **UCP-03**: The header of the page will read “*Reference Type* data for site XX since yy/yy/yyyy” with the reference type and the yy’s replaced by the criteria reference type and date. The XX would be the site code for the warehouse. For example the header may read “Shipping Container data for site TN since 02/01/2015”.
* **UCP-04**: The horizontal control referred to in UCP-01 will contain the criteria selection controls located in the area above the grid and below the header. The criteria controls are:
  + **UCP-04a:** A 3 radio button set for *7* days, *14* days and *21* days ago; the 7, 14 and 21 will be replaced in labels by the actual date calculated, for example if today is 2/8/2015 the label for 7 days would be “Since 2/1/15”. This horizontal radio set will be to the left side.
  + **UCP-04b:** A 3 radio button set for Reference Type will be labelled Container for Shipping Container type, PO for PO type and ID for ID type. This horizontal radio set will be to the right side.
* **UCP-05**: A grey Refresh button will refresh the page using currently selected criteria. It is also in the horizontal control area. The button will be wider than normal to accommodate the useful text below. The refresh button is centered on the page. The normal text for the button is “Data is current for the selected criteria”. When either radio set deviates from the value represented by the current data, the button text will change to “Get New Data” or the color will turn Red, informing the user their data does not match the criteria.
* **UCP-06:** The page will display the shipping container data mentioned in UCP-01 in a structure that looks like a data grid. The data columns of the grid will be container number, reference type, date began unloading, time first pallet was built, date ended unloading, time last pallet was built, user id building the last pallet, item number, item description, quantity of the item palletized in the normal location, quantity of the item palletized to the damaged location, quantity of the item expected on the container, and number of undamaged pallets built.
  + Reference Type is Container in the case of shipping container, PO in the case of PO, ID in the case of an ID. The title of the first column will change appropriate if the reference type is not shipping container.
  + The data in the grid will be sorted by date and time the container was unloaded descending by date and time
  + If more than one user builds pallets for the reference number an asterisk will be appended to the user id. The detail page will list the pallets and the user id associated with each pallet.
* **UCP-07**: The footer of the page will have diagnostic information as is usual for pages in this WMS system. The data displayed is controlled by the site master frame page and the system. It cannot be changed in this project,
* **UCP-08**: The data grid will open up with data for the default values of *container number* as a reference type and 7 days prior today of container shipments. These are the expected most common values so there is no need to make users select data and refresh in order to get started.
* **UCP-09**: After each click of the Refresh button, the data grid will contain the matching records for the criteria. That is it will have only data for the reference type selected and the reference types must have started unloading on or after the days ago criteria.
* **UCP-10**: Rows in the data grid will be clickable. A click anywhere in the row will bring up the Palletization Details web page for the container number of the row.
* **UCP-11**: When a row is clicked to see palletization detail, the system will “remember” the last set of criteria for the unloaded shipping page and then the same criteria will be applied when returned to the unloaded container page.
* **UCP-12**: In the event of data or communication errors such that there is no data to load, a user friendly message will be displayed in the item description field of the grid. If the error is such that it cannot be user friendly it will say “Contact the Help Desk for assistance”.
* **UCP-13**: The page will not provide paging, all data matching the criteria will be displayed and the user must use the browser scrollbars to see it if necessary.
* **UCP-14**: The page is accessible from the main WMS web page directory <http://sms>. The page’s address can be stored in the browser favorites for easy access.
* **Unloaded Container Web Page sample page**

|  |
| --- |
| Shipping Container data for site TN since 02/02/2015 |
| Since 2/2/15 Since 1/26/15 Since 1/19/15 Shipping Container PO ID  Refresh |
| Container Type Date Time Date Time User Item Description Good Damaged Expected Good Pallets  Number Began Began Ended Ended ID Qty Qty Qty Built |
| OSCL Container 2/2/15 10:10 2/2/15 12:15 sam 123456 Fan 2200 15 2215 50 |
| … |
| … |
| Footer (system diagnostic data) |

## Palletization Details Web Page Requirements (PDP)

* **PDP-01**: The layout of this page is a header across the top, a data display area for the shipping container data (or other reference types), then a row for a return button and finally a footer area. See sample page at end of this section.
* **PDP-02**: The standard WMS system page color scheme will be used unless as noted here.
* **PDP-03**: The header of the page will read “Palletization Data for *Container* *Number,* *Reference Number*” with the reference type and number replaced by the correct values. For example the header may read “Palletization Data for Container OSCL123453”.
* **PDP-04**: The page will display the data in a structure that looks like a data grid. Note that only verified pallets will appear on page. The data columns of the grid will be pallet ID, user id, current location of pallet, bin number, status, date created, time created, item number, item description, quantity of the item on this pallet.
  + The data in the grid will be sorted by pallet ID.
* **PDP-05**: The footer of the page will have diagnostic information as is usual for pages in this system. The data is controlled by the site master page and the system.
* **PDP-06**: The page will open up with data specified in the URL query string as to which container number is being displayed. It is an error to come directly to this page, the page should only be accessed from the Containers Unloaded Page.
* **PDP-07**: The records in the data grid will be all of the verified pallets that match the container number selected on the Unload Container Page.
* **PDP-08**: In the event of data or communication errors such that there is no data to load, a user friendly message will be displayed in the item description field of the grid. If the error is such that it cannot be user friendly it will say “Contact the Help Desk for assistance”.
* **PDP-09**: The page will not provide paging, all data matching the criteria will be displayed and the user must scroll to see it if there is a lot.
* **PDP-10**: A **Return** button between the data grid and the footer will let the user return to the Unloaded Containers Page with that page’s previous criteria already set.
* **Palletization Details Page wireframe**

|  |
| --- |
| Palletization Data for Container OSCL123453 |
| Since 2/2/15 Since 1/26/15 Since 1/19/15 Shipping Container PO ID  Refresh |
| Pallet ID User Location Bin Number Status Date Created Time Created Item Description Quantity |
| 0460131234456 sam 1 1 Verified 2/2/15 10:20 123456 Fan 55 |
| … |
| … |
| Footer (system data) |

# Nonfunctional Requirements

## Performance Requirements

* + **SQE-1:** ContainersUnloaded Pages will typically return 7 days of data of any reference type within 3 seconds. 14 and 21 days data within 10 seconds. These specifications assume typical loads on the database and web service servers and also normal network traffic.
  + **SQE-2:** Palletization Detail page will typically return within 3 seconds. There is no restriction on the amount of data because it is assumed for now there cannot be an unreasonable amount of data for any one reference number. These specifications assume typical loads on the database and web service servers and also normal network traffic.
  + **SQRE-1:** The software shall display appropriate messages when data retrieval fails due to timeout or web service/database failure.

## Safety Requirements

* + **SQU-1:** User documentation will be provided in a manner consistent to other modules of the WMS system. A white paper will explain how to use the pages within Acme’s environment. The white paper will be posted along with similar white papers for other parts of the system.
  + **SQRE-2:** The software shall never display inconsistent or partial data. If any errors occur that threaten the data the operation should return no data and a message per SQRE-1.

## Security Requirements

* + **SQS-1:** The application is an internal network application with no exposure to the public. Security is handled by the IIS webserver, only domain users have access to the pages. This application does not have to provide additional security.

## Software Quality Attributes

* + **SQP-1:** The new software modules will follow standards and conventions in the Acme Custom Programming Guide except as noted below.
  + **SQP-2**: The new software modules will follow standards and conventions in the various specifications documents about the WMS system except as noted below. Coding and user experience will be consistent with the rest of the system.
  + **SQP-3:** The page will not time out or auto refresh as is common in other parts of the system. This is an exception to SQP-2
  + **WCR-02**: It is not the goal of the project use techniques that limit the web pages to IE; however in order to save time this is allowed with permission from the Application Development Manager.
  + **SQT-1**: Serious errors that deny the user data or might provide bad data to the user must fail with a message to the user in the data grid as per SQRE-1 and SQRE-2. The server side web page operation must log the exception to the user’s device log file. The web service method must log its exception to the windows event log appropriate to the web service with an Error designation. The logging is details in the specifications for the WMS system.

## Business Rules

* + **SQIP-1:** Web pages are written in ASP.NET with JavaScript (JQuery preferred) client side scripting when appropriate.
  + **SQIP-2:** Web pages are children of the WMS system’s site.master page which controls headers, footers and page-wide global settings.
  + **SQIP-3:** Web page formatting is based on CSS style sheet files. If necessary each new page can have its own style sheet but the sheet must inherit from the SiteWebPages.css style sheet.

# Appendix A: Glossary

|  |  |
| --- | --- |
| **Acronym** | **Definition** |
| SRS | Software Requirements Specification |
| API | Application Programming Interface |
| ASP.NET | A platform from Microsoft for developing web sites |
| DBMS | Database Management System |
| IE | Internet Explorer Browser |
| IIS | Internet Information Services web server |
| Reference Number | A usually unique number identifying the source of the good on the pallet. Typically Container, PO or ID. |
| Reference Type | A label to identify the type of reference number on the pallet. It is the container number for a shipping container but could many other values for other types. |
| SD | Software Deployment |
| SDR | Server/Database Requirement |
| SQC | Software Quality Correctness |
| SQE | Software Quality Efficiency |
| SQIP | Software Quality Interoperability |
| SQM | Software Quality Maintainability |
| SQRE | Software Quality Reliability |
| SQP | Software Quality Portability |
| SQS | Software Quality Security |
| SQT | Software Quality Testability |
| SQU | Software Quality Usability |
| WCR | Web Client Requirement |

# Appendix B: Indexed Requirements

## Mobile Client Requirements

* **MCR-01**: Mobile requirements are not required. These pages are intended to be displayed on larger screens such as desktops or large wall monitors. They are not intended for the handheld scanners used in the warehouse.

## Web Client Requirements

* **WCR-01**: The web pages shall be designed for Internet Explorer 9 and above. Beginning with IE 10 compatibility node is required for the WMS system.
* See WCR-02 about programming for multiple browsers

## Server Database Requirements

* **SDR-01**: The web service method shall collect data using the WMS entities data model which connects to the appropriate database.
* **SDR-02**: The webpages are presentation layer only and do not access the database directly. Only the WMS web service shall access the database on behalf of the web pages.
* **SDR**-**03**: The database is the standard SQL Server already included with the WMS product. No additions or changes necessary since these pages display existing data.

## Product Operation Requirements

Correctness

* + **SQC-1:** The project shall include unit tests and system tests detailed in another document.
  + See SQT-2, SQRE-1 & SQRE-2 above for details about messages when there are data errors.

Efficiency

* + See SQE-1 and SQE-2 above for page load performance requirements. The system must be efficient enough to support these requirements.
  + **SQE-3**: All software in the project should release objects as soon as possible to minimize memory usage
  + **SQE-4**: Database queries in this project need to consider a balance of efficiency between entire entity objects & anonymous objects; between joins & decoupled queries; and other such normal concerns.

Usability

* + **SQU-1:** User documentation will be provided in a manner consistent to other modules of the WMS system. In this case a white paper will be developed that explains how to use the pages within Acme’s environment. The white paper will be posted along with similar white papers for other parts of the system.

## Product Revision Requirements

Maintainability

* + **SQM-1:**  The software shall be stored in the appropriate source control system with check outs required to make changes.
  + **SQM-2**: All supporting documents shall be stored with Acme’s other WMS documentation on the project’s website.

Testability

* + **SQT-1:** The software shall implement diagnostic logging per usual Acme WMS standards as below:
  + **SQT-2**: Serious errors that deny the user data or might provide bad data to the user must fail with a message to the user in the data grid. The server side web page operation must log the exception to the user’s log file. The web service method must log its exception to the windows event log appropriate to the web service with an Error designation.
  + **SQT-3:** Less serious errors that do not invalidate user data can assume appropriate default actions and continue as long as the problem does not affect data accuracy or the user is informed. The situation still needs to be logged as in SQT-2 with a warning designation. The action taken should be noted in the log.
  + **SQT-4:** The web pages will make the usual Device State entries that all workflows and web pages in the WMS system does. This operation is handled automatically by inheriting the new pages from the system’s base page.
  + **SQT-5:** Testing is to be performed first on the system’s development server. With approval by management it will be promoted to the system’s test server and tested again. When this stage is approved the software may be deployed by itself or in conjunction with other features and fixes as a schedule determined by IT and each warehouse.

## Product Transition and Deployment Requirements

Portability

* + Portability among displays is defined in WCR-01 and WCR-02 above.

Transition

* + This project is a simple addition to an existing system. Therefore, transition for this project is limited to proper testing (SQT requirements), education (SQU-01) and deployment (SD-1)

Deployment

**SD-1**: The product will be deployed by Acme IT personnel using the usual methods of WMS upgrades and installation which are to hand copy required files into the production system on a scheduled developed with users of the system (if there will be a system interruption). Automated methods of deployment are on the backlog but have never made it to top of the priority list.

# Appendix C: To Be Determined List

## As a nonfunctional requirement, these new pages were intended to be a complete model for using CSS tables and JQuery client side scripting in future system web pages. Time limitations may restrict the completeness of the model. The pages should still function as planned, although the underlying technique may be traditional APS.NET server side scripting.