Massachusetts Regional Library System
Library Delivery Services

Final Report

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Executive Summary

The high cost of operating six separate delivery systems, the burden of delivery on individual libraries, and the increasingly high expectations of library users inspired all six regional library systems in Massachusetts to come together to evaluate their options. The current project was undertaken to provide them with an analysis of their delivery operations and to provide recommendations for improving the system and preparing for future growth.

To begin the study, the Consultants (Lori Ayre of The Galecia Group and Melissa Stockton of Quipu Group) visited libraries and sort facilities in each region and met with representatives of each of the automated networks. Each delivery and sort operation was evaluated and data from regions, networks and individual libraries reviewed. This report includes a summary of findings as well as recommendations for individual systems and for the state as a whole.

Consultants take a system view of Massachusetts delivery and provide specific recommendations for establishing an efficient sort and delivery operation in Massachusetts that will improve delivery service, save money, and reduce staff workload in individual libraries.

Consultants recommend establishing an automated, central sort operation. The recommended system shall be equipped with an automated storage and retrieval system to reduce staffing requirements and ensure optimized staging of incoming and outgoing delivery totes. The sorter shall separate holds from returns from media, and provide tote check-in capability at the libraries. In anticipation of ongoing delivery volume increases, the sorter shall be designed to sort all Massachusetts library material within 10 hours so that operation time can be increased as needed while still meeting the demand of overnight delivery. WMRLS shall continue to be provide in-house courier service while other regions will continue to use contract couriers for library delivery and for service to WMRLS headquarters.

Other recommendations focus on reducing the time, space, and workload required at each library while improving services to library users: automation of routine tasks, standardization of labeling and packaging procedures, forging cooperative and supportive relationships between regional delivery services and networks, and selecting appropriate tools and service providers for each task.

The envisioned system positions Massachusetts to provide 99.9% sorting accuracy, guarantee next day turnaround for libraries receiving daily delivery, expand resource sharing and delivery services to new libraries, handle greater volume with ease, reduce library staff workload, and save $2.5 million over a 10 year period.

Background

The six Massachusetts regional library systems contracted with The Galecia Group and Quipu Group (Consultants) to develop a plan that will look at all aspects of delivery from the library, regional library systems, shared automated network (integrated library system), library user and vendor perspectives. Consultants were to identify the ways in which the state of Massachusetts can most cost effectively and efficiently provide delivery service. The goal was to determine the best combination of systems which would yield a service that is 98% accurate with a 24-hour turnaround for delivery.

There are nine automated library networks, primarily public library participants (with some academic and schools libraries). All libraries in automated library networks belong to the regions, not all regional members belong to a network. Network members pay fees to belong to a network. They do not pay fees to belong to a region. Cost of delivery—moving items from one library to another—is paid by each region. Delivery services are now managed independently by six regional library systems and a cross-state courier links the regional sort facilities for daily transfer of materials between regions.

The volume of delivery is nearly 12 million items annually, and growing. As the volume continues to increase, delivery service has had major stresses placed on it. The stress to participating libraries comes through the staff time that is needed to process incoming and outgoing materials. Statewide delivery studies show that many libraries commit one (1) FTE to handle delivery each day. The regions have been forced to commit more and more of their budget to delivery at the expense of other programs. In one case, over 40% of the total regional budget is dedicated to delivery. A recent study indicates that the regions combined are spending more than $2.3 million annually on delivery.

The regions contracted with the Consultants to investigate different ways of doing delivery and to develop a plan that will implement the most efficient method of providing delivery service. The Final Report is the culmination of all of the information gathered by the Consultants during this project.

Summary of Findings

The Consultants visited each region during a week-long review of existing delivery services. A second visit by the lead Consultant, Lori Bowen Ayre was specifically targeted toward the topic of sorting operations in the state. This section summarizes the observations made during the two visits.

Regional Environments

Regions

Each of the six regions is unique in many ways, including the geography of the area and how they provide delivery services to member libraries. See Appendix A: Summary of Delivery Services for high level numbers related to delivery budgets and volume of materials, which are referred to throughout the report. See Appendix B for detailed information on each region and the pertinent information gathered during each visit.

Boston Regional Library System (BRLS)

BRLS is the smallest region in the state (96.5 square miles) with 23 locations, and is composed of Boston and selected Boston suburbs. BRLS has the lowest delivery volume and fewest stops of all the regions. Couriers make 5,876 stops per year and move 312,656 items per year. The delivery budget is $76,284. BRLS provides this delivery service at a per item cost of $0.24, a per stop cost of $26 and a per location cost of $3,317.

Three automated networks operate in BRLS, including Fenway Libraries Online (FLO), Metro Boston Library Network (MBLN) and the Boston Public system. Boston Public Library is also currently running a SirsiDynix Horizon system.

FLO is a consortium of academic and special interest libraries in the Boston/Cambridge area. The FLO consortium is running a shared Endeavor library system. The FLO catalog has over 1 million items and annual circulation statistics of over 266,000 transactions.

MBLN is run out of the BRLS offices and includes three public libraries, two academic libraries, Boston schools and several special libraries. The MBLN group is running a shared SirsiDynix Horizon system. The MBLN catalog holds over 5.1 million items and the network reports over 2.8 million circulation transactions per year.

Delivery and sorting is outsourced to a regional delivery vendor which employs a single driver to handle delivery and sorting functions for the 23 BRLS libraries. The driver makes deliveries using a small van and runs a single route. The courier's driver/sorter uses a manual pigeon hole sort system using a small section of the warehouse space and reports sorting rates of 450 pieces per hour (PPH).

Central Massachusetts Regional Library System (CMRLS)

CMRLS is a 1513 square mile region (the third largest in the state) composed of 9 large libraries and over 210 small public and school libraries. The majority of the public libraries served by this region are classified as small (municipalities with populations of 10,000 or less). The region contains many rural areas as well as several large urban areas. The region includes the Academic & Research Collaborative (ARC), a group of 23 academic and special libraries.

