



APPAREL RESEARCH NETWORK (ARN) PROGRAM

Final Technical Report

(SP0103-02-D-0018/0015 Delivery Order 15)

**ARN VIM IRM Implementation at
Kentucky Logistics Operations Center (KYLOC)
Central Clothing Distribution Facility (CCDF)**

Prepared for

**Apparel Research Network (ARN) Program
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PREFACE

This Final Technical Report covers work accomplished for the Apparel Research Network (ARN) of the Defense Logistics Agency (DLA) in conformance with Delivery Order 0015 during the period 1 June 2005 to 31 March 2007.

This short term project specifically covered implementing Virtual Item Manager, Integrated Retail Module, Radio Frequency network, in order to provide the Defense Supply Center Philadelphia (DSCP) retail visibility of the DLA owned inventory located at Kentucky Logistics Operation Center (KYLOC).

This STP incorporated: (1) installation of a local area network; (2) data conversion from the central clothing distribution center (CCDF) legacy databases; (3) installation of a wireless network; (4) implementation of the Integrated Retail Module to capture the issue data; (5) implementation of Virtual Item Manager (VIM) as the inventory management system; and, (6) implementation of CabinetNG as the electronic filing cabinet for all issue forms.

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1.0 Executive Summary

1.1 Overview

Kentucky Logistics Operations Center (KYLOC) is a “virtual prime vendor” of Defense Supply Center Philadelphia (DSCP). Originally KYLOC was established as a means of supporting the clothing requirements of the National Guard Bureau. KYLOC supports 54 states and territories. Since the start of this project, KYLOC began supporting all of the Reserve forces in the United States and its territories as well as supporting the active duty forces in Iraq and Afghanistan. KYLOC has also been an emergency distribution location in support of the 9 recruit training centers as well as other units on a limited basis.

KYLOC developed a web-based ordering system that allows service members (or the authorized ordering official for each unit) to order uniforms with insignia and name tapes directly back to KYLOC. KYLOC downloads these orders twice per day and distributes orders for processing through 3 Branches (Navy, Air Guard and Army). At the outset of this project KYLOC was processing approximately 5,000 total orders per day. By the end of the project, the processing numbers had increased to an average of 7,500 total orders per day.

This project came about because DSCP did not have timely and accurately visibility of the stock position at KYLOC. There was a 45 day delay between the issue of an item until the transactions were sent for posting against the Standard Accounting and Materials Management System/Business Systems Modernization (SAMMS/BSM). Even after transactions were sent to DSCP for posting against SAMMS/BSM, KYLOC Information Technology (IT) personnel did not have visibility of transactions or of SAMMS/BSM on-hand balances that would enable them to monitor and request resolution for transactions that were not posted. In terms of management of stock availability and re-supply decision support, DSCP was blind as to the asset position of stock maintained at KYLOC. AdvanTech was asked to participate in a research and development effort in an attempt to provide DSCP with near real-time visibility of the DLA asset availability.

Conceptually, implementing the Apparel Research Network (ARN) Integrated Retail Module (IRM) to capture and format COA data and using ARN Virtual Item Manager (VIM) for the processing of receipts, adjustments, and Material Release Orders (MROs) would provide DSCP with a proven method of timely updates to SAMMS/BSM. Based on this assumption the project proceeded with the anticipated benefit of providing DSCP with a near real-time visibility of Defense Logistics Agency (DLA) assets located at KYLOC.

1.2 Project Approach

Implementation of VIM and IRM at a site as large as KYLOC was a much more complex task than that experienced at any Recruit Training Center (RTC). Several months of effort were spent evaluating the existing legacy databases and process diagrams provided by KYLOC. The implementation approach for this STP was completed by the following steps:

- (1) Network Evaluation and Design;
- (2) Local Area Network Installation;
- (3) Wireless Network Installation;
- (4) Assess current operational flows and legacy database;
- (5) Assess legacy system interface requirements;
- (6) Modify existing IRM database to accommodate unique KYLOC requirements;
- (7) Develop COA transaction sets for KYLOC's Navy customers;
- (8) Design Scan Form (pick ticket) for Navy Orders;
- (9) Create Clothing Record (Customer Invoice) for Navy Orders;
- (10) Develop an Exchange/Return and Reship function in IRM;
- (11) Develop a synchronization tool to pull daily order data from KYLOC's legacy database;
- (12) Perform concurrent testing of Navy order download, Navy order scan forms process, Navy order exchanges/returns, Navy order reshipments, and Navy order modifications;
- (13) Modify VIM to accommodate the KYLOC replenishment request process;
- (14) Train Navy and Customer Service users on IRM and VIM

- (15) Convert legacy data for Bulk warehouse and Navy stockroom;
- (16) Go Live with IRM in Navy Branch and Customer Service;
- (17) Go Live with VIM across all Stockrooms; and,
- (18) Site Support.

1.3 Short Term Project (STP) Objectives

Ultimately the goal of this STP was provide a more efficient method of sending data to DSCP and provide greater visibility of the stock position at KYLOC to DSCP. The specific objectives were to:

- Implement the ARN VIM IRM system capabilities to provide KYLOC automated data entry and transaction management processes for their issues, receipts, physical inventories and stock movements;
- Establish high speed Internet communications of IRM-generated MILSTRIP transactions for processing in VIM to update the quantities on hand for each NSN, and push these transactions to SAMMS/BSM twice a day; and,
- Provide DSCP Item Managers on-line, real-time visibility of current quantities on hand at KYLOC.

There were also several opportunities at the outset of this project where ARN could bring efficiencies to the current process.

- Using VIM as the inventory management tool would provide real-time visibility of DLA assets to DSCP;
- VIM would also provide greater visibility of all stockroom assets throughout KYLOC;
- VIM and IRM together would provide a more efficient mechanism to send and track transactions that update BSM;

- Modifying the IRM program would create a more efficient process of printing pick tickets/scan forms thereby reducing the time required to sort and distribute the daily orders;
- Combining multiple functions to a single workstation could streamline the order processing;
- Modifying the logic used to change orders and subsequently modifying the IRM program duplicate shipments could be reduced;
- Incorporating wireless technology for stock moves, receipts, location surveys and physical inventory could increase inventory accuracy; and,
- Changing the recording of locations in the bulk warehouse would increase the efficiency of the physical inventory process.

1.4 Pre Conversion Workflow Process

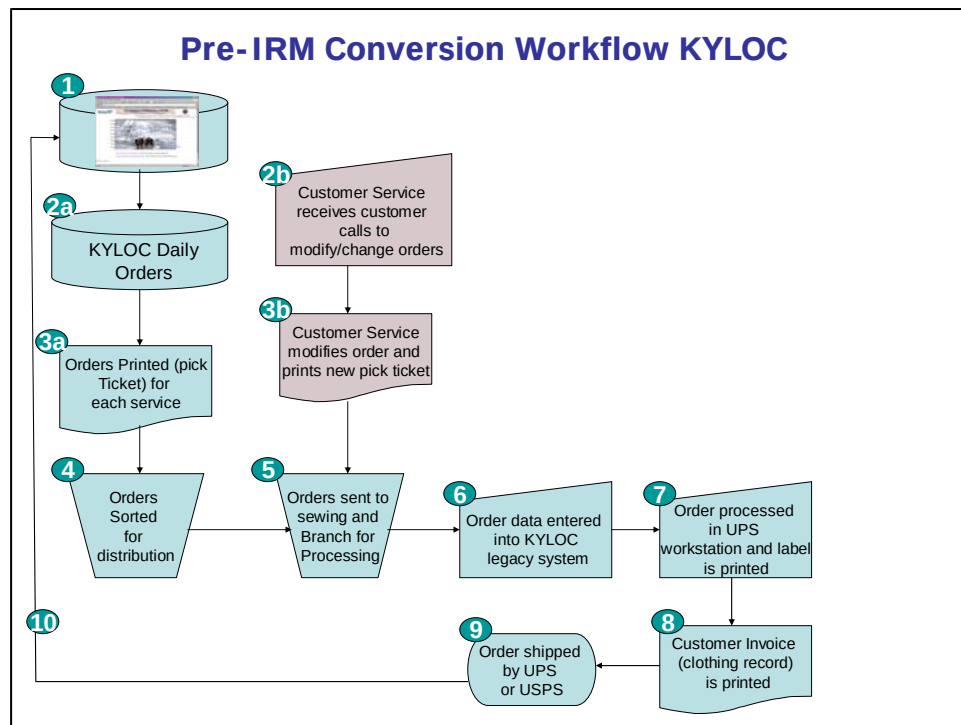


Figure 1 - KYLOC Orders Workflow Pre-Conversion

In the above workflow diagram of the KYLOC legacy system process the bullets are described below:

1. Customers place orders on the KYLOC Ordering website www.kyloc.ky.gov/ccdfinv.
2. Every morning the Customer Support staff download orders from the website and accept telephonic changes to orders.
3. Customer support staff print pick tickets and all daily reports.
4. The staff then segregate the orders for each Branch (there are 3 Branches at KYLOC), and further segregate the orders that have a sewing requirement.
5. These orders or pick tickets are then delivered to the appropriate Branch where stock is pulled and placed in a tote.
6. Every order is validated by Quality Control (QC). QC compares the order to the items in the tote. QC also inspects to make sure that the correct name has been sewn on the shirts. QC scans the requisition number from the order. The application then displays the order and QC either accepts or modifies the quantity to reflect the quantity actually issued.
7. The order is then pushed down to the United Parcel Shipping (UPS) workstation where a shipping label is printed and affixed to the shipping box.
8. The order is pushed to the “shipping” workstation. The Requisition Number is scanned and the clothing record is printed and placed in the shipping box. KYLOC maintains 1 copy of the clothing record filed by last name.
9. The order is then shipped to the requesting customer.
10. The tracking number from the shipping label is then passed back to the website and associated with a specific order. This provides the customer with information about the shipment.

The following table illustrates the volumes of orders processed for the US Navy during the first year following the implementation of the ARN VIM IRM capabilities. The number of Navy orders processed did not show any significant change since the conversion to the new system capabilities.

It was projected that implementing VIM IRM throughout KYLOC would increase asset visibility and this would result in a decrease in the numbers of backorders at KYLOC. As indicated there was not any significant decrease in the Navy backorders although the systems implemented did provide more accurate and timely information on the asset levels for each item stocked, i.e., increased asset visibility for KYLOC and DSCP personnel. As shown, over the initial 12 month period following implementation of VMI IRM capabilities to support the Navy stockroom, KYLOC averaged a 33% fill rate on new incoming orders. The following table provides detailed data on orders processed and backorders during that period.

US Navy Orders Processed						
Year	Month	New Orders	Orders Filled	% Orders Filled	Back-Orders	% Back-Ordered
2006	12	3585	1567	44%	2018	56%
2007	1	3648	906	25%	2742	75%
2007	2	2488	1016	41%	1472	59%
2007	3	2502	973	39%	1529	61%
2007	4	2492	1174	47%	1318	53%
2007	5	2798	574	21%	2224	79%
2007	6	3069	1097	36%	1972	64%
2007	7	2673	624	23%	2049	77%
2007	8	2594	523	20%	2071	80%
2007	9	2579	584	23%	1995	77%
2007	10	1205	585	49%	620	51%
2007	11	1638	399	24%	1239	76%
Averages/month		2606		33%	33%	67%

Table 1 – Navy Orders Processed in First Year of ARN VIM IRM Operation

As a result of the added visibility of assets at KYLOC, personnel reported better response from the supporting Customer Account Specialists (CASs) at DSCP. Overtime, it is projected that this trend will continue with a shift in the flow of gear to KYLOC that more closely matches the

actual requirements. Also by providing the rolled-up back-orders to KYLOC customers in VIM, the CASs can easily identify the items / national stock numbers (NSNs) needed to fill those backorders.

1.5 ARN System Architecture

The following figure illustrates the ARN System Architecture as implemented at KYLOC. This section provides a summary discussion of the implementation process and issues encountered.

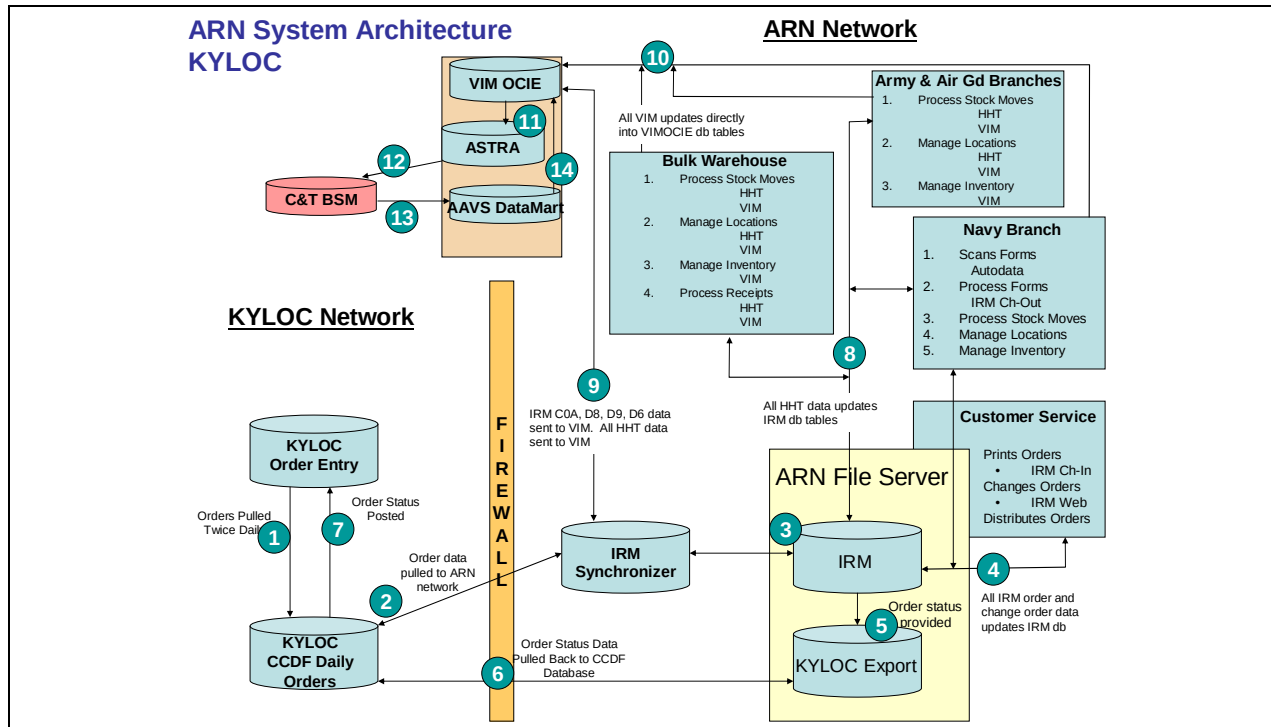


Figure 2 - ARN System Architecture KYLOC

Implementing the ARN VIM IRM System Architecture and data flows proved to be very complex to meet KYLOC operational requirements. There were additional interfaces and one additional database required for this implementation of the ARN VIM IRM solution. As depicted above:

1. KYLOC Customer Service runs a legacy job to pull orders from the KYLOC ordering database;
2. KYLOC order data is pulled to the ARN network through the IRM Synchronizer across the ARN firewall;
3. IRM Database is updated with new order data;
4. KYLOC Customer Service prints scan forms from IRM Check-In and modifies orders and reprints forms using IRMWeb, and Navy Branch processes forms using IRM Check-Out;
5. Order status is written from the IRM database to the KYLOC Export database;
6. KYLOC IT staff pull status back;
7. IRM order status is posted to the KYLOC ordering website;
8. All inventory data collected with the HHT is updated to IRM database tables;
9. IRM synchronizer sends all IRM issue/exchange data and all HHT transactions to VIM through a secure VPN connection;
10. Users update VIM directly with Receipts, Stock Moves, Adjustments, Location Data;
11. Receipt, Issue and Adjustment data is sent to ASTRA;
12. ASTRA sends data to BSM;
13. The AAVS DataMart pulls data from BSM; and,
14. Updated AAVS DataMart data is pulled into VIM.

The system consists of several components: 1) IRM Check-In; 2) IRM Check-out; 3) IRM Web; 4) AutoData; 5) CabinetNG; 6) Handheld Terminal applications; 7) Local Area Network (File Server, DNS Server, Cisco Router, 7 switches, 18 wireless access points, 7 ARN workstations, and 14 HHTs); and, 8) a cross domain connection between the KYLOC network and the ARN network allowing users to access the IRM Web application from their internal KYLOC workstations.

[illegible]

Activity	6 / 05	7 / 05	8 / 05	9 / 05	10 / 05	11 / 05	12 / 05	1 / 06	2 / 06	3 / 06	4 / 06	5 / 06	6 / 06	7 / 06	8 / 06	9 / 06	10 / 06	11 / 06	12 / 06	1 / 07	2 / 07	3 / 07
Clothing Record																						
IRM Web																						
VIM Modifications																						
Go Live & Support																						
IRM Check-Out Modifications																						
IRM Web Modifications																						
Network Modifications																						
VIM Modifications																						

Table 2 – ARN VIM IRM Project Timeline

1.6 Summary of Lessons Learned

The following items highlight the key lessons learned that needed to be considered for future rollout efforts of the multiple stockroom functionality and other enhancements:

- **Concurrent Testing** – There were several surprises after the initial “go live” that would have been caught had a more realistic concurrent testing been incorporated in the pre “go live” phase of the project.
 - The concurrent testing did not include pulling daily orders. The same subset of daily orders was used throughout the test phase.
 - This prevented the testing and validation of every possible C0A MILSTRIP string, prevented the mimicking of backorder and change order data and subsequent validation of C0A, D9 and D8 transaction sets, and prevented the realistic testing of releasing backorders.
 - Subsequent stockrooms brought on to IRM should have a 2 month period

of concurrent testing where the daily orders are downloaded to IRM Test each day.

- KYLOC should provide a file of the previous day's activity, and the same activity should then be mimicked in IRM with all test transactions updated to a KYLOC Export Test database that KYLOC IT staff validate and certify.
- **Conversion** – The conversion should be tested and validated. There were problems with the conversion of the historical data. Not all of this data was identified and therefore not all of the data was converted. The problem occurred when Customer Service needed to access this data several weeks after “go live”. KYLOC should validate and sign-off on the data conversion. There should be 3 validated conversions prior to the final “go live” conversion.
- **Network Coverage** – The local area network (LAN) had very good coverage with a few exceptions.
 - The wireless network coverage was initially designed to provide coverage at key areas where stock was actually in processed into the stockrooms. KYLOC requested that each stockroom be provided with 100% coverage of all areas.
 - Initially a wireless bridge was used to connect the Bulk Warehouse to the main network. Weather proved to be a problem and the wireless bridge equipment was hit by lightening twice and had to be replaced. After the second event KYLOC IT redirected a fiber connection from the KYLOC switch to the ARN switch in building 14. AdvanTech created a VLAN to separate the KYLOC network from the ARN network and connect building 14 ARN network to the main ARN network.
- **HHT Synchronization** – The stock move process using the handhelds to immediately ship and receive stock from one warehouse to another is an excellent tool. However, there was a problem with the speed at which data was available to populate the HHT. Initially the stock move request generated in VIM was taking up to 2 hours to synchronize back down to the HHT. By the time the data was available, the warehouse had already pulled and shipped the stock. Several stock move transactions were “lost” during this phase of the project. AdvanTech modified the synchronization tool to link directly to the VIM production database. Stock move transactions were then available within 5 minutes of a user requesting stock in VIM.

➤ **Equipment –**

- The average volume of forms to be scanned at KYLOC is double the quantity of the largest RTC at the RTC's busiest time. The scanners used at the RTC cannot accommodate the volume of transactions and the speed at which KYLOC will need to process for Army Branch orders.
- The printers used at KYLOC should be changed to meet the printer specifications already in use by KYLOC on their legacy system. Initially Lexmark printers were installed. The Lexmark printer requires replacement of the printer cartridge every 4 weeks, and KYLOC will have trouble purchasing these "non-standard" consumable supplies. Switching to the HP printers allows for the normal re-supply of consumable printer products.
- A redundant failover server should be onsite at KYLOC. The operations at KYLOC cannot support a 1 to 2 day downtime should a catastrophic failure occur on the current file server.

➤ **Deployment Team –**

- The KYLOC operation was much larger than any site that AdvanTech has previously converted. KYLOC consists of 4 separate stock rooms, operates three shifts in support of their clothing mission, has over 23 VIM users, has approximately 18 daily HHT users, and currently has 12 IRM users.
- The deployment team was too small to adequately cover the space and number of users during "on-the-job" training prior to "go live" and the team was too small to cover the initial post "go live" support.
- The deployment team should include: (1) at least one team member who can support the network for the pre "go live" (2 weeks) and the post "go live" (2 weeks) on site support; (2) at least two trainers for first and second shift and one trainer for third shift; (3) one software engineer on site for the pre and post "go live" period; and, (4) the project manager.

➤ **Inventory Data for VIM –**

- Only two of the four stockrooms were initially completely converted to support with VIM IRM capabilities (Navy and Bulk Warehouse). The remaining two stockrooms supporting the Air Guard and Army will not

be completely converted to VIM until they are brought on line with IRM for issue data capture.

- KYLOC had performed a complete inventory of the Navy Branch and a partial inventory of the Bulk Warehouse. These inventories were conducted during the September/March 2006 time frame. The time between the inventory and the actual “go live” was delayed and there was no way to assure DSCP that the inventory numbers had updated BSM. KYLOC is now conducting “spot” inventories by PGC to reconcile the numbers.
- In the future, the two remaining stockroom quantity on-hand will be converted from the data in the KLOC legacy database, and a complete inventory of the stockroom should be conducted using VIM inventory functions within 1 week of the VIM “go live.”
- Following conversion of the remaining stockrooms, KYLOC and DSCP personnel will have enhanced visibility of the assets maintained to meet / fulfill customer orders using the ARN VIM IRM capabilities.

1.7 Summary Objectives & Results Achieved

There were several objectives defined at the start of this project including the following:

- Implement ARN VIM IRM to provide KYLOC automated data entry and transaction management processes for their issues, receipts, physical inventories and stock movements;
- Establish high speed Internet communications of IRM-generated MILSTRIP transactions for processing in VIM to update the quantities on hand for each NSN, and push these transactions to SAMMS/BSM twice a day; and,
- Provide DSCP Item Managers on-line, real-time visibility of current quantities on hand at KYLOC.

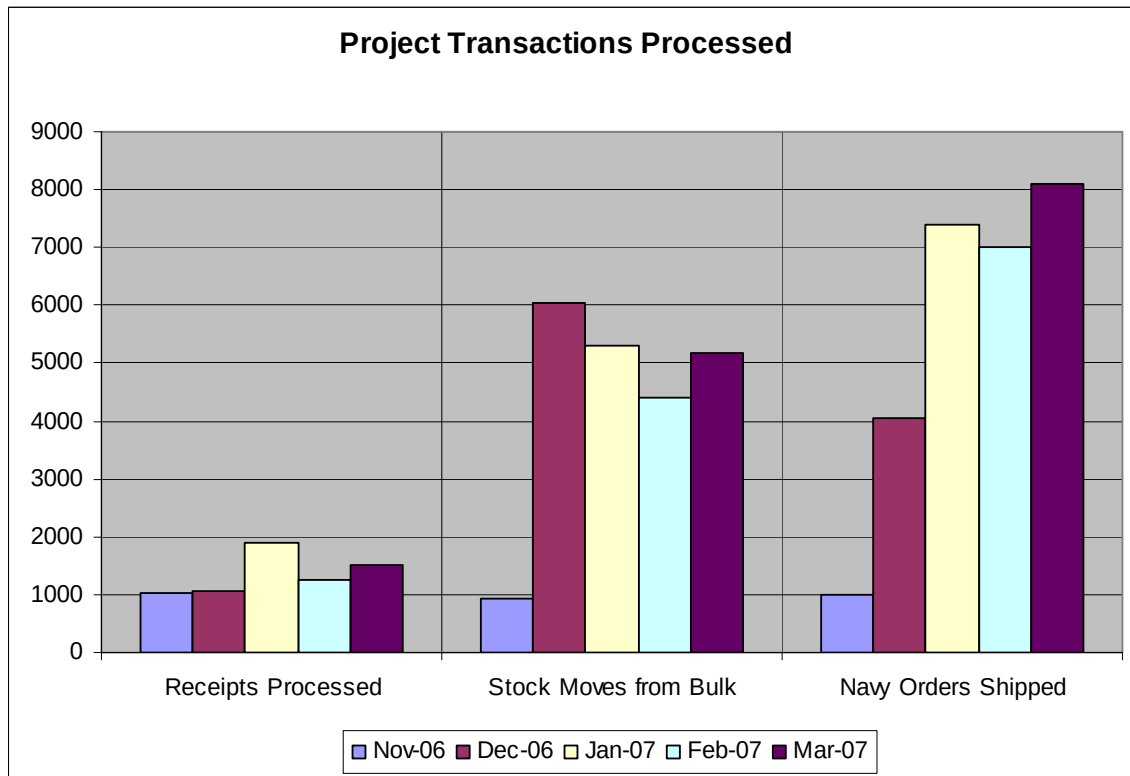


Figure 3 – Transactions Processed

1.7.1 Implement ARN VIM IRM

IRM was implemented for the Navy Branch. All issues made to Navy Branch customers are captured by IRM and formatted into the appropriate MILSTRIP formats. MILSTRIPs can be processed throughout the day for update to VIM and BSM.

VIM was also successfully implemented. All stock moves between each stockroom are captured with appropriate accompanying internal adjustments. All receipts, credit returns, MROs, and external adjustments are processed through VIM and transmitted to BSM daily.

1.7.2 High Speed Internet Connection to Push Transactions to VIM

An extensive network was installed at KYLOC which included the wireless infrastructure that made it possible to take advantage of the operational efficiencies of HHT technology. A T1 line was also installed to allow for the near continual update of data from the KYLOC ARN network to the VIM production database.

1.7.3 Visibility of KYLOC Inventory

DSCP has better visibility of the current stockrooms supported with ARN IRM capabilities in two ways. First, using VIM, all authorized DSCP Customer Account Specialists (CAS) and Supply Planners can see the actual near-real time balances on any stock number at KYLOC. Second, BSM is more up-to-date because of the frequency and tracking of transaction-set updates sent from VIM. Prior to the implementation of VIM, some transactions were never sent to BSM from KYLOC.

As noted earlier, following conversion of the remaining stockrooms, authorized KYLOC and DSCP personnel will have enhanced visibility of the assets maintained to meet / fulfill customer orders using the ARN VIM IRM capabilities. It is projected that this will facilitate a continued trend towards the reduction of back-orders and enhanced customer order fulfillment.

2.0 ARN Network Implementation

The following figure provides a high level overview of the systems architecture and network diagram of the KYLOC ARN network. The figure shows the relationship of the nodes providing interfaces and communications to the Internet capabilities essential to providing access to the ARN IRM systems and visibility of assets for improved support to KYLOC order fulfillment processing.

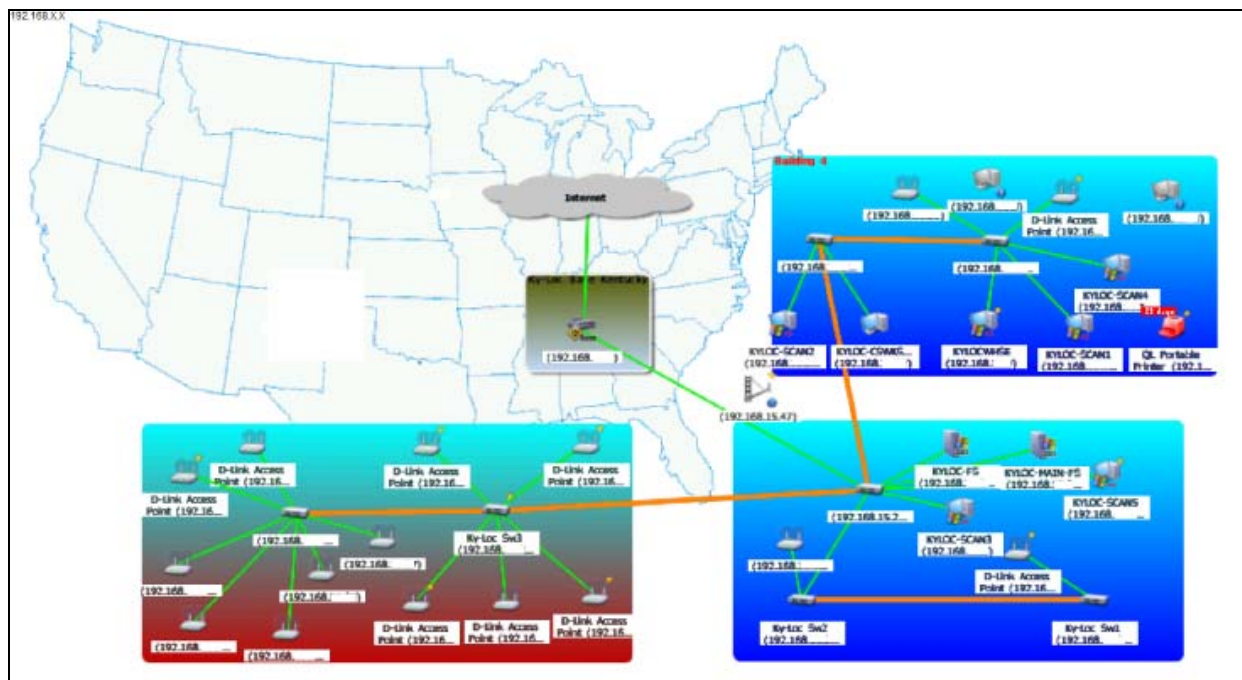


Figure 4 – Network Devices

AdvanTech established a local area network which included a wireless network. The local area network consisted of a file server, domain controller, Cisco Router, 7 switchers, 18 wireless access points, 14 hand held terminals, and 7 workstations. The initial network design was based on providing full network coverage for all primary work locations that would be using IRM and where the HHTs would need to have active connection to the server. In order to accomplish this AdvanTech made several assumptions:

- The stock move function on the HHT was the only function that required an active connection to the server. Therefore, wherever stock moved into the various stockrooms that would be the one area that had to a constant and active connection to the server.
- All other functions on the HHT required a download of data (all dues-in are downloaded to the HHT, all inventory data for the physical inventory is downloaded to the applicable HHT based on user accounts).
- The initial design did not include wireless coverage in the various offices nor in areas of the stockrooms where stock moves were not entering or leaving the building.
- Network drops were provided in each production area where forms will be scanned, 2 drops were provided in the Customer Service office, and 2 drops were provided in the main Bulk Warehouse office.
- VIM users would not need an ARN workstation in order to process transactions or view reports in VIM. It was decided that in offices where IRM was not used no network drops/connections would be required.

2.1 Overview of System Architecture

The following figure provides a detailed view or schematic of the network layout in the KYLOC facilities. The bullets following the figure summarize the specific challenges and resolutions to meeting the networking infrastructure requirements at KYLOC.

During the project, a substantial portion of the effort was directed to ensuring a thorough understanding of operational requirements. This was followed by careful implementation of ARN IRM system hardware components with testing to ensure adequate scalability of systems to meet operational needs.

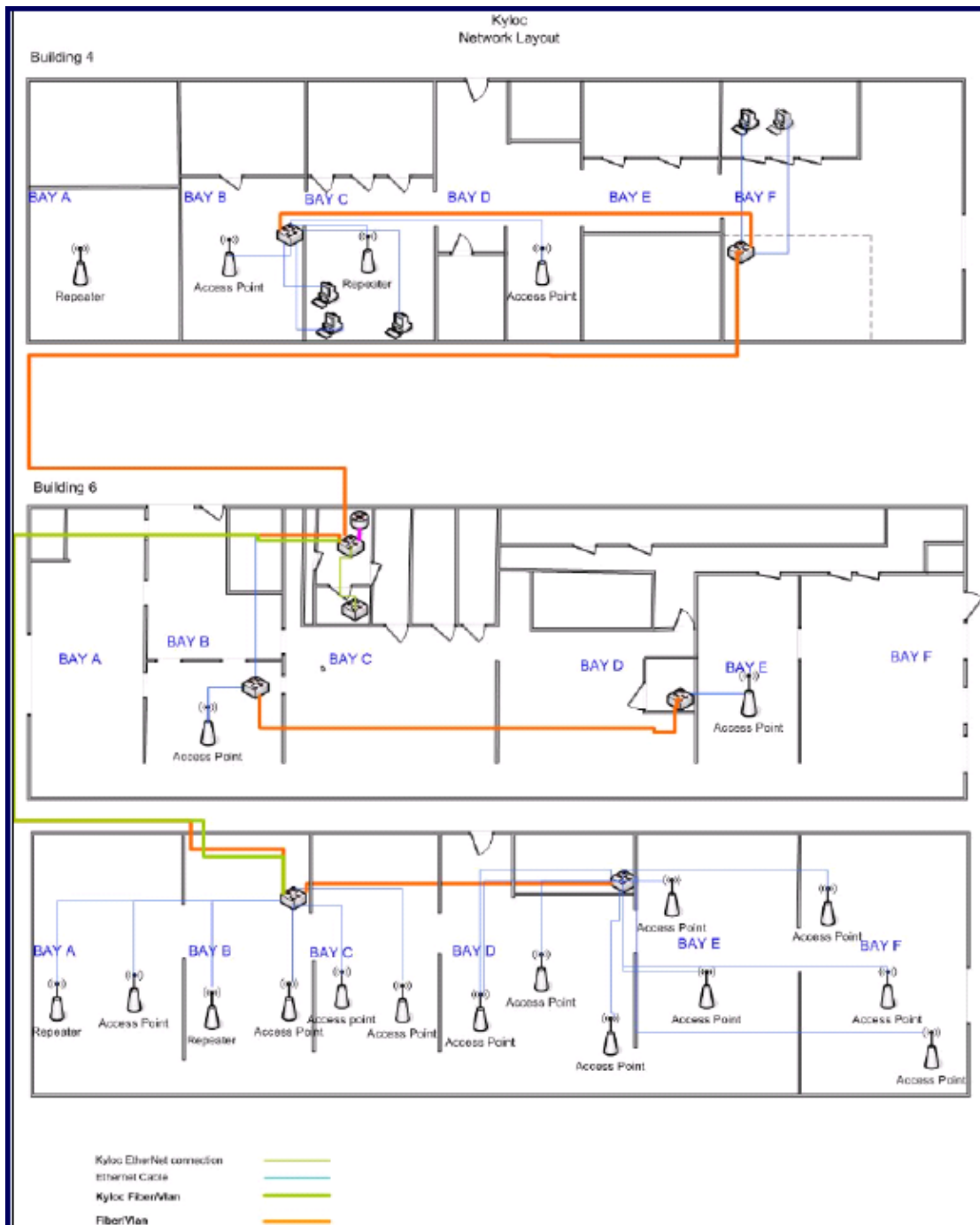


Figure 5 – Detail Network Diagram

The following outlines the specific challenges and resolutions to the networking infrastructure at KYLOC:

- Network Security:
 - Servers (type and OS and Apps)
 - Router
 - Policies
 - Internal connections (ARN, ATI)
 - VPNs
 - External connections (KYLOC)
 - VLANS
 - Workstation OS and Apps
 - Virus Protection
 - Network Monitoring
 - Backup Policy and Procedure
- Wireless Security:
 - Access Point Configuration
 - HHT OS and Configuration
- Account Security
- ISP support: DSL to T1 line...

3.0 Implement And Integrate The ARN VIM IRM System

3.1 Integrated Retail Module (IRM)

3.1.1 Overview - IRM

The IRM implementation was much more complex than any Recruit Training Center implementation of IRM. Interfaces to and from the KYLOC legacy database were required, a faster synchronization tool between VIM and IRM was required, an additional interface to CabinetNG was required, 33 scan forms were required, and ultimately an IRM Web application was needed.

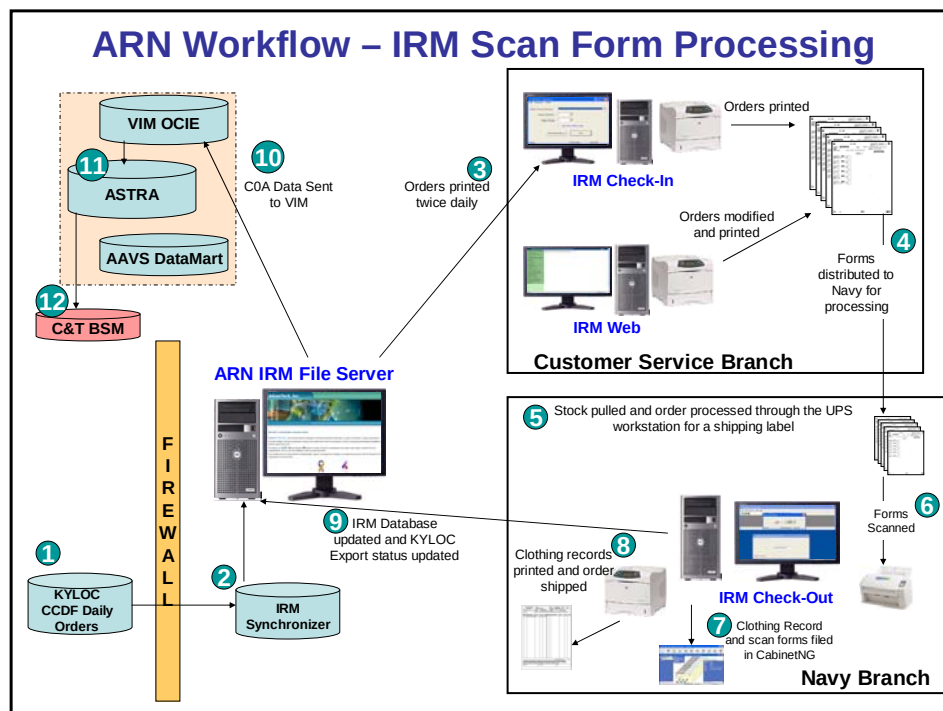


Figure 6 – IRM Workflow

The numbered bullets above depict the following workflow:

1. KYLOC legacy system captures orders;

2. IRM synchronizes the legacy order data and pushes to the IRM database;
3. Orders available to print are displayed in IRM Check-In and are printed;
4. Scan Forms are distributed to the Navy Branch for processing
5. Stock is pulled and the orders are processed on the UPS workstation and a UPS label is affixed to the package;
6. Forms are scanned and processed in IRM Check-Out,
7. Scan Forms and Clothing Records are filed in CabinetNG;
8. Clothing records are printed and affixed to the outside of the package;
9. IRM is updated and order status is pushed to the KYLOC Export database;
10. C0A data is pushed to VIM;
11. ASTRA validates C0A format; and,
12. C0A data is pushed to BSM.

3.1.2 Components – ARN IRM

ARN IRM consists of several software components all working in concert to maintain accurate service member issue data. Some of these components are new and designed specifically for the KYLOC implementation of IRM. These components, their purpose and modifications made to meet KYLOC requirements are described in the following table.

Name	Purpose	Modifications
CabinetNG	(COTS) Electronic Filing Cabinet for the Scan Forms	Added an additional interface to file the Clothing Record
AutoData	(COTS) OCR Application used to scan forms	Developed 33 separate forms
IRM Check-In	Prints forms for daily orders and updates IRM database	Modified to allow user to print by service category, DoDAAC, and/or priority. Automatically sorted orders to prevent manual sorting by Customer Service
IRM Check-Out	Scans Forms and updates IRM database and generates the COA transactions	
IRM Shipment Tracking	New Application to associate UPS shipping label data to original customer order	Later merged into IRM Check-Out
IRM Web	New application used to Release Backorders, Process Exchanges, Release Orders for Reshipment, Process Substitutions to Orders, Change Orders, Research Service Member Specific Data and Monitor Status of IRM processes	Generates D8, D9 and D6 (return) transaction sets later sent to VIM by the synchronizer
KYLOC Export	New database that is updated continuously as data is processed in IRM. Provides current status of all orders for posting by KYLOC to the KYLOC ordering website	
IRM Synchronizer	Pulls data from the KYLOC Legacy Database to populate IRM, pulls data from VIM to populate IRM and sends data directly to VIM	Modified to send data directly to VIM and to pull data from VIM to update new IRM tables needed for IRM Web actions and HHT processing
RF Server	Monitors and controls the data sent to the HHTs	

Table 3 – ARN IRM Software Components

3.1.3 Objectives IRM

The short term project objective for IRM was to implement a process that would provide KYLOC automated data entry and transaction management of their issues. IRM has been

successfully implemented in terms of speed and processing of the issues from the KYLOC Navy Branch. Additional efficiencies were provided with the automatic electronic filing of the Scan Form and the Clothing Record for each shipment. IRM Web provided a web-based application that enhanced the IRM users ability to research IRM transactions, follow-up on backorder data, and review service member specific historical files.

The IRM implementation got off to a slow start in November with only 993 scan forms processed. This averaged out to approximately 90 scan forms per day. This number included regular orders as well as backorders that were released. However, by March 2007, a total of 8093 scan forms were processed averaging 367 forms per day. The Navy Branch typically uses only one of two scan stations to process all of the orders through the Branch. The COA data can be compiled throughout the day; however, the Navy Branch chooses to only run the MILSTRIP program once per day. This MILSTRIP data is then sent through the IRM Synchronizer program to VIM within a few minutes.

The improved processing time was attributed to several factors:

- The IRM Check-Out program was modified to include the IRM Shipment Tracking application. This reduced the number of steps required by the user to process the scan form;
- IRM Check-Out was modified to immediately process the issue data as soon as the AutoData scan had completed.;
- IRM Check-Out was modified to allow users to process orders that were completely backordered by simply scanning the bar-coded requisition number on the scan form; and,
- Users became faster through the repetitive process of using the system.

There were also some initial problems with complete data capture that were identified by the Navy Branch Chief. The Branch Chief noticed that on occasion some items were being backordered even though they had not been indicated as backordered on the scan form. After researching this problem, IRM Check-Out was modified to validate the original order data

against the scanned data and an automatic validation window displayed for the user to select the correct issue quantity if a mismatch occurred.

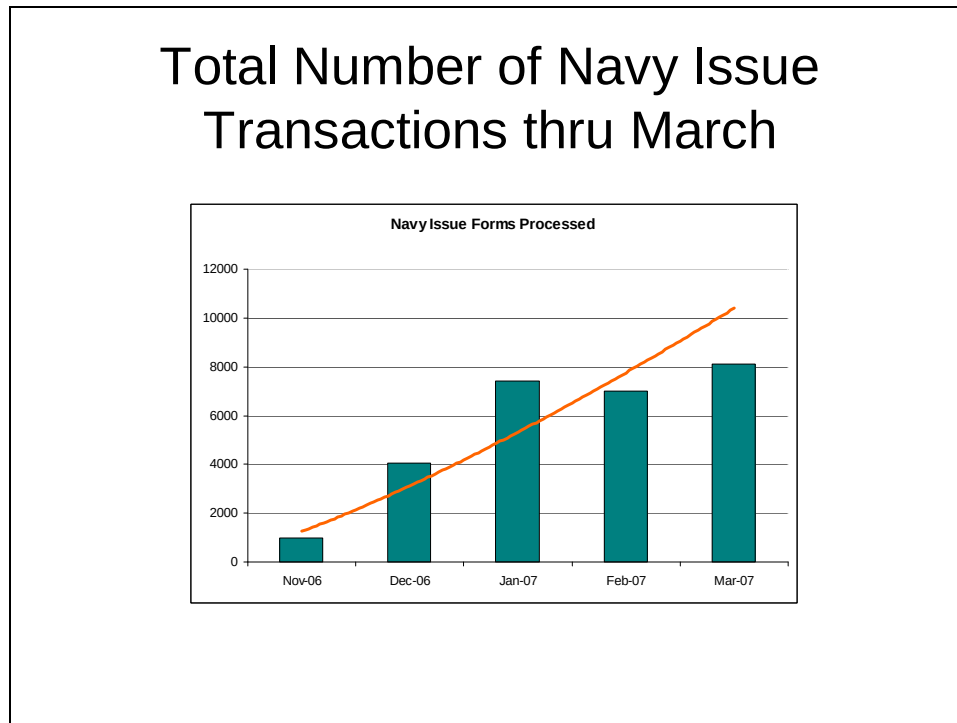


Figure 7 – Navy Scan form Statistics

3.2 Virtual Item Manager (VIM)

3.2.1 Overview VIM

VIM is a proven tool used to manage retail inventory while providing total asset visibility to DSCP. The data transmission conventions are also proven to help audit the transaction updates to BSM. Through these proven techniques ARN is better able to ensure a closer reflection of the stock position reflected in BSM to that of the stock position reflected in VIM. This in turn provides DSCP with the ability to plan for and push the right stock in the right quantities to KYLOC. The tools that provide this support to DSCP include: (1) VIM production database, (2) ASTRA database, and (3) wireless technology for faster data capture.

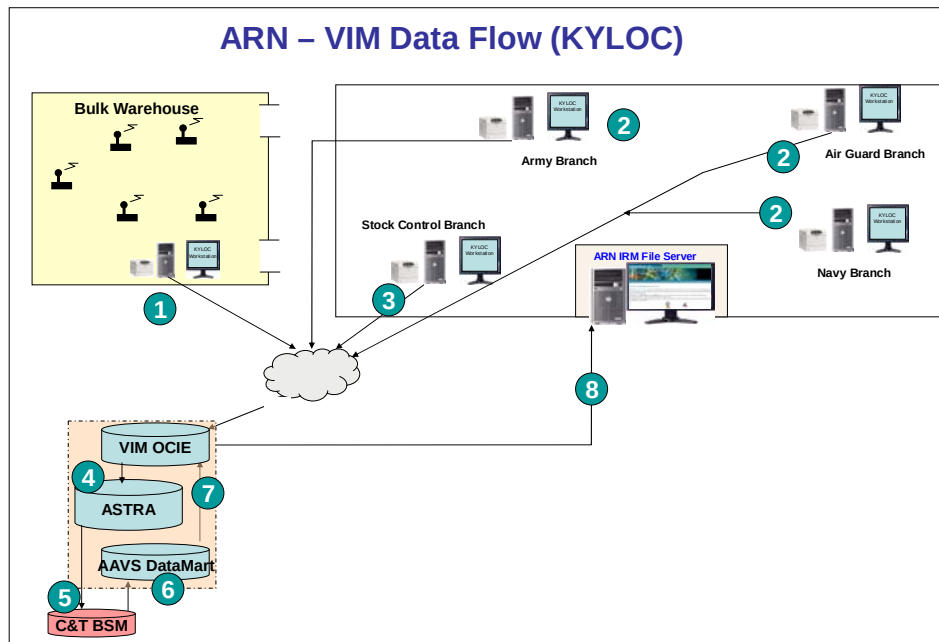


Figure 8 – ARN VIM Data Flow

The numbered bullets above depict the following workflow:

1. Bulk Warehouse processes receipts, MROs, adjustments, and location adjustments directly to VIM through a KYLOC workstation;
2. Army, Air Guard and Navy Branches process stock moves, adjustments, physical inventory counts, and location adjustments directly to VIM through a KYLOC workstation;
3. Stock Control Branch processes receipts, DD250 receipts, adjustments, credit returns, and physical inventory counts directly to VIM through a KYLOC workstation;
4. VIM OCIE sends transactions to ASTRA;
5. ASTRA sends transaction data to BSM;
6. AAVS DataMart pulls BSM data;

7. VIM pulls data updates from AAVS DataMart; and,
8. Updated location, due-in, on-hand, and stock move data is pulled into the IRM database.

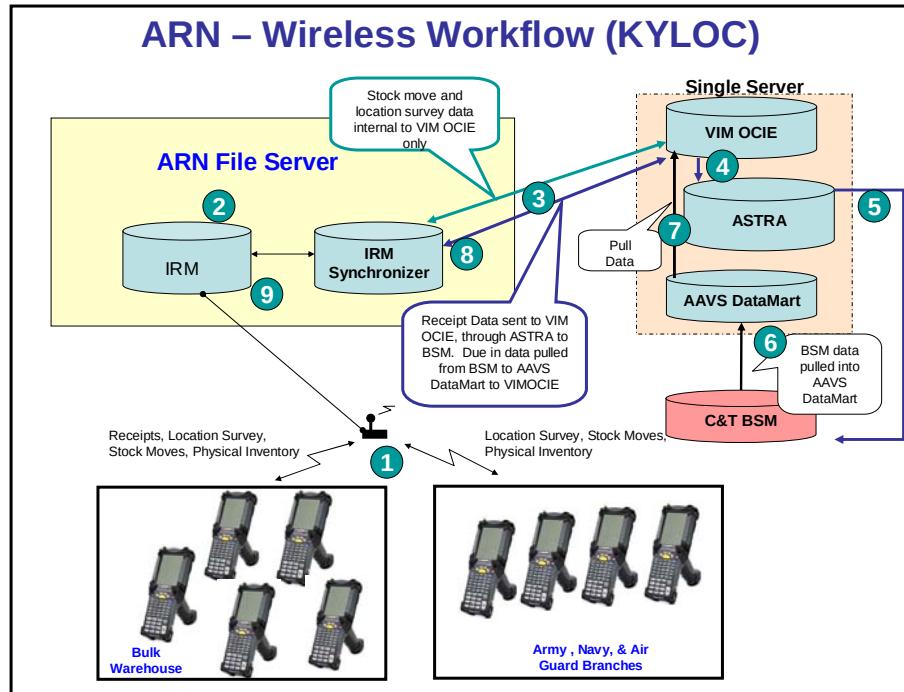


Figure 9 – ARN Wireless Workflow

The numbered bullets above depict the following workflow:

1. Branches send inventory transaction data;
2. IRM database holds inventory transaction data;
3. Data is sent via the IRM Synchronizer directly to VIM;
4. Receipt Data is validated in ASTRA;
5. ASTRA forwards receipt data to BSM;
6. BSM data is pulled into AAVS DataMart;

7. VIM is updated with Due-In data;
8. VIM data (location, due-in, stock move, quantity on-hand) is pulled by IRM Synchronizer; and,
9. IRM tables are updated and available for processing.

3.2.2 Components – VIM

VIM is comprised of several components that provide the retail site with the functionality needed to accurately manage DLA inventory assets. Each of these components, their purpose and the modifications to meet KYLOC operational requirements are described in the following table.

Name	Purpose	Modification
Virtual Item Manager - OCIE	Retail Inventory Management Tool: ➤ Process Receipts ➤ Process Adjustments ➤ Capture Issues ➤ Process Credit Returns ➤ Process Physical inventory ➤ Manage Locations ➤ Transfer Stock within KYLOC ➤ Process MRO shipments ➤ Manage BSM Push List requests	➤ Combined Wholesale Local and Wholesale into a Single OCIE database, ➤ Added a replenishment request feature, ➤ Added replenishment history report, ➤ Added stock move report, ➤ Modified view credit report, ➤ Added a schedule users for inventory function, ➤ Modified stock move report, ➤ Modified Bin Label report
ASTRA	Validates MILSTRIP Transactions and sends to BSM	
AAVS DataMart	Pulls updated BSM data for population into VIM OCIE tables	
VIM ASAP	Process MRO shipments to other sites, Process DD250 receipts.	
HHT Appliaionts	➤ Process Receipts, ➤ Process Stock Moves between stockrooms, ➤ Process a location survey, ➤ Process a Physical Inventory	➤ Added a Location Survey Function, ➤ Added the ability to Add NSNs to a location during an inventory, ➤ Modified Stock Move to allow user to cancel an open quantity

Table 4 – Components of VIM

3.2.3 Objectives - VIM

This short term project was proposed to implement ARN VIM to provide KYLOC transaction management of receipts, physical inventories and stock movements. This objective was met for the initial two stockrooms supported. For these stockrooms, the receipts are now processed with HHTs or directly into VIM, adjustments are processed directly into VIM, all issue data is reflected in VIM, all credit returns are reflected in VIM. As noted previously, plans are to expand these capabilities for the other stockrooms in the future. This will provide DSCP with enhanced visibility of the actual near-real time balances on any stock number at KYLOC.

3.2.3.1 Receipts Processed

As indicated in the following graphic, the volume of receipts handled have continued to increase over time. As shown, the volume is tending towards stabilization for branch support activities and will be dependent in the future on the volume of support required.

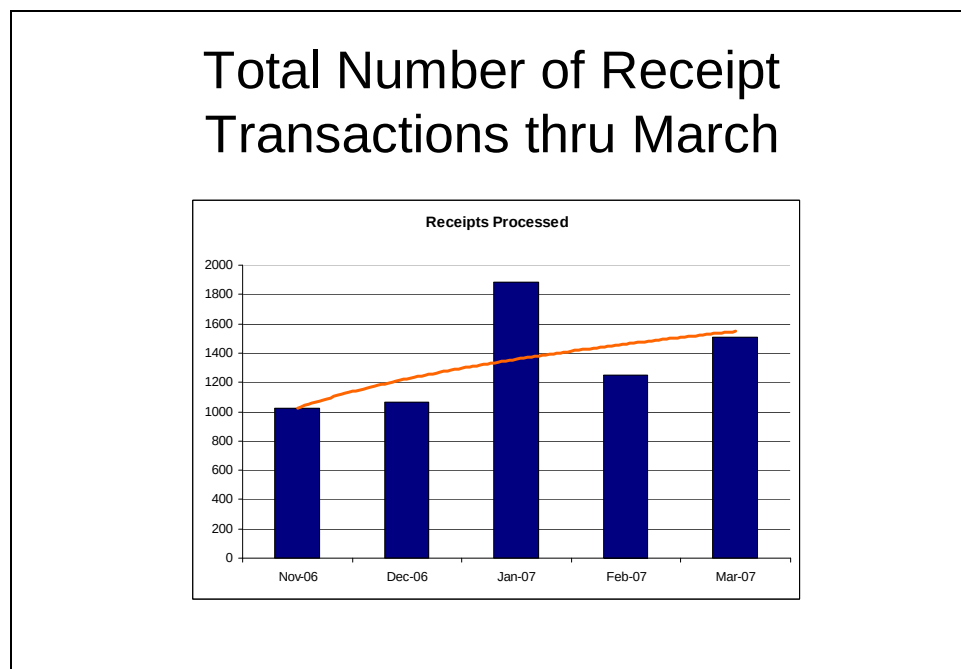


Figure 10 – Receipt Transactions by Month

Receipts are processed by HHTs or directly into VIM averaging about 1350 receipts per month during the 5 month post go live timeframe.

3.2.3.2 Stock Moves Between Stockrooms

As indicated in the following graphic, the volume of inventory handled and the number of stock movements accomplished as a result of the systems implemented have continued to increase over time. Ultimately, this figure is expected to stabilize for branch support activities.

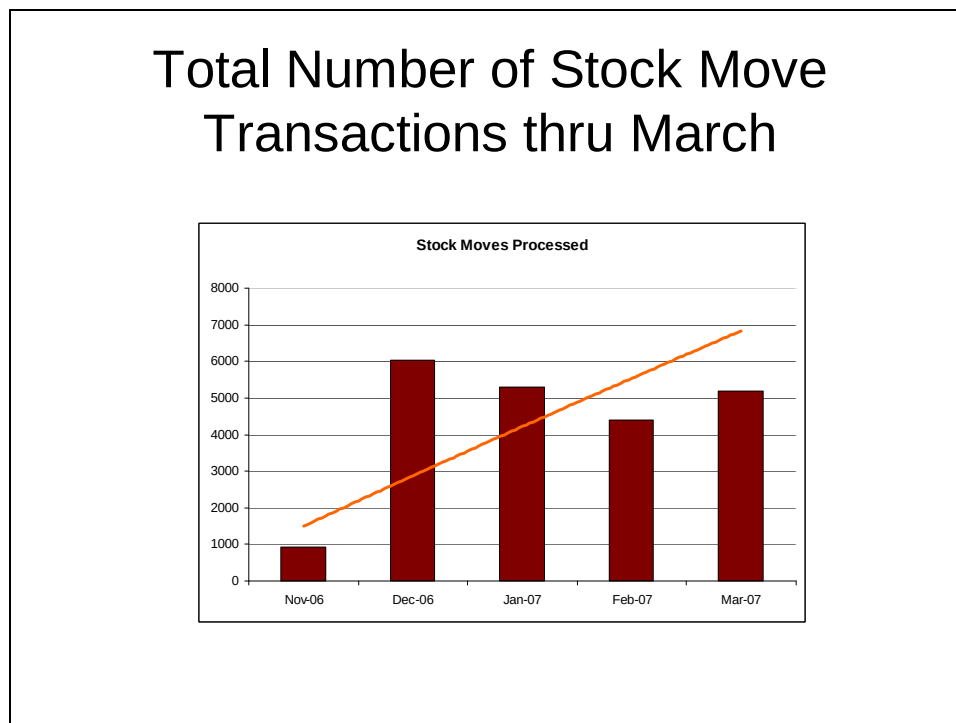


Figure 11 – Stock Move Transactions by Month

Stock moves are processed either with the HHT or directly into VIM. KYLOC averages approximately 4300 stock moves per month.

3.2.3.3 COAs

The following table summarizes the COAs generated since mid-November. Site personnel will continue to monitor this metric of systems performance and synchronization as the use of the systems developed and implemented continues.

COAs Generated Since 11/16/07	
# of COAs	\$ Value of COAs
55,721	\$4,408,723.75

Table 5 – COA Statistics Navy Branch

COA transactions are being generated by IRM and then processed through ASTRA to BSM. To date nearly \$4.5 million dollars in sales have been sent to BSM. These numbers reflect the issues from the Navy Branch only. The issues made from the Army and Air Guard Branches are still processed through the KYLOC legacy system.

3.2.3.4 Inventory Adjustments

The following table summarizes the inventory adjustments sent to BSM since mid-November. Site personnel will continue to monitor this metric of systems performance and synchronization as the use of the systems developed and implemented continues.

Inventory Adjustments Sent to BSM Since 11/16/07		
Type	#	\$
Gains	962	\$8,164,162.08
Losses	632	\$7,604,533.86

Table 6 – Inventory Adjustment Transactions sent to BSM

Inventory Gain and Loss transactions are being captured in VIM and sent to BSM. KYLOC averages approximately 300 transactions per month.

3.2.3.5 Other Transactions

One immediate benefit to the implementation of VIM at KYLOC was the modification of the process used to borrow stock for issue from the NGMMC. Prior to the implementation of VIM, if KYLOC were low on certain items needed to support the War Fighter, they would be authorized to borrow items from the collocated NGMMC.

The borrowed material would be used to fulfill service member orders, and once KYLOC received stock, they would repay the NGMMC. The borrowed inventory was never formally gained and therefore was never reflected in BSM. All C0A documents produced from the issue of the items could not be processed in BSM because BSM did not reflect enough stock on hand to process the issue. When KYLOC received the re-supply of the stock, a receipt was processed, but the repayment of the stock was never reflected in BSM.

With the implementation of VIM this process was changed. All “borrowed” stock is processed as a credit return with a reason of “Borrowed from NGMMC.” This D6 is processed and transmitted to BSM. All C0As are processed against the stock that is now also reflected in BSM. When KYLOC receives the re-supply and processes the receipt, the repayment to NGMMC occurs with the processing of an Inventory Adjustment in VIM that is also transmitted to BSM. Obviously this change in processing has provided a more accurate reflection of inventory in BSM.

Borrowed Items Since 11/16/07		
# of Transactions	Total Qty of Items	\$ Value of Borrowed Inventory
278	204,466	\$1,841,241.32

Table 7 – Visibility of Borrowed Inventory

To achieve the stated objectives several modifications were made to VIM in order to support the complex supply support mission of KYLOC and provide visibility of the KYLOC stock position to DSCP. These modifications included:

- VIM OCIE Database – The VIMWL and VIM Wholesale tables were combined into a single VIM OCIE database;
- Replenishment – Users are now allowed to request replenishment and have visibility of supporting Stockrooms available quantity; and,
- Reports –
 - Stock Move report modified to reflect request ID;
 - View Credits displays the Cost Center of the Credit Return;
 - Replenishment History; and,
 - Suggested Order List modified to reflect quantity of the Bulk stockroom only.

4.0 Visibility Of Inventory Data By DSCP

This project ultimately was intended to provide better visibility of the DLA assets located and maintained at KYLOC. This was a key component of this project and was accomplished by providing VIM as a tool for DSCP Item Managers and Customer Account Specialists to view real-time inventory data. It was also through ARN VIM and IRM that transactions were more efficiently processed and tracked to ensure the timely update of BSM stock quantities.

Through the visibility provided by ARN VIM and more accurate inventories reflected in BSM, more realistic supply decisions are now possible and can be made by DSCP with regards to re-supply of KYLOC, transfer of assets from KYLOC to other sites, and budget planning. This is because authorized DSCP personnel have better visibility of the current stockrooms supported with the ARN IRM system capabilities.

DSSCP personnel including Customer Account Specialists (CAS) and Supply Planners authorized to use the ARN VIM and IRM capabilities can review actual near-real time on-hand stock quantities for all NSNs maintained to fulfill customer orders at KYLOC. The capability to review on-hand assets is projected to facilitate continued reduction of back-orders and enhanced customer order fulfillment in the future.

5.0 Results Achieved

This section provides summary information on the results achieved by implementing ARN VIM and IRM capabilities at KYLOC. It is important to note that the support has not ended with the completion of this project. Refinements continue to be made to fine-tune operational support and efficiency of the supply chain activities.

5.1 Operational Objectives & Results

The expected benefits were:

- Implement ARN VIM IRM to provide KYLOC automated data entry and transaction management processes for their issues, receipts, physical inventories and stock movements;
- Establish high speed Internet communications of IRM-generated MILSTRIP transactions for processing in VIM to update the quantities on hand for each NSN, and push these transactions to SAMMS/BSM twice a day; and,
- Provide DSCP Item Managers on-line, real-time visibility of current quantities on hand at KYLOC.

Through ARN VIM and IRM, all transactions that affect the inventory are now captured through the use of automated data capture techniques (OCR technology and wireless HHTs) or directly into VIM. This has in turn provided DSCP with the tools necessary to view the stock position at KYLOC of all DLA owned inventory. It has also provided a means of posting transactions much more efficiently to BSM thus providing DSCP with better data upon which supply and contracting decisions are made.

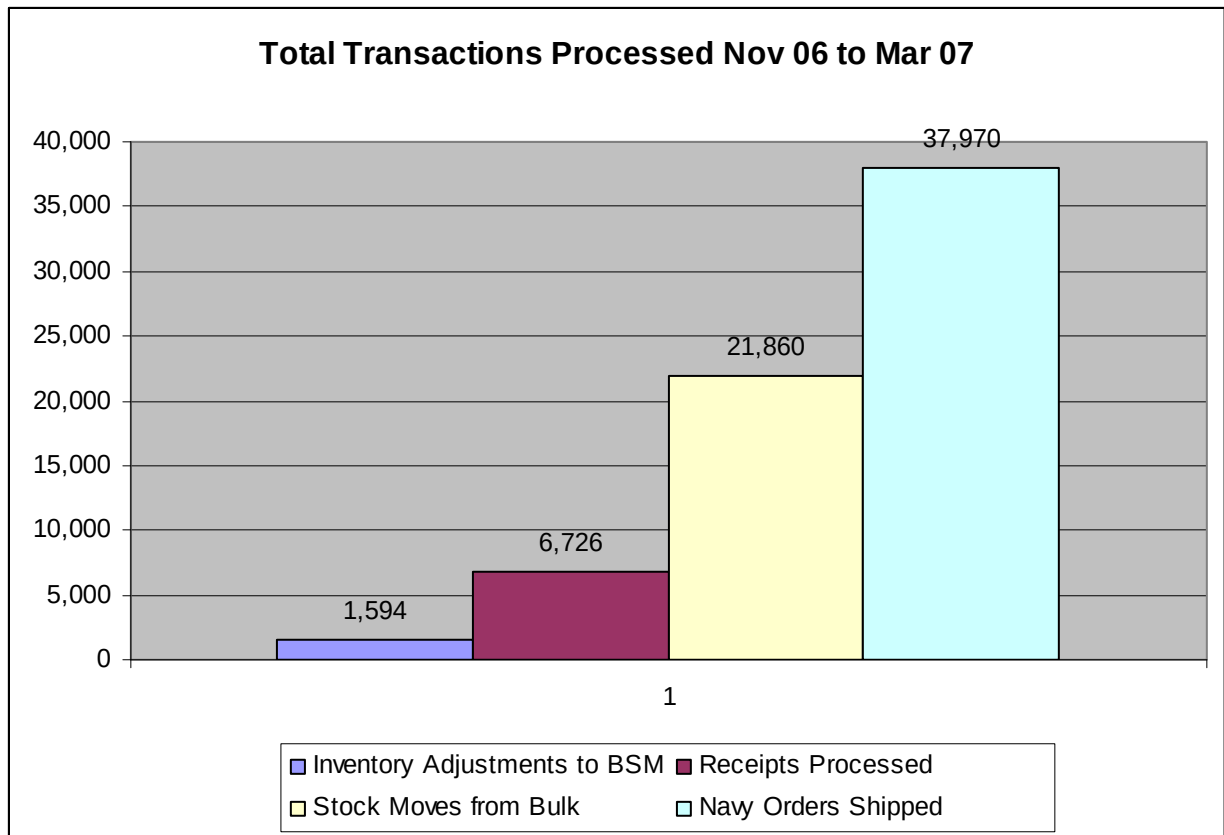


Figure 12 – Total Transactions Processed by Month

The above graphic summarizes the volumes of the different types of transactions processed as a result of the systems developed and implemented to support operations. The unit supported is one of the smaller operational areas at KYLOC and with planned expansion to support other areas in the future, the volume of transactions in each of the categories indicated will grow significantly.

6.0 Summary

The implementation of VIM and of IRM in the Navy Branch should be considered a success. A more accurate accounting of the stock maintained at KYLOC is available not only through VIM, but with the periodic inventories and daily transaction monitoring, the stock position reflected in BSM for KYLOC will continue to improve.

DSCP should consider rolling out the IRM solution to the KYLOC Air Guard Branch. (See Appendix D, Air Guard Conversion Activities.)

There are some considerations that should be addressed before rolling out the IRM solution to the Army Branch. The Army Branch processes on average 7,000 orders per day. IRM should be evaluated to determine if the processing speed from IRM can support processing 7,000 forms in a 24 hour period. Downloading the additional 7,000 orders each day should be evaluated to determine if the IRM Synchronizer can support that number of downloads in a timely fashion and that does not adversely affect the KYLOC production schedule/cycle.

Overall the ARN VIM application has been a very useful tool that provides visibility to DSCP of KYLOC stock that was never before visible. Once the remaining two stockroom issue data is reflected in VIM, DSCP will have total visibility of all of the DLA assets at KYLOC.

APPENDICES

Appendix A – Definition of Terms & Acronyms

Appendix B – Project Personnel

Appendix C – IRM Database

Appendix D – Air Guard Branch Conversion Activities

Appendix A – Definition of Terms & Acronyms

The following acronyms are used in this report and are provided to provide clarity of understanding for the reader.

- ◆ **ARN** – Apparel Research Network made up of selected industry and academic partners working together to develop innovative solutions for the Apparel industries support of military departments.
- ◆ **ASTRA** - ARN Supply-chain Transaction Repository Audit.
- ◆ **BSM** – Business Systems Modernization
- ◆ **C&T** – Clothing and Textiles Division of the Defense Supply Center Philadelphia.
- ◆ **CCDF** – Clothing
- ◆ **DOS** – Day Of Supply.
- ◆ **DSCP – Defense Supply Center Philadelphia** - DSCP controls the procurement and distribution of Medical, Subsistence (i.e., food), and Clothing and Textiles commodities to Defense Logistics Agency (DLA) depots and stock record accounts, worldwide.
- ◆ **Due-Member** – Backordered. When an item has been ordered but cannot be fulfilled due to a lack of stock on-hand.
- ◆ **HHT** – Hand-Held Terminal
- ◆ **KYLOC** – Kentucky Logistics Operations Center
- ◆ **KYLOCExport** – Database used to provide real time IRM data to KYLOC IT staff. This allows them to update their ordering website with current status of all orders.
- ◆ **MILSTRIP** – Military Standard Replenishment System
- ◆ **NGMMC** – National Guard Material Management Center
- ◆ **NSN** – National Stock Number

- ◆ **RIC** – Routing Identifier Code – Refers to a code used in SAMMS for identification of location where materials are to be shipped.
- ◆ **SAMMS** – Standard Accounting and Material Management System - This system is used by the Defense Logistics Agency, Defense Procurement Support Center.
- ◆ **VIM** – The Virtual Item Manager (VIM) system incorporates operational data extracted from the SAMMS Clothing & Textile (C&T) server as the basis for the operational and decision support capabilities provided in a single source of information for Item Managers at the retail (Recruit Training Centers) and wholesale (DSCP) level.
- ◆ **VIMOCIE** – The combined VIMWL and VIM Wholesale database constructed for the KYLOC implementation.
- ◆ **VIM/WL** – VIM Wholesale Local

Appendix B – Project Personnel

The following personnel were involved in various phases or tasks for this project. Each of these individuals played key roles and worked closely together in achieving the desired at KYLOC.

KYLOC Personnel

<u>Individual</u>	<u>Position/Responsibility, Organization</u>
Jack Carpenter	Director
Del Presely	Chief Stock Control
Chris Ripy	Chief Information Technology
Randal Wise	Chief Navy Branch
Connie Spicer	Chief Customer Service Branch
James Osborne	Chief Air Guard Branch
Jim Foster	Chief Army Branch
Susan Thompson	Stock Control Clerk
Joe Lancaster	Warehouse Supervisor
James O'Banion	Navy Branch
Dottie	Navy Branch
Lynne	Navy Branch
Ellen	Navy Branch
Vanessa Brown	Army Branch
Judd Ellis	Network Manager
Don Peyton	Warehouse

Defense Logistics Agency & Defense Supply Center Philadelphia Personnel

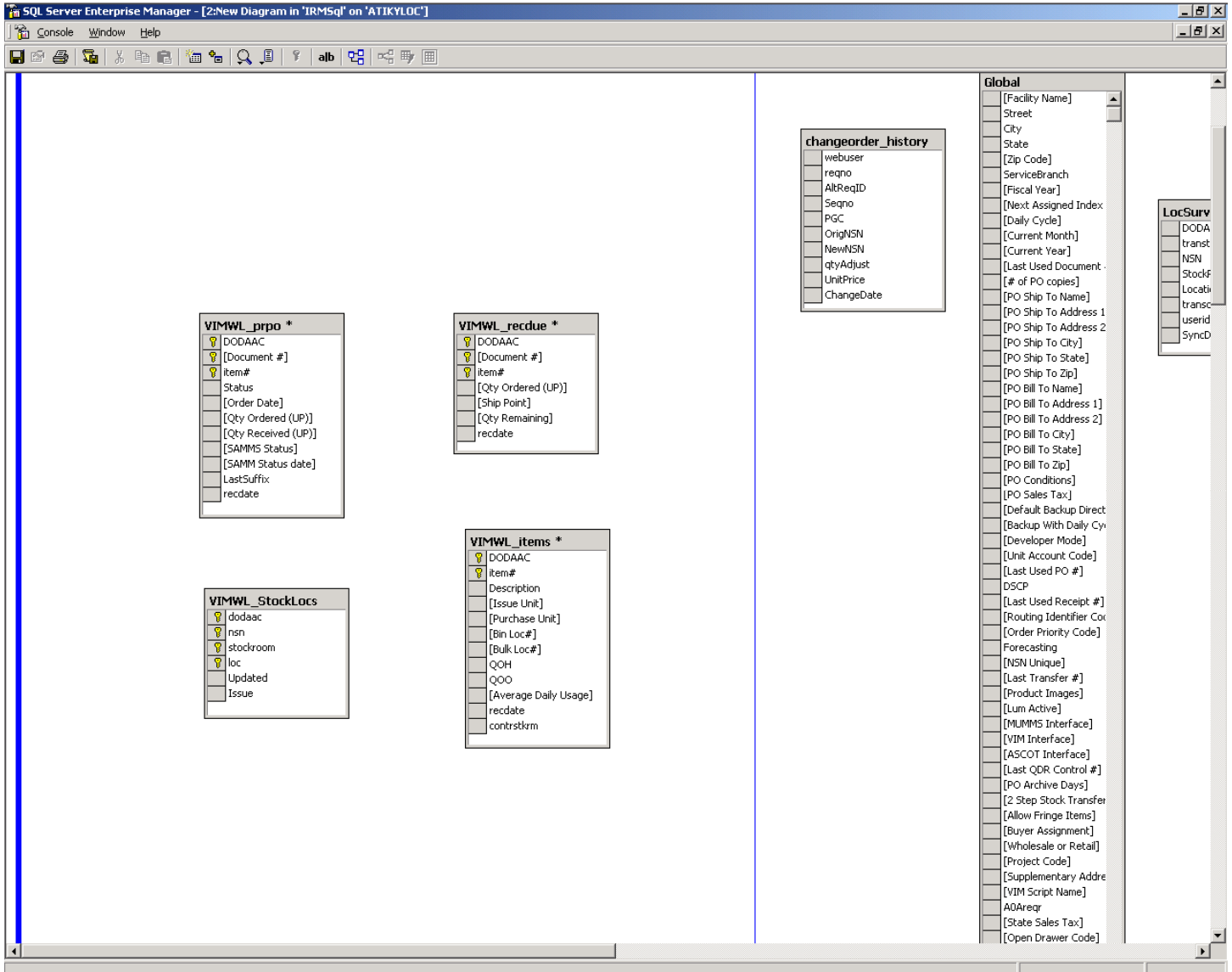
<u>Individual</u>	<u>Position/Responsibility, Organization</u>
Bernie Johns	Deputy Program Manager to ARN Program Manager
John McAndrews	Chief Customer Facing Division, DSCP
Kathleen Moore	Support Staff to ARN Program Manager
Monique Olifant	Manager CAS, DSCP

Michal Safar	Support Staff to ARN Program Manager
Julie Tsao	ARN Program Manager for DLA (Contracting Officer's Technical Representative)
Harry Veneri	Project Manager, DSCP

Contractor (AdvanTech) Personnel

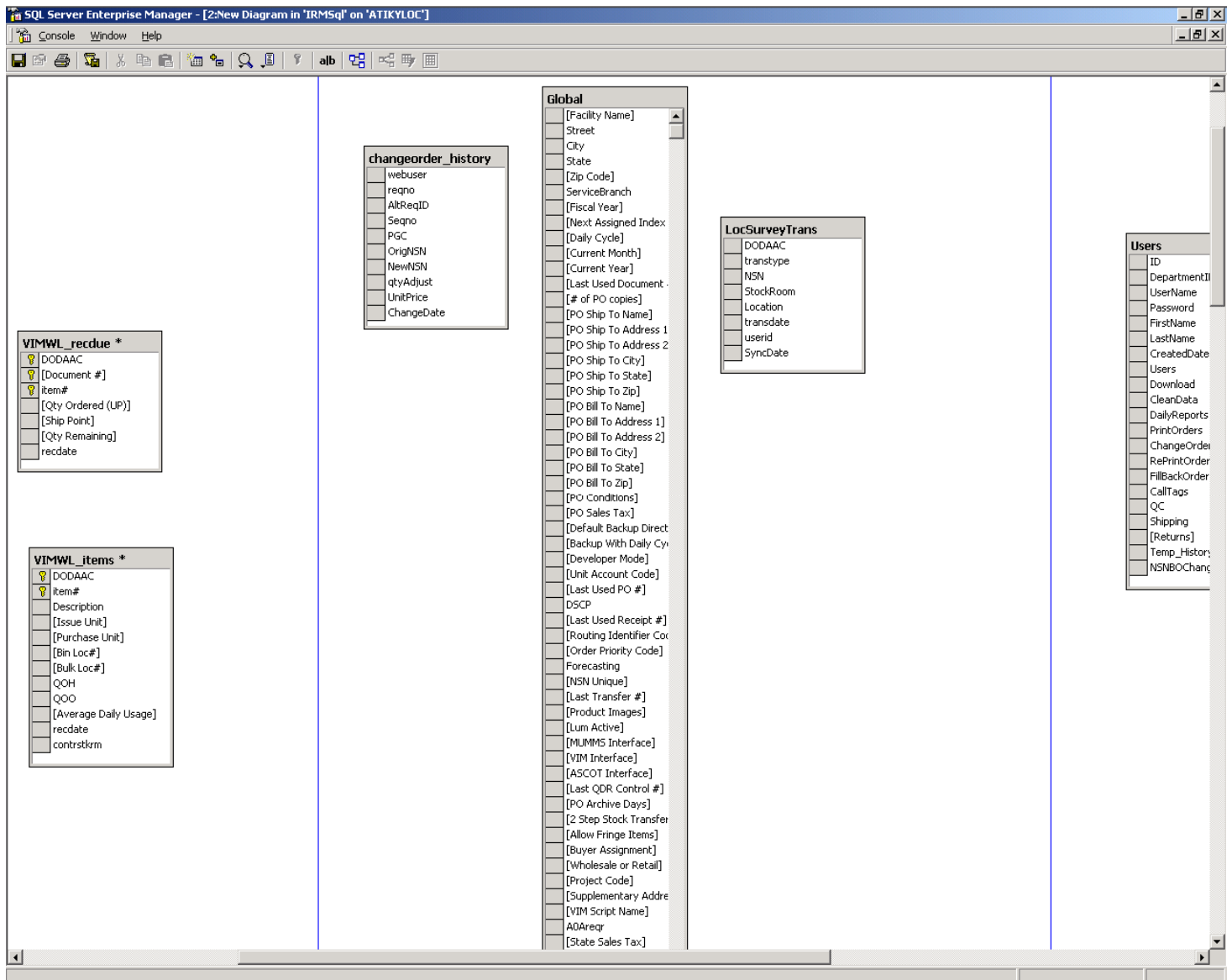
<u>Individual</u>	<u>Position/Responsibility, Organization</u>
Robert E. Bona	Vice President, Operations
Douglas D. DeLoach	Senior Trainer, Implementation Support
Carol E. Fraser	Director of Technical Services & Project Manager
Richard A. Perrin	President & Principal Investigator
Frankie M. Mason	Network Management
Terry L. Smith	Manager, Applications Development
Mike Purdy	Lead Developer
Debra L. Wassel	Technical Support Specialist, Implementation Team
Robert J. Padilla	Senior Trainer, Implementation Team
David L. Crutchfield	Customer Service Engineer, Implementation Team

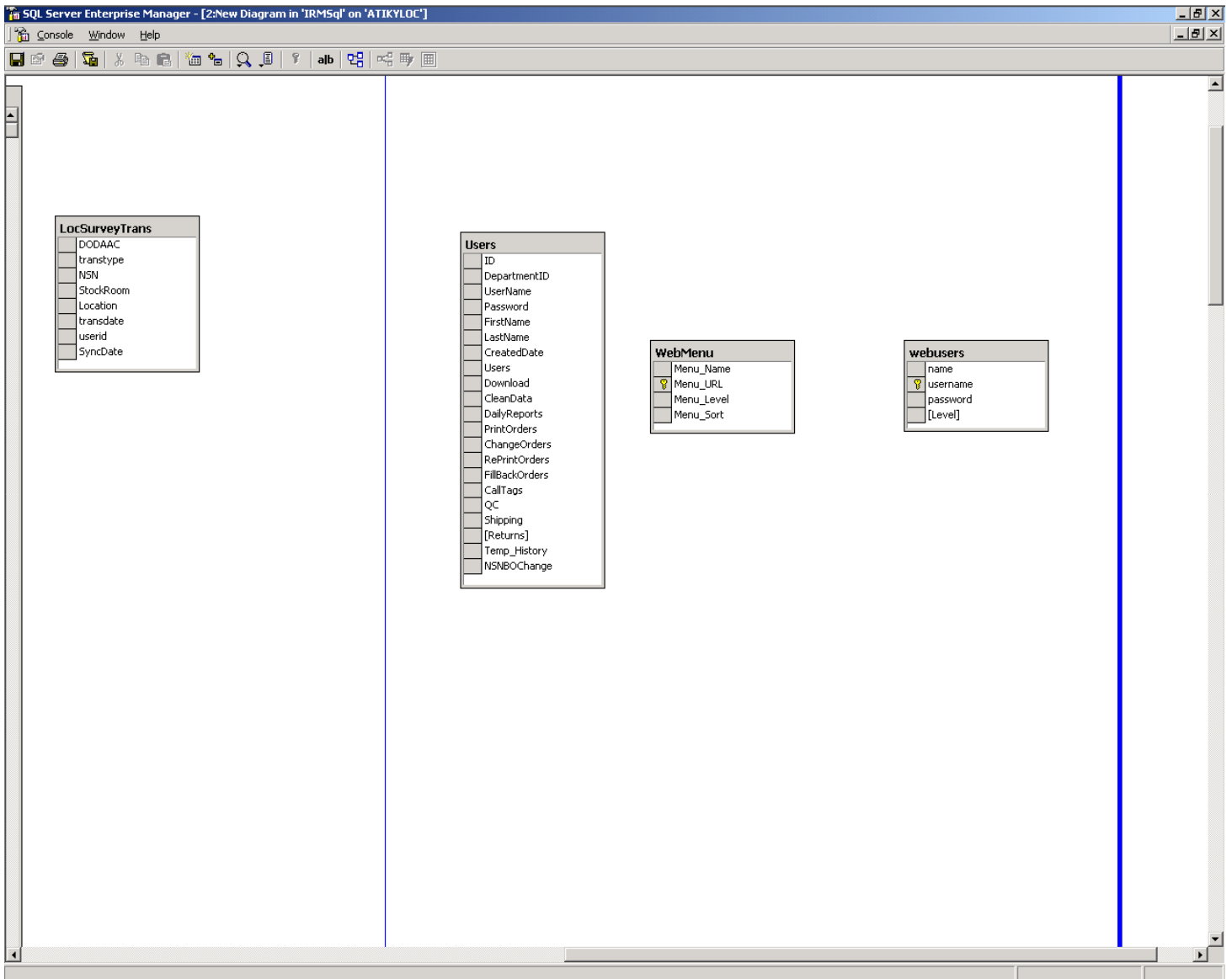
Appendix C – IRM Database

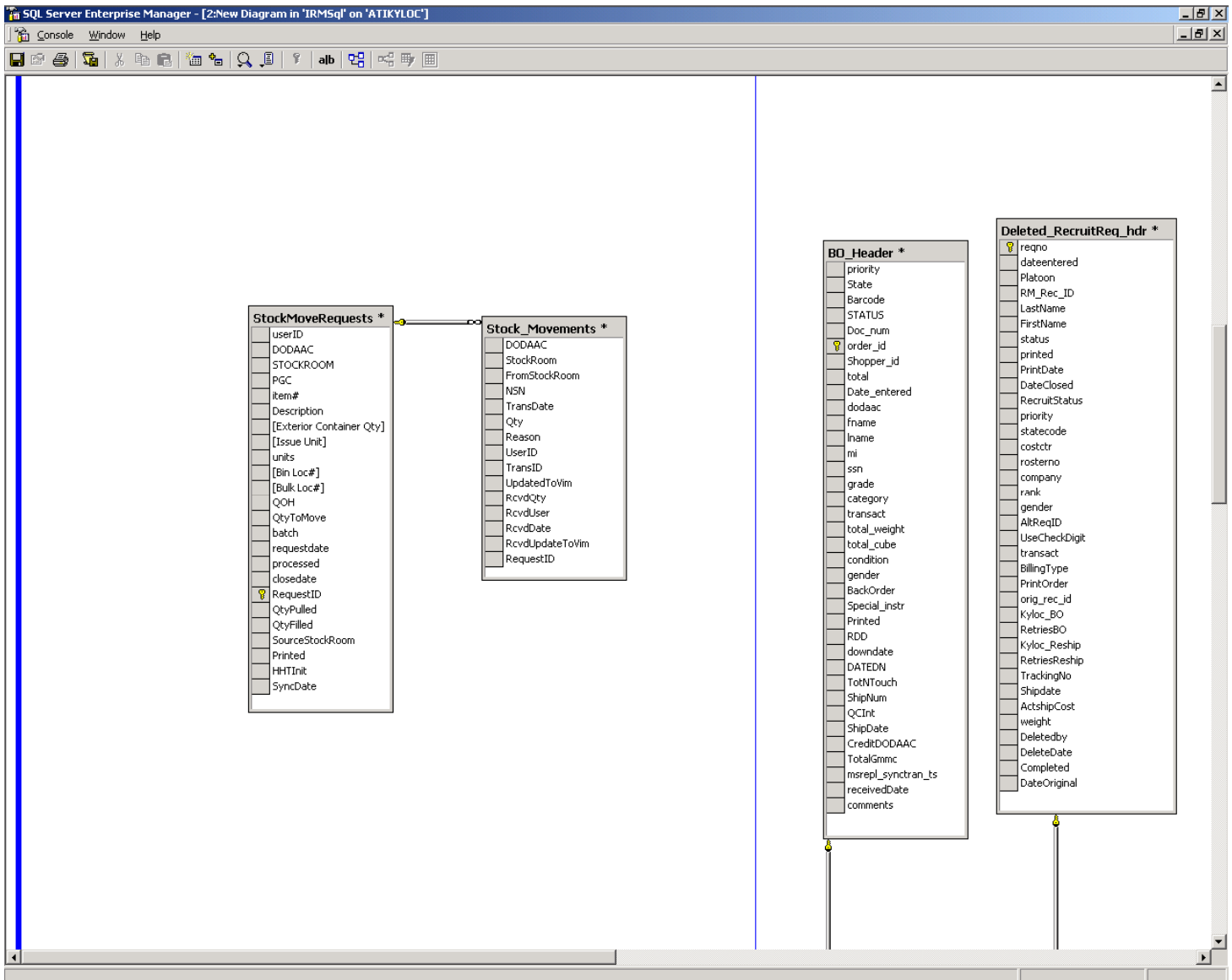


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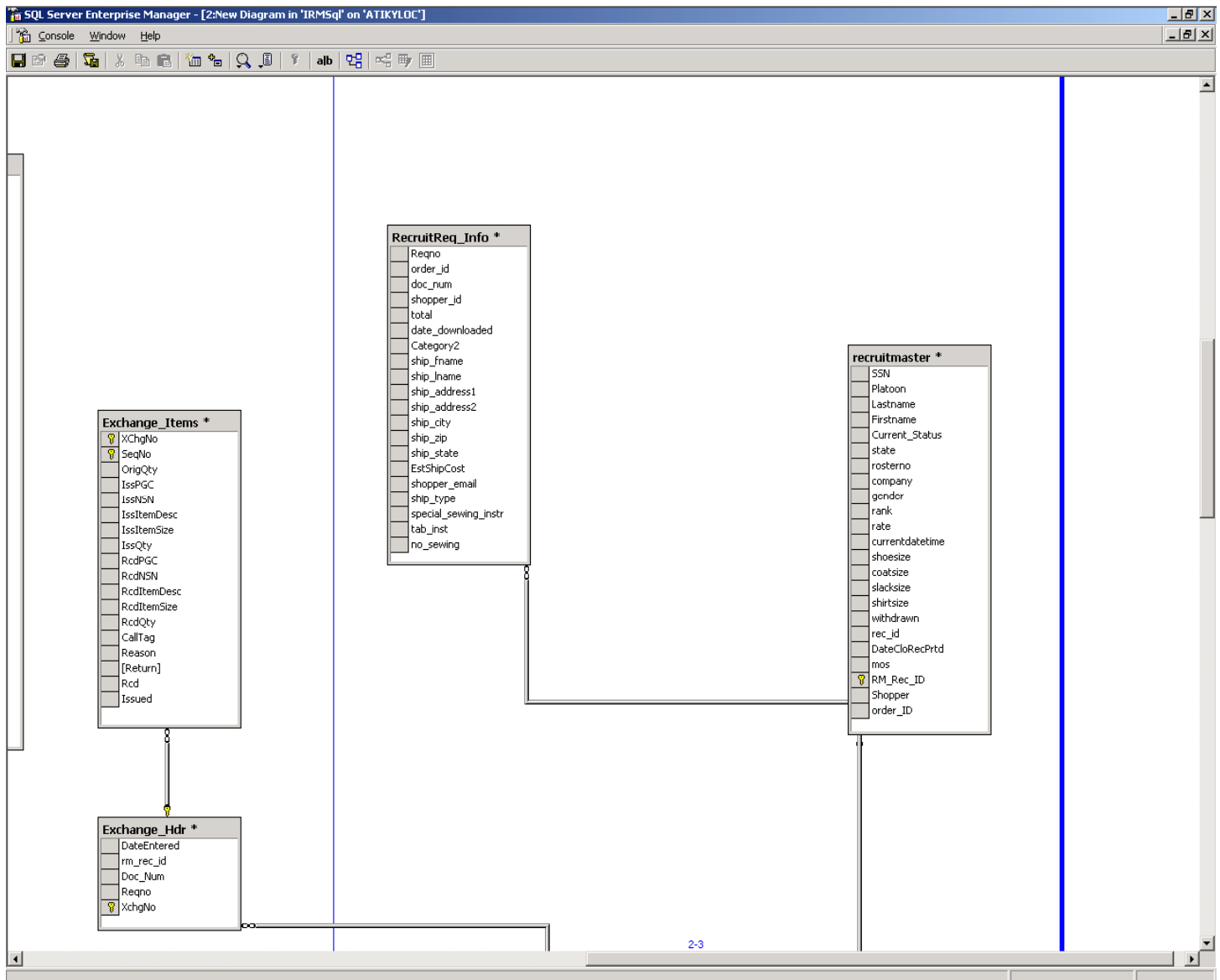


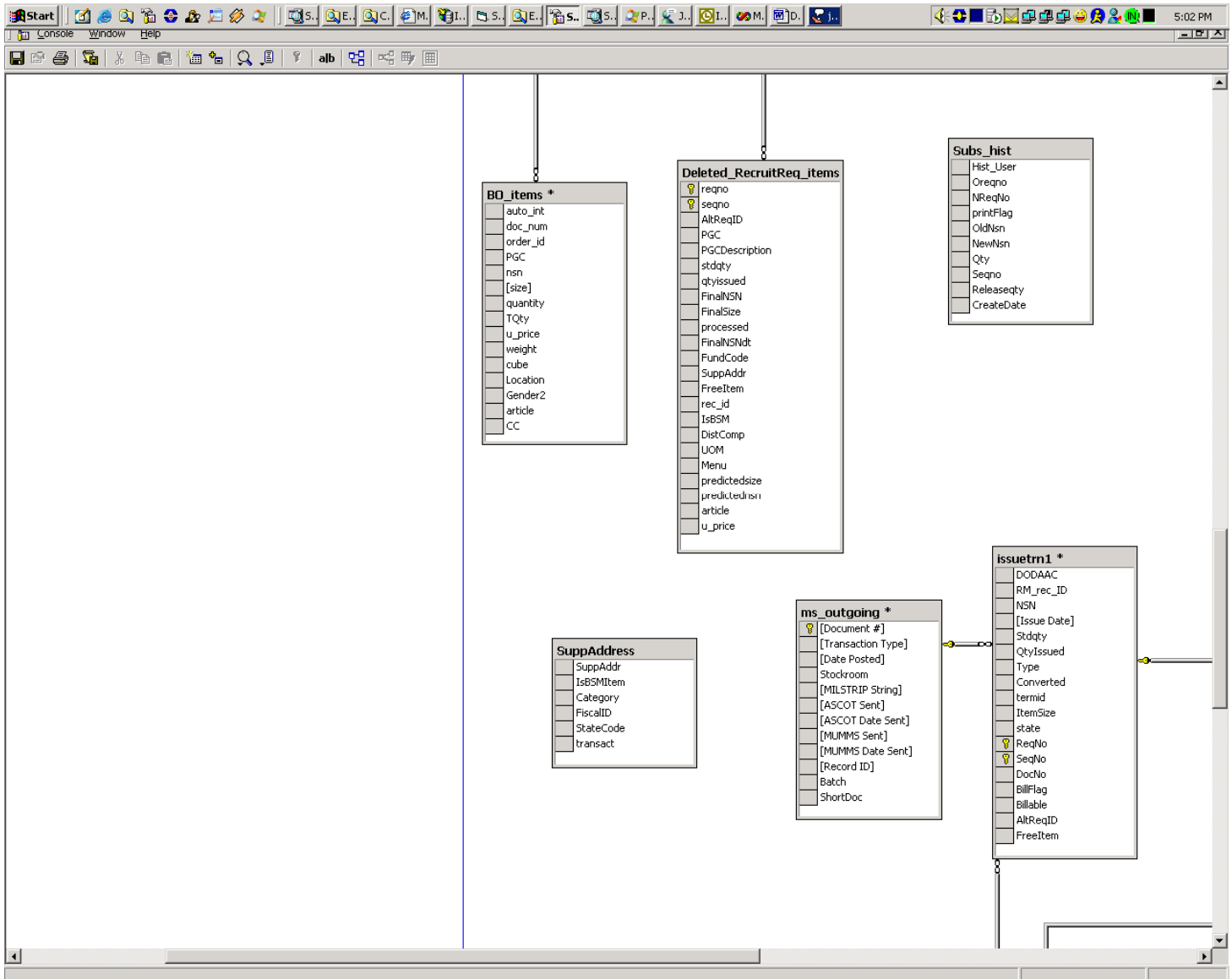




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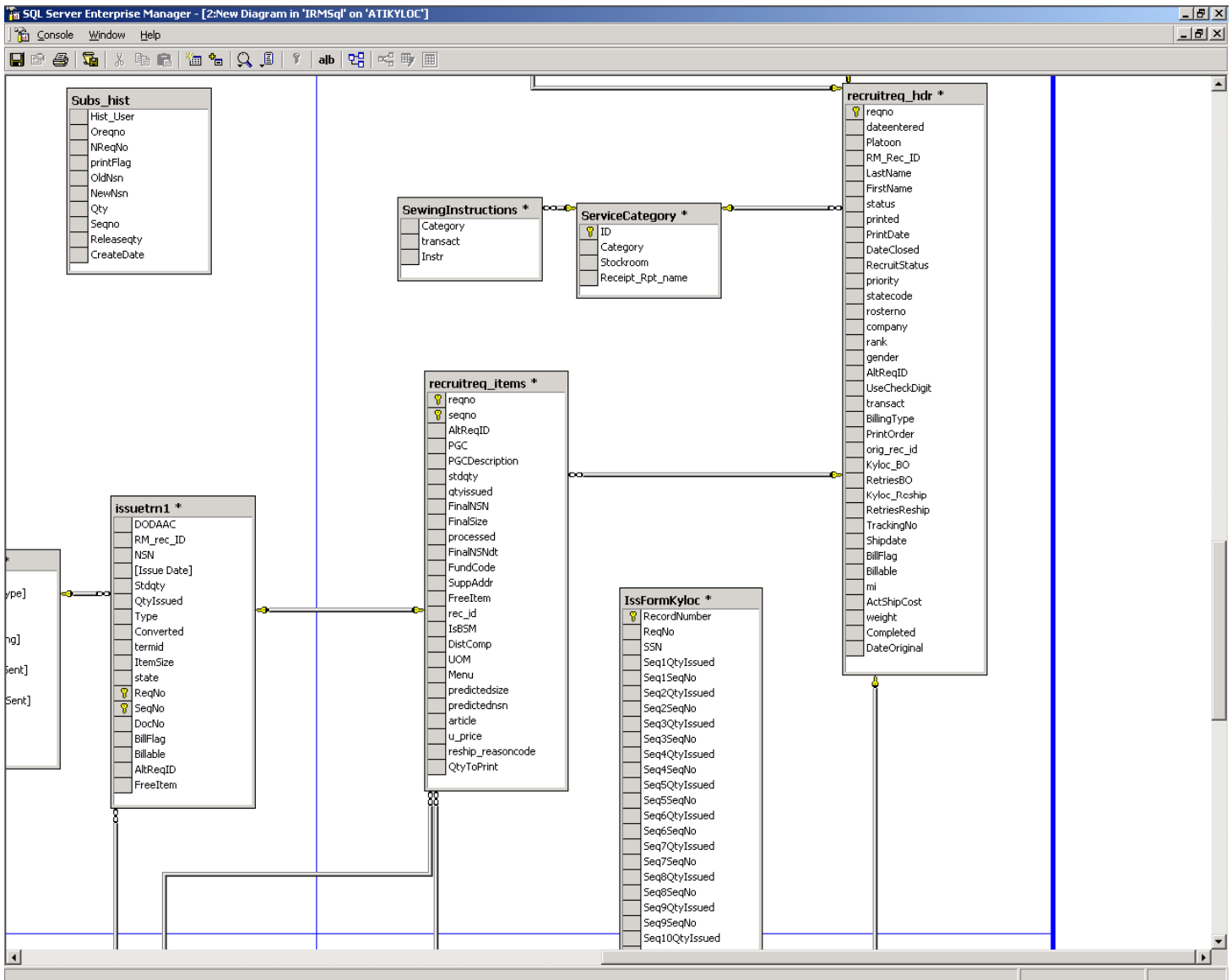
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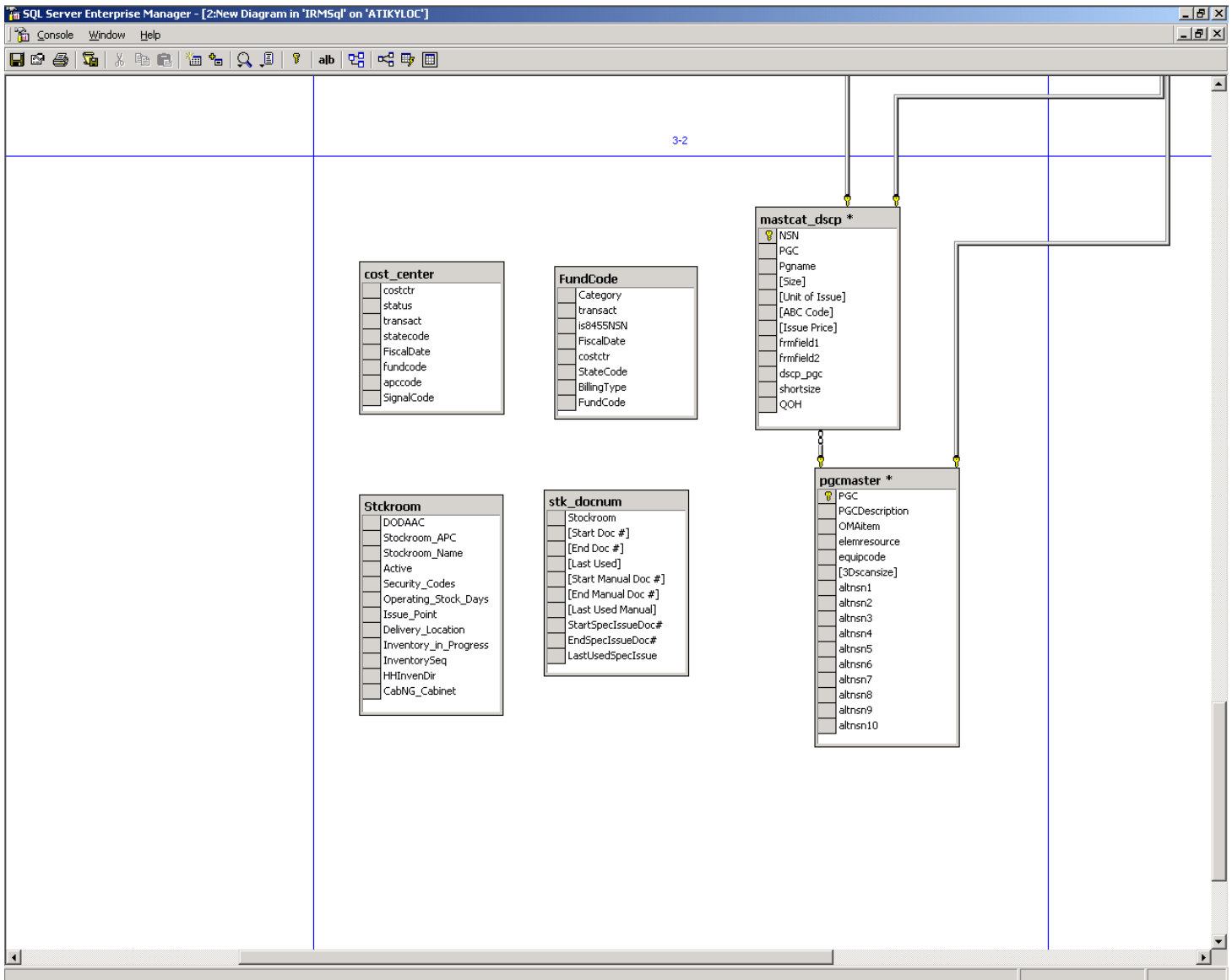




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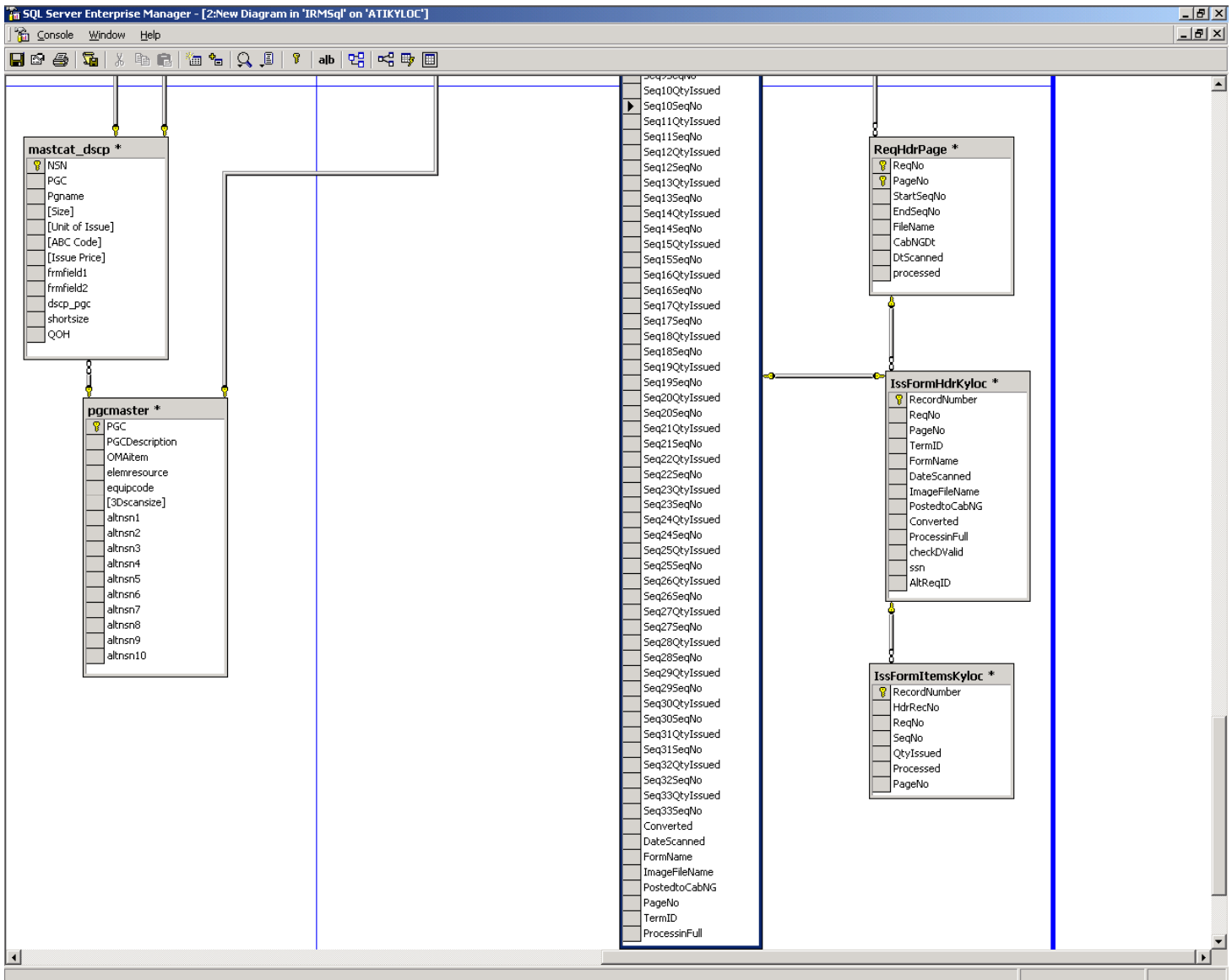
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Appendix D – Air Guard Branch Conversion Activities

Task	Start	End
Air Guard C0A Logic	04/30/07	04/30/07
Review C0A Logic for AG	04/30/07	04/30/07
Develop Air Guard C0A function	04/30/07	04/30/07
Air Guard Scan Forms	04/30/07	05/04/07
KYLOC Provide Special Sewing Instrucitons	04/30/07	04/30/07
KYLOC Provide Logic of "dummy NSNs" that contain sewing info	05/01/07	05/01/07
AdvanTech Create Scan forms	05/04/07	05/04/07
KYLOC certify scan form formats & instructions	05/04/07	05/04/07
Clothing Record / Invoice	05/15/07	05/21/07
Review AG Clothing Record Requirements	05/15/07	05/15/07
Form name should be CCDF Form 3078-1	05/15/07	05/15/07
Confirm that AFNG shipping address will appear in Organization area.	05/15/07	05/15/07
Add Special Sewing Instructions to bottom of invoice.	05/15/07	05/15/07
Add Airman Status to bottom of invoice (calculated from receipt.category2 values)	05/15/07	05/15/07
Develop AG Clothing Record Function	05/21/07	05/21/07
Conversion Routines	05/01/07	05/18/07
KYLOC Id all Databases and Tables with AG Data for IRM	05/01/07	05/01/07
AdvanTech create conversion routine	05/07/07	05/07/07
AdvanTech create conversion reports	05/11/07	05/11/07
Count of Backorders by 1 Service, 2 DODAAC, 3 NSN & Qty	05/11/07	05/11/07
Count of Open Orders by 1 Service, 2 DODAAC, 3 NSN & Qty	05/11/07	05/11/07
Count of Historical Orders (legacy) matches count of Historical Orders in IRM	05/11/07	05/11/07
Run Conversions	05/14/07	05/18/07
AdvanTech run 3 successful conversions	05/14/07	05/18/07
KYLOC validate conversion reports	05/14/07	05/18/07
Test Daily Order Download	05/02/07	05/10/07
Develop Test Area Daily Download to pull both AG and Navy orders	05/02/07	05/02/07
Test Speed of Downloading both Navy and AG Downloads	05/07/07	05/10/07
KYLOC Certify Speed of Download is Adequate	05/10/07	05/10/07
AdvanTech Concurrent Testing	05/03/07	05/23/07
Validate Recruitreq_Hdr Document #	05/03/07	05/03/07
Allow for a 6 to 10 character dodaac in the document number for AFNG. This probably will figure into calculating how to create suffix data in IRM.	05/03/07	05/03/07
KYLOC Provide Daily File of Previous Days issue transactions	05/04/07	05/04/07
Backordered Items	05/04/07	05/04/07
Released Backorders	05/04/07	05/04/07
Orders Processed	05/04/07	05/04/07
Modified Orders	05/04/07	05/04/07
Create Test KYLOC Export and Update	05/04/07	05/04/07

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Task	Start	End
Test creating previous days transactions for AG and Navy	05/08/07	05/23/07
KYLOC Certify all Transaction Sets	05/23/07	05/23/07
KYLOC certify AG Clothing records	05/23/07	05/23/07
Modify IRM Web reports to break by new AG Branch and Sv Categories	05/01/07	05/11/07
AdvanTech verify which reports should break by Branch, Svc Category	05/01/07	05/07/07
Status 1 & 2 report	05/01/07	05/01/07
Exception	05/01/07	05/01/07
Backorder	05/01/07	05/01/07
Consolidated Backorder	05/01/07	05/01/07
Scan Station Activity	05/01/07	05/01/07
Download Report	05/01/07	05/01/07
KYLOC verify the IRMWeb reports to change	05/07/07	05/07/07
AdvanTech modify reports	05/09/07	05/09/07
KYLOC sign-off on reports	05/11/07	05/11/07
KYLOC pre conversion activities	06/15/07	06/15/07
Modify existing AFNG download process so that order status values will indicate passed to IRM.	06/15/07	06/15/07
Modify existing Customer Service application by removing AFNG processes that will become obsolete once in IRM (e.g. Print Orders, etc.)	06/15/07	06/15/07
Modify existing report application by removing AFNG reports that will become obsolete once in IRM.	06/15/07	06/15/07
Create process to pull AFNG shipped, cancelled, and new back orders created in IRM from KYLOCExport table into appropriate KYLOC databases/tables.	06/15/07	06/15/07
Remove KYLOC COA creation for AFNG shipments (will be obsolete once in IRM).	06/15/07	06/15/07
Change back order suffix scheme on pending (un-printed) back orders before import into IRM.	06/15/07	06/15/07
Modify current internal procedure of using VIM Stock Move Report to adjust AFNG branch inventory (this will be obsolete once in IRM/VIM).	06/15/07	06/15/07
Modify current returns program to disallow AFNG returns (will be obsolete once in IRM).	06/15/07	06/15/07
Remove QC (back order creation) and Final Ship applications that are currently on the AFNG shipping line (will be obsolete once in IRM).	06/15/07	06/15/07
Go-Live	05/21/07	06/18/07
Train users on IRM Checkout	05/21/07	06/01/07
Train users on IRMWeb	06/04/07	06/14/07
KYLOC Clear the Issue Line AG	06/15/07	06/15/07
AdvanTech convert data for IRM and VIM (qty) Night	06/15/07	06/15/07
Go Live	06/18/07	06/18/07
Complete Inventory	06/17/07	06/17/07