The region delivers over 1.6 million items a year, making over 17,000 stops to 97 locations. The delivery budget is $285,859. CMRLS provides this delivery service at a per item cost of $0.18, a per stop cost of $16 and a per location cost of $2,947.
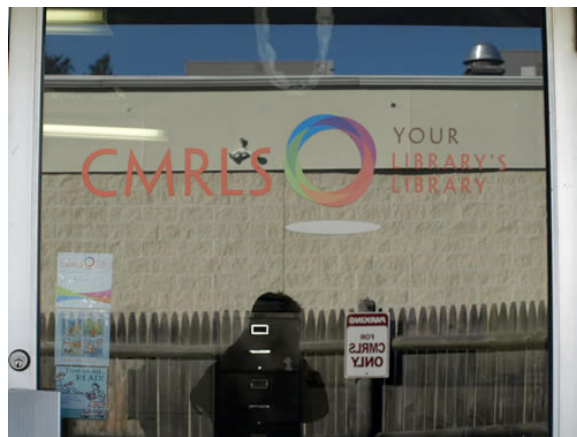
CMRLS Office

CMRLS and the Western Massachusetts Regional Library System (WMRLS) created C/W MARS (Central Western Massachusetts Automated Resource Sharing). C/W MARS is composed of two shared Innovative Interface's Millennium catalogs (Central and Western) combined together via the INNReach product to form a single union catalog. The C/W MARS union catalog has over 1.8 million bibliographic records and 7 million item records. Annual circulation statistics total over 10 million transactions.

C/W MARS has three levels of membership available: full, mininet and online affiliate. Full members have full access to all Millennium modules, including Circulation, Acquisitions and Serials (approximately 60 libraries are members at this level). Mininet members represent communities with populations less than 10,000 and are given a discounted rate. Mininet members can access the Cataloging and Circulation modules of the Millennium system (approximately 40 libraries are members at this level). Online affiliates have their bibliographic and item records included in the union catalog; however, they have no access to the Circulation or other Millennium modules (approximately 30 libraries are members at this level). Online affiliate library card holders cannot place holds online.

One unique aspect of the CMRLS region is the in-house sorting of delivery materials for 93 libraries. The region hired a sorting staff and operates their own sorting facility at the regional headquarters offices. The cost of the sorting operation accounts for approximately 16% of the total delivery budget.

At the time of Consultants' visit, CMRLS was using one courier to provide courier services to ARC members. All other locations receive delivery from a different courier service. In the summer of 2008, CMRLS brought all locations under a single courier.

Consultants visited the Beaman Memorial Library in West Boylston. This is a small library which receives one or two totes per day. The library is an online affiliate of C/W MARS and runs a Winnebago system for circulation at the library. The library spends approximately 20-24 staff hours a week processing incoming and outgoing delivery materials which requires duplicate entry into the two library systems.

Beaman Memorial Public Library, West Boylston

Consultants also visited Shrewsbury Public Library, a community of 26,000 and growing.

The library is a full C/W MARS member and receives anywhere from two to 14 totes per day. The library spends approximately 90 hours of staff time a week processing incoming and outgoing delivery materials. Shrewsbury Public pre-sorts items for Worcester Public Library.

The libraries within the CMRLS region are very pleased with the delivery service and the contracted delivery vendor. When asked, the library staff had very few complaints and was only interested in minor adjustments to the service. Staff expressed an interest in

Shrewsbury Public Library

more automation and customization of routing labels and hold slips as well as more standardization in the packaging of AV materials.

Metrowest Massachusetts Regional Library System (Metrowest)

Metrowest is a 476 square mile region (one of the smallest service areas in the state) and is made up of 28 academic libraries, 38 public libraries, 245 school libraries and 50 special libraries. The region includes urban and suburban areas with extremely high traffic volume. Parking is difficult and streets are narrow which makes delivery a challenge.

The region delivers over 3.3 million items a year, making over 13,000 stops to 57 locations. The delivery budget is $573,450. Metrowest provides this delivery service at a per item cost of $0.17, a per stop cost of $42 and a per location cost of $10,061.

Minuteman is the single automated network in the region and is made up of 35 public libraries and 6 academic libraries. The automated network moved to an Innovate Interface's shared Millennium catalog in 2003. The catalog has more than 1.2 million titles. Annual circulation is over 14.5 million transactions. Deliveries between Minuteman libraries account for 98% of the delivery volume within Metrowest. Minuteman uses priority paging. The system first looks to see if there is copy at the pick up location. If not, it will look to see if there are copies at a branch location. If not, then the system randomly chooses a copy from one of the other member libraries.

Metrowest uses a single courier as their sorting and delivery service vendor. The Northeastern Massachusetts Regional Library System (NMRLS) also contracts with the same courier for their delivery and sorting services. The courier uses independent drivers with their own cargo vans for delivery. Drivers are paid using a formula which includes the number of stops and the volume at each stop.

The courier's sorting operation has a goal of sorting 400 pieces per hour. They employ 10 sorters for 35 hours per week to sort materials for both Metrowest and NMRLS. Costs for sorting account for approximately 28% of the total delivery budget for both Metrowest and NMRLS.

Woburn Public Library

Consultants visited the Woburn Public Library which is a member of the Minuteman Library Network. Woburn is the first stop on one of the Metrowest routes and receives 5-6 totes each day. The staff commented that their delivery volume has doubled in the last year. Routing labels and hold slips automatically print out when items are scanned. The routing labels and hold slips have been customized by Minuteman staff.

Library complaints were mainly about the courier's performance and included totes left at the library, high levels of mis-sorting, and slow turnaround time. The other issue raised was the lack of space in the libraries for managing the totes for the delivery service. Retrofitting areas in older libraries for delivery services offers a great challenge to individual libraries, especially as the volume of interlibrary loan increases.

Northeast Massachusetts Regional Library System (NMRLS)

NMRLS is a region of 977 square miles (the fourth largest service area) and is made up of 331 public, academic, school and special libraries. The region contains a unique combination of small, medium and large libraries and municipalities. Population, traffic, distances between libraries and road conditions pose major challenges for delivery in this region.

The region delivers 2.4 million items per year, making over 16,000 stops to 72 locations. The delivery budget is $529,000. NMRLS provides this delivery service at a per item cost of $0.22, a per stop cost of $31.89 and a per location cost of $7,347.

NMRLS has two automated networks, North of Boston Library Exchange (NOBLE) and Merrimack Valley Library Consortium (MVLC).

NOBLE is a library consortium of 28 libraries, one third academic libraries and two thirds public libraries. The group shares an Innovative Interfaces Millennium catalog with over 3.1 million items. Annual circulation transactions total over 3.6 million. NOBLE uses the random sort functionality for requests in their Innovative Interfaces system; however, items available on the shelf at the requested pick up location are automatically selected first. The NOBLE system also fills holds for popular items from the copies owned at the requested pick up location first then once all of the local holds are fulfilled; those copies are available for fulfilling holds at other locations. These automatic selections from the home library help to minimize the number of items sent through the courier. NOBLE libraries can have routing labels printed automatically for items being delivered to other NOBLE libraries. Routing labels for items being delivered to MVLC or other Massachusetts libraries must be filled out by hand.

MVLC is a consortium of 35 public libraries which range from very small seaside communities to large, urban communities. MVLC runs a shared SirsiDynix Horizon system. The shared catalog has over 3.1 million items, with over 5.7 million circulation transactions each year. MVLC has implemented "location first" item paging available in the Horizon system. The system gives priority to items that are available from the requested pickup location first. This feature has resulted in a 10% increase of "in-library" filled requests and has reduced the number of items being sent through the delivery service. MVLC also implemented some prioritization schedules in the Horizon system for 4 or 5 libraries to try to more fairly balance the load. It has been reported that

the prioritization schedules lead to some unintended consequences and have been discontinued.

Beverly Public Library

NMRLS uses the same vendor as Metrowest, for their sorting and delivery services. The courier employs 10 sorters for 35 hours per week to sort materials for both Metrowest and NMRLS. Costs for sorting account for approximately 28% of the total delivery budget for both Metrowest and NMRLS. NMRLS provides delivery for 7 libraries which are not members of the NOBLE or MVLC consortia.

Consultants visited Beverly Public Library, a member of the NOBLE automated network. They frequently have totes left behind at the library and deal with an erratic delivery schedule, sometimes receiving a small number of totes 2 or 3 times a day. They have also experienced problems with large numbers of mis-sorted items; however, this issue has been greatly improved recently. The library utilizes the automated slip printing capabilities which can be accessed by a limited number of PCs in the library.

The Consultants also visited Burlington Public Library, a member of MVLC. The library has a relatively large space for managing their delivery materials. They currently pre-sort for five libraries. The staff indicated that they have had some problems with totes which are not picked up and frequently receive two deliveries a day. The library utilizes circulation staff for processing MVLC requests and reference staff for requests from NOBLE and the statewide Virtual Catalog.

Burlington Public Library

The issues raised by the libraries in the NMRLS region are related specifically to the delivery service provider. The libraries were upset by the slow turnaround time as well as the service provided by specific, individual drivers working for the company. Totes have been routinely left behind, with delivery vehicle capacity being stated as the main cause of the problem. The comment was made that turnaround time used to be 2-3 days but that more recently some deliveries have taken over a week.

Southeastern Massachusetts Library System (SEMLS)

SEMLS is a region of 2,882 square miles (the largest in the state) and is made up of a combination of 86 urban and rural communities. Traffic, waterways, road conditions, parking and geographic distances provide many challenges for delivery in this region. In particular, the Cape has few, heavily congested roads yet significantly increases the number of driving miles between stops. One delivery route even includes a connection to a ferry.

The region delivers over 3.2 million items a year, making 35,000 stops to 156 locations (almost twice as many stops each year than any other region). The delivery budget is $871,439. Stops include three automated network offices and two boat docks. SEMLS provides this delivery service at a per item cost of $0.27, a per stop cost of $24.90 and a per location cost of $5,586.

The SEMLS region has three automated networks, Cape Libraries Automated Materials Sharing (CLAMS), SAILS, Inc. and Old Colony Library Network (OCLN).

CLAMS has 35 delivery sites and runs a shared Innovative Interfaces Millennium system. The shared catalog contains over 1.5 million items and over 2.8 million circulation transactions are completed each year. Routing labels print out automatically.

SAILS has 74 delivery sites and runs a SirsiDynix Unicorn system. The SAILS catalog has over 3.4 million items and the group performs more than 4.3 million circulation transactions each year. SAILS currently utilizes random priority/load leveling functionality for requests within the Unicorn system. Members can print hold slips, with some customizations available.

OCLN has 38 delivery sites and also runs a SirsiDynix Unicorn system. OCLN has the smallest number of libraries of the automated networks within SEMLS but represents the highest volume in delivery. The OCLN catalog contains 2.9 million items. Circulation transactions total over 5.2 million annually. OCLN uses the grouping feature in the SirsiDynix Unicorn system to group central libraries and their branches. Other than these groupings, requests are randomized in order to balance the load between libraries. Since the Consultants visit, OCLN has implemented automated routing slip spring due to the implementation of a new version SirsiDynix Unicorn.

At the time of the Consultants March 2008 visit, the delivery and sorting vendor for SEMLS was not the same as at time of publication; however, SEMLS moved their business in July 2008. In March, Consultants visited the courier's sorting facility. The vendor had three separate sorting areas, one for each of the automated networks because the majority of all deliveries within a network stay in that network. Any inter-network delivery items were taken individually to the appropriate automated network sorting area. The courier used independently contracted drivers for delivery, each with their own

vehicle. The company provides other transportation services and had a large pool of employees available to fill in when a driver cannot make their shift. Sorting speed was reported at 600 items per hour.

SEMLS has a separate methodology in place for dealing with deliveries to the libraries in Nantucket. The courier sorts the items for the Nantucket libraries and deliver the bags to the Nantucket boat service office. Library material is transported to the Nantucket side for $3.00 per bag. A part-time employee in Nantucket, paid by SEMLS, picks up the material from the Nantucket boat service office and delivers the bags to the libraries. The same driver also picks up item from the libraries and drops them at the boat service office for transport back across the harbor. The annual cost for this service is under $15,000 a year which is half of what SEMLS was quoted by a courier for handling the Nantucket delivery.

Norfolk Public Library

Consultants visited Norfolk Public Library and met with several members of the SEMLS Delivery Committee at the library. Norfolk is a part of the SAILS network and receives an average of five totes per day. The library has RFID tagged all of their materials and has a small automated 3-tote sorting machine connected to the book drop. RFID tags are not utilized for items sent and received through the delivery system. The library is unable to print routing labels automatically due to inconsistencies in the names of the libraries between their SirsiDynix Unicorn system and the names required on regional routing labels.

The library staff in this region emphasized the need for more automated slip printing and complained of incompatibility issues with the names utilized for the libraries in the different systems. Packaging requirements were the other main issue brought up by the Delivery Committee representatives and library staff. Sorting facility staff commented on the problems they encounter with illegible routing labels and noted that handwritten slips created slowed down sorting and negatively affected sorting accuracy.

Western Massachusetts Regional Library System (WMRLS)

WMRLS is a region of 2800 square miles (the second largest in the state). The

WMRLS Regional Headquarters

region contains one urban area (Springfield) and a large number of small, rural, and widely distributed libraries. WMRLS has poor and complex road systems making up the large distances between libraries. WMRLS maintains an in-house staff and vehicle fleet for delivery and sorting operations.

The region delivers over 1.5 million items a year, making over 15,000 stops to 132 locations. The delivery budget is $405,234. WMRLS provides this delivery service at a per item cost of $0.26, a per stop cost of $26.69 and a per location cost of $3,070.

C/W MARS is the automated network within WMRLS. As discussed, the network is composed of two shared Innovative Interfaces Millennium catalogs (Central and Western) combined together via the INNReach product to form a single union catalog. The C/W MARS union catalog has over 1.8 million bibliographic records and 7 million item records. Annual circulation statistics total over 10 million transactions.

The region provides their own delivery and sorting services, employing delivery and sorting staff and maintaining their own fleet of vehicles. Much of the sorting for the region is done on-route by the drivers. Each delivery van is outfitted with special shelving to aid in the on-board sorting. Since much of the sorting is done by the drivers, no separate figure was available for the sorting operations. WMRLS outsources the delivery operations for Springfield City Library and a small group of academic libraries known as Cooperating Libraries of Greater Springfield (CLGS) to a courier. WMRLS headquarters is also a regular stop on a delivery route serving 5 academic libraries in the region, which are not a part of the C/W MARS system, at an annual cost of $1500 per year.

The Jones Library, Amherst

The Consultants visited the Amherst Public Library, a full member of C/W MARS. The library staff spends at least 24 hours each week receiving and sending materials for delivery. Library maintenance staff handles deliveries to the Amherst branches, including those items received through the WMRLS delivery service.

Library staff in this region stated they are very happy with the delivery service and the drivers. The main complaints were related to the lack of automated slip printing capabilities, difficulties with packaging and lack of space to manage the delivery operations.

Automated Network and Regional Delivery Relationship

Each region's delivery volume is driven by the automated networks. A large majority of all delivery volume occurs within the networks. Very little material moves across network systems within the regions. See Appendix F for maps showing the distribution of each network in each of the regions. Even within the C/W MARS automated network, the great majority of the resource sharing takes place between libraries in the same shared catalog with much less volume moving between the Central and Western regions/catalogs and an even fewer number of items moving outside of the Central or Western regions.

SEMLS has three automated networks in the region. Ninety-eight percent of items are delivered between libraries within the region. The majority of the delivery volume takes place between libraries in a specific automated network. The courier's sorting facility is split up into three sections, one for each automated network. The small numbers of items which are moved between automated networks are hand carried from one sorting area to the other; however, no count of the items handled in this way was available. Norfolk library reported that 95% of their deliveries are to/from other libraries in their automated network (SAILS).

In the Metrowest region, the Minuteman automated network reports that 98% of all delivery takes place among libraries in their network. In 2007, 1.3 million items were delivered within the network, 9,000 items were borrowed from out of network and 18,000 items were loaned out of network.

In the Northeast region, MVLC reported that in 2007 605,000 items were delivered from one MVLC library to another. Deliveries outside of the network numbered approximately 12,000 (2%). For the region, 99% of all deliveries are made among the libraries in the region, with the vast majority of items being moved among libraries within the same automated network.

All of the regions visited appear to have cordial, if somewhat distant relationships with the automated network(s) in their region. An annual, statewide meeting brings together staff from the automated networks and the regions; however, it wasn't clear that additional meetings between personnel from the regional offices and the network offices within a region regularly took place. It was apparent that detailed discussions and planning between the regional delivery services and the automated networks were not common. In fact, at least one representative from an automated network stated that she saw no relationship between the delivery service and the automated library system. However, it is the network and how the system is set up that controls how delivery requests are prioritized and routed so there is most definitely a relationship between the two.

CMRLS & WMRLS

The C/W MARS system fills requests randomly, with first preference given to patrons for which their home library has a copy available. No priority tables have been set up to optimize requests with delivery; however, they do utilize software which keeps requests within a single library system (main library and branches) whenever possible. C/W MARS is currently using item level holds although they may move to title level holds in the near future which would allow them to set up priority tables for requests.

SEMLS

OCLN uses SirsiDynix Unicorn and currently does some grouping in the system for central libraries and their branches. SAILS uses SirsiDynix Unicorn and has implemented random priority with some load leveling within that system. CLAMS uses Millennium's basic load leveling feature in order to ensure requests are distributed among member evenly.

NMRLS

NOBLE uses Innovative's random sort capability for requests in their Millennium system. MVLC uses SirsiDynix Horizon and implemented some custom load balancing and groupings for central libraries and their branches which has been discontinued due to some unintended consequences of implementing these custom features.

Metrowest

Minuteman uses Millennium's randomizing feature for their requests.

Materials Handling and Delivery Findings

Labeling

In addition to the ability to control how requests are assigned to each member library using routing tables, randomizing, prioritizing and grouping, each of the library systems also offers varying degrees of routing slip and holds slip printing capabilities.

Library staff using automatically printed routing labels and hold slips were very happy with the service and reported it dramatically reduced the work involved in preparing material for delivery and the holds shelf. The networks that enjoy the most success with automatically printed routing labels and hold slips have provided some customization for each library. These libraries mentioned that more local customization is desired and that some small changes would decrease the staff time even further.

At least one network reported that their library staff did not want to automatically print routing labels and hold slips; however, this did not conform to the Consultant interviews at the libraries. Generally, the default labels generated by the library systems are not particularly useful because the print is too small and not necessarily arranged on the slip appropriately; but, when network staff make the effort to customize the labels and slips according to the needs of the library staff, they are very popular and save circulation staff a significant amount of time.

None of the networks have automated routing label printing for items that leave the network. All routing labels for out-of-network delivery must be completed by hand. Delivery and sorting staff reported that the cross-network, handwritten labels slow down the sorting operation and result in items going to the wrong location.

In fact, handwritten routing labels were mentioned as an issue by each sorting and delivery vendor in the state. One problem with this methodology is that each sorter must decipher the handwriting of many individuals. The other problem associated with handwritten slips is the inconsistency in library names and delivery codes. Most of the public libraries in Massachusetts have a municipality name as well as a library name. When filling out a routing slip, some libraries use the town name and others use the library name. This means that each person sorting materials must learn what library is in each town. The standard abbreviations found in the Delivery Routing Directory for statewide library delivery services, maintained by Boston Public Library and the Massachusetts Board of Library Commissioners is not consistently used by libraries in any region.

Routing labels for statewide delivery are standard across the state and must be completed by hand. Requests made via the statewide Virtual Catalog are transported with a cross-state label or book band. The courier for the cross-state route stated that the cross-state

labels have small print and are very hard to read. See Appendix E for a sample of the Virtual Catalog book band. He also mentioned that it is difficult to distinguish between destination and origin of the items being delivered. As a result, each label must be closely inspected which slows down the operation considerably and results in sorting errors.

Several sorting and delivery personnel suggested that numeric codes for locations and color-coding (for networks, regions, cross-state) would be useful.

C/W MARS

C/W MARS full members and mininet members have automatically printed routing labels (for intra-network deliveries only). Hold slips are automatically printed with minimal customization which results in very small print on each hold slip that is very difficult for staff to read. See Appendix C for examples of the routing labels in the CMRLS and WMRLS regions and Appendix D for examples of the hold slips used in both regions.

Minuteman

Minuteman customized the Innovative auto print software for each library to print routing labels (for intra-network deliveries only) and hold slips. See Appendix C for examples of the routing labels used in the Metrowest region and Appendix D for examples of the hold slips used in the network.
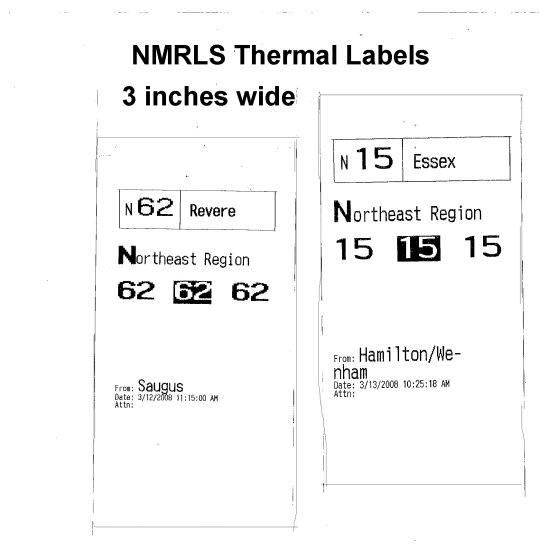
Figure 1 -- Thermal Labels from NMRLS

NOBLE

NOBLE has customized, automated printing for routing labels (for intra-network deliveries only) and hold slips. See Appendix C for examples of the routing labels used in the NMRLS region and Appendix D for examples of the hold slips used in the network.

MVLC

MVLC has customized the SirsiDynix Horizon automated printing for routing labels (for intra-network deliveries only) and hold slips. See Appendix C for examples of the routing labels used in the NMRLS region and Appendix D for examples of the hold slips used in the network.

CLAMS

CLAMS utilizes the Innovative automated printing for routing labels (for intra-network deliveries only) and hold slips. See Appendix C for examples of the routing labels used in the SEMLS region and Appendix D for examples of the hold slips used in the network.

SAILS

SAILS has limited automated capabilities for routing labels (for intra-network deliveries only) and hold slips, using the SirsiDynix Unicorn printing functionality. See Appendix C for examples of the routing labels used in the SEMLS region and Appendix D for examples of the hold slips used in the network.

OCLN

OCLN has limited automated capabilities for routing labels (for intra-network deliveries only) and hold slips, using the SirsiDynix Unicorn printing functionality, however, a recent SirsiDynix upgrade has given them increased abilities in this area. See Appendix C for examples of the routing labels used in the SEMLS region and Appendix D for examples of the hold slips used in the network.

Packaging

Each region packages delivery material differently. Most libraries voiced at least one complaint about how they package material or how it was packaged by libraries elsewhere. Some complained that too many or too few items are bundled into a single stack. Others stated that other libraries do not bundle items at all and send out each item separately.

Packaging of AV materials was mentioned as a problem in every region. The majority of comments involved the time and material required for packing and unpacking CDs and DVDs. Some regions indicated that their rules for AV packaging were created as a way to deter theft of high value items. Other regions indicated that their AV packaging rules were implemented to decrease the amount of damage done to these materials during the delivery process.

DVD and packaging

Wrapping and unwrapping delivery material takes time and adds to the library staff workload. One library worker spent over a minute to unwrap a single CD. In addition, storage of packaging supplies adds to the problem of too little space for processing delivery. Delivery vendors were also concerned about the additional space required in the totes for the packaging.

Some libraries use jiffy bags to protect each CD or DVD. At least one library chooses not to reuse jiffy bags because they have no extra space for storing them between uses. Instead, the jiffy bags are recycled (after removing each individual staple).

Libraries and delivery vendors mentioned numerous problems with CD and DVD cases. In the summer months, some of the cases reportedly melted. Cases often get smashed or broken during delivery (especially true for CDs). Some libraries wrap CDs individually to avoid scratches and breakage while others wrapped one to three CDs in bubble wrap before placing them into an envelope. One library suggested using stronger CD cases without all of the extra padding.

Ergonomics

Consultants witnessed a wide variety of ergonomic issues at the libraries as well as the sorting facilities. Many libraries lack the space needed to optimize the process of sorting and preparing material for delivery and for processing receipt of delivered material. Finding space for the incoming and outgoing totes is a challenge for virtually all libraries regardless of size or age of the building.

The height at which totes are handled is problematic in most libraries. None of the libraries used any kind of electric or pneumatic lift system for ensuring that staff could work out of totes without having to lift them onto a table, desk or book cart top and without bending down to pull items out of totes on the floor. The least amount of bending is required when libraries utilize book carts with flat tops for each tote. But even this arrangement requires lifting up each tote while it is loaded with material.

WMRLS Delivery Truck Configuration

WMRLS has outfitted their trucks to provide space for sorting materials while on-route. The bins are arranged for pigeonhole sorting on the truck and most of the bins are at a height that is relatively comfortable to use. The truck does not have a ramp for hand-trucking totes into the truck for sorting, but a step has been placed on the back of the truck so the drivers don't have to jump in and out of truck from a high distance.

The sorting facility at the WMRLS headquarters utilizes book carts with flat tops to move totes around in the sorting area, however, the shelving utilized for the sorting bins requires staff to reach above their head when placing materials in some bins and then down to ground level for other bins.

CMRLS maintains bins in their sorting area at reasonable heights; however, the incoming totes to be sorted are placed in stacks of up to four or five totes high. Sorting staff has to reach into totes at all levels (five feet high or down on the floor). All totes are moved manually by the sorting and delivery staff.

The outsourced vendor sorting operations visited are also not optimally set up for healthy ergonomics. Sorting bins are staged on shelves that are either too high (above the sorters heads) or too low (on the ground).

Each region has a different type of delivery tote. The bin size and weights vary, with some weighing up to 40 or more pounds when loaded with material.

Table 1: Summary of Tote Sizes and Weights when Loaded

Region	Size of Totes (inches)	Number of Items Per Tote	Average Weight Loaded (pounds)
BRLS	21.62 x 15.25 x 9.5	29	
CMRLS	18 x 13 x 11	37	
	21 x 15 x 17	64	
METROWEST	21.25 x 15 x 12.5	45	39.92
NMRLS	21.5 x 15.25 x 9.75	33.8	31.1
SEMLS	21.62 x 15.25 x 9.5	29	
	21.25 x 15 x 12.5	40	
	17 x 7 x 17 (bag)	20	
	19.5 x 15.5 X 10	20	44
WMRLS	12 x 24 x 16.5	35	65
	8 x 22 x 16.5	25	35

Inter-regional/ Cross-state Delivery

A contracted courier provides the cross-state delivery services. Each region is visited twice every night, except for WMRLS which is the furthest in distance from the other sites. The driver stops at each of the other regions on the way to WMRLS and then again on the way back from WMRLS.

The cross-state delivery route operates fairly reliably. However, sometimes items get misrouted and end up lost in the wrong region with no easy way to determine what happened. Not only is it difficult to explain what went awry when an item disappears for two weeks (when it should have arrived

Cross-State Delivery Totes

within a couple days according to delivery schedules), but it is also impossible to tell how to correct the error.

The problem with items that cross regional borders is that there is no central point of contact where lost items go and where a representative has the information needed to get the item back on track. If an item owned by a library in BRLS gets lost somewhere in SEMLS without the routing slip, the only recourse is to return the item to the owning BRLS library. No one in the SEMLS region can scan the item to find out where it belongs because they don't have access to the appropriate network software. In other words, items detached from their cross-state routing labels are at high risk for delayed delivery if they manage to get delivered at all. This is also true at the cross-network level.

In addition, the routing labels used for cross-state delivery use extremely small print; see Appendix E for an example of the Virtual Catalog routing slip/book band. The destination information must be put on the slip by hand and some people's handwriting can be difficult to read. People tend to use their own abbreviations and this creates some ambiguity between destinations.

Statewide Catalog

The statewide Virtual Catalog (an implementation of SirsiDynix's URSA product) has a minimal effect on delivery volumes at this time; however, significant improvements are in the works. Already, a much better version of URSA is in use at Tampa Bay Library Consortium and this beta release is likely to be made available to other libraries in the next year. Any changes and upgrades to the Virtual Catalog should be followed closely by the regions because it could dramatically change the patterns of delivery in Massachusetts. Whereas the current pattern is to keep 90% or more of the sharing within a network, this could change if the resource sharing tools made available to end users and staff were easier to use.

Today, resources are shared within a network because users can easily request items within a network. They don't have to leave the catalog to make a request. It is also much easier for library staff to respond to requests within the network than those via the Virtual Catalog. Requests from the Virtual Catalog require a number of manual processes to complete. Network staff in one network accesses the Virtual Catalog each day to get the new requests. This network does not allow media items to circulate via the Virtual Catalog so the network staff first deals with rejecting all of the requests for media. Once these requests have been handled, the staff creates emails for each library, listing the requested information.

Other libraries in the state receive notification of Virtual Catalog requests through their normal pull-list processes or by accessing the staff side of the Virtual Catalog. Libraries

that have the Virtual Catalog requests included in the pull-list from their own local automated library system must also login to the Virtual Catalog to determine which library has been designated as the pick-up location for that request. In addition, many libraries must perform a duplicative checkout procedure, duplicating the information in the Virtual Catalog and in their own local catalog.

If the URSA product was as easy to use as the shared catalog is, customers would begin to use it much more frequently. If the URSA product was as easy for staff to use as network requests are, library staff might promote the Virtual Catalog more widely. According to SirsiDynix, the next iteration of URSA is likely to be much more popular with customers. The release after that is promised to address the staff needs (allowing for circ to circ requests without requiring double entry for staff). Time will tell if SirsiDynix will follow the development schedule they've promised but if they do, the Massachusetts resource sharing and delivery environment could change dramatically.

Resource Sharing Initiatives in the Regions

Each region has a wide range of services they offer to their constituents, some of which could affect delivery services. This section details some resource sharing initiatives described to the Consultants.

BRLS
Boston Public Library is starting a scan-on-demand service. Scan-on-demand is a service which utilizes high-level scanning equipment to create a digital copy of a document upon request. The service will initially function with research and in-house collections specifically requested through OCLC. Scan-on-demand has the possibility of reducing delivery volumes because items that are now transported could be scanned and emailed (or made available online).

CMRLS
CMRLS facilitates and pursues cooperative collection development initiatives among libraries in the region as well as other regions in the state. CMRLS has recently made significant purchases of eBooks and downloadable video to share in the C/W MARS downloadable collection.

Depending on the collection development and collection management initiatives implemented, it could have an effect on delivery volume. For example, floating collections have been shown to dramatically decrease delivery volumes by eliminating the return trip involved in each loan transaction. Rather than borrowing an item and then returning it, the library that accepts the return simply incorporates the item into their own collection until it is borrowed by another library. On the other hand, a collection management strategy in which one library focuses on a subject area so that other member

libraries can reduce their collection in that area, could have the effect of increasing delivery volumes.

Metrowest

The Minuteman network recommends purchasing one copy of an item for every six holds in the system (e.g. a purchase alert of 6) and informs libraries about which titles have a higher number of holds. An aggressive purchase alert system can decrease delivery volumes because additional copies of popular titles are purchased and moved into circulation rather than relying on too few copies moving around the system to fill the large number of requests.

Ebooks have the potential to decrease delivery volumes as more and more people find the ebook to be an acceptable substitute for the physical book. Minuteman tried to put together a group deal for audio books with Overdrive but the deal was not completed. Nonetheless, some libraries in the network purchased ebooks through Recorded Books. A more coordinated and sustained effort to promote some kind of ebook program -- especially now that Overdrive is compatible with iPod -- could provide some relief for delivery services and may also attract a new category of customer to the library.

NMRLS

MVLC has a system-wide subscription to Overdrive, a system which offers audio books and ebooks. Whereas some member libraries in the NOBLE system have individual subscriptions to online and audio book collections, no large-scale rollout of any ebooks program has been implemented. As noted above, individual and group subscriptions to ebooks do have some potential for reducing delivery volumes and attracting new library users.

SEMLS

CLAMS does not use a purchase alert system but does provide a list of the top 25 books with holds on their website. The 2007 release of the Innovative software promises a new consortial purchasing alert list capability and CLAMS plans to implement purchase alerts at that time.

CLAMS used to have a floating video collection which reduced the number of deliveries associated with video transactions. The program has been discontinued but it does give CLAMS a proven track record for handling floating collections so such a program could be more easily implemented here than a region or network that had never attempted to use floating collections.

CLAMS has a small group of libraries which participate in group purchases of audio books from Overdrive, which, as stated above, has the potential of decreasing delivery volumes.

SAILS posts a list of titles on a hold purchase alert list on their website. This list serves as incentive for libraries to purchase more copies of particularly popular titles which can reduce delivery volume as more holds are filled by the local library.

Libraries in the SAILS network have access to audio books from Overdrive, which, as stated above, has the potential of decreasing delivery volumes.

OCLN provides an alert list to their members for items with high numbers of outstanding hold requests. The alert list includes the number of network and local copies, the number of network holds and the number of local holds . This list serves as incentive for libraries to purchase more copies of particularly popular titles which can reduce delivery volume as more holds are filled by the local library.

OCLN members have access to audio books from Overdrive, which, as stated above, has the potential of decreasing delivery volumes.

WMRLS

WMRLS has a shared collection available to member libraries. Most of the collection is audiovisual materials, large print, genre fiction and children's materials and is used in the bookmobile service; however, the items are also loaned out to individual libraries. Shared collections may not cut down on the number of items sent through the delivery service, but it can mean a better turnaround time for some items since every route stops at the regional office every day.

Sort Operation Findings

This section represents a summary of findings following a three day trip to Massachusetts that included meetings at Boston Public Library with Michael Colford, with Sunny Vandermark and Greg Pronevitz, Cindy Roach, and CMRLS Headquarters with all the Regional Administrators. Lori Ayre, Principal Consultant from The Galecia Group, attended each of above-referenced meetings. Accompanying Ayre at were representatives of automated materials handling system vendors.

The standard Massachusetts routing slip with prominent regional designation at top.

Issues Affecting Efficiency and Accuracy in Manual Sort Operations

The efficiency of a manual sort operation relies primarily on three factors: routing labels used for sorting, the sorting environment, and sorting personnel.

Routing labels

Many of the regions use a standard Massachusetts routing slip similar to the one shown to the right. Each region has their own version of the same routing slip with their own regional designation at the top (W, C, B, M, N, and S).

The standard slips require handwriting the name of the "Town/Institution" near the top (underneath the regional designation). There is also space on the label for branch, department (see "Attention"), date sent and notes. Many libraries preprint these forms so that the "From" location does not need to be handwritten.

Many of the libraries reuse the routing labels which often involves scribbling out the old information and writing in new destinations or instructions. This practice makes is more difficult to quickly identify the valid information, slows down the sorting, and introduces errors in sorting.

The most prominent feature of the Massachusetts routing slip is the regional designation. For 95% of the material, this designation isn't important because so little material moves outside of a region. A better approach would be to reduce the size of the region identifier and increase the size of the destination location. This in combination with a standardized code for each location receiving delivery would improve accuracy and efficiency.
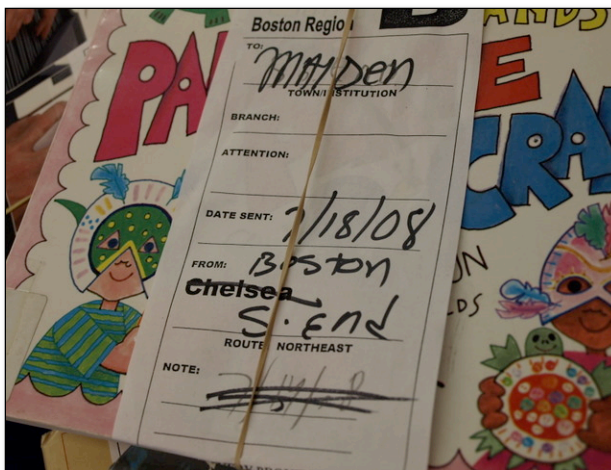
Example of a reused, handwritten routing slip that is very difficult to read.

A better routing slip would make the destination location more prominent so that sorters could quickly glance at the label without having to study it to know where the item should go. The destination location should always be visible, consistent, and legible. Some of the handwritten labels observed in Massachusetts libraries were almost completely illegible.

Another practice that causes sorting mistakes is the inconsistent naming conventions. The slip calls for the "Town/Institution" but rarely is the town and the institution listed on the routing slip. Most people identify the library by either the town (e.g. Groveland or Haverhill) or the library name (Langley Adams) or the institution name (Northern Essex Community College). All of the sorting operations reported this inconsistency with certain locations.

Sorting efficiency and accuracy would be improved if each location receiving delivery had a succinct identifier. Alpha-numeric codes can be especially effective if they are tied to something that makes it easy to remember it. Relating the location code to a route is not a good idea because routes change as new libraries start using the service and as volumes fluctuate.

A properly designed location code system should make it easy to quickly identify a location and be easy to distinguish between similarly named locations[1].

It is unreasonable to assume that sorters can work at 99% accuracy with illegible or inconsistently identified locations and with routing labels tucked too far inside the books and cases. Moving to automatically generated routing labels based an alpha-numeric coding system will resolve many of the efficiency and accuracy issues currently faced by the sorters.

MLN's Innovative Routing Slip

Eliminating handwritten labels in favor of automatically printed routing labels will save time of library staff. Library staff using automatically printed routing labels and hold slips report that this feature has improved their workflow dramatically. Unfortunately, the default hold slips and routing labels provided by SirsiDynix and Innovative print on such small slips of paper with such a small font size that they are essentially useless (although at least one library chose to use them for their holds despite the difficulty reading the slips) because of the tremendous time-savings.
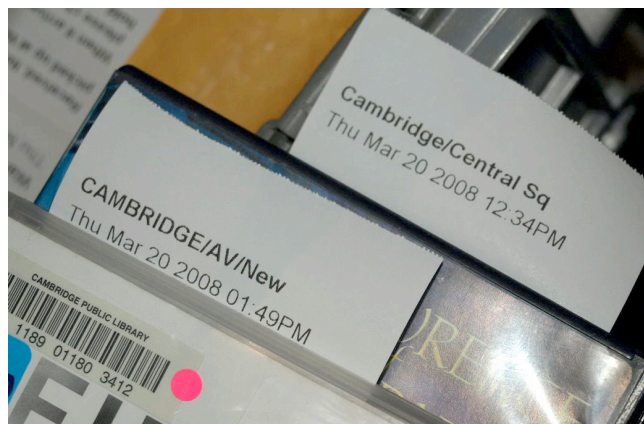
Luckily, several of the networks (NOBLE, C/W MARS and MLN for Innovative, and MVLN for Horizon) and have developed a system for generating a custom routing label that is very easy to read for library staff as well as sorters.

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[1] Examples of suitable location codes are provided in another section of the Final Report.

At least one of the Innovative networks, CLAMS, has not provided the custom routing slip printing capability for their members that other Innovative networks have. There is no doubt that working together with other networks that have implemented this capability would benefit CLAMS members tremendously. Similarly, MVLC has implemented this feature for their Horizon network. And MBLN (in the BRLS region) could benefit from MVLN's help in rolling out this feature as well.

As for the other networks without customized routing slip printing capability, it is recommended that each network develop this capability if possible. It may not be possible in the case of OCLN and SAILS due to the fact that library destinations are hard-coded with the library name (instead of the state recommended abbreviation) and cannot be changed. This may be something for which a workaround could be developed and requires further study by the network (perhaps with support from the region). As of November of 2008, three OCLN libraries and the central site are printing transit slips. OCLN is recruiting more libraries at this time and have been able to match the SEMLS delivery code in most situations. The Transit slip can be configured to include the transit reason (On Hold, Reshelving, etc,) which OCLN hopes will help sorting and reshelving at the destination library.

CMRLS sort center with angled stacks of totes allowing for efficient sorting to 60 locations per row.

The standard routing label will be required at libraries where automatically generated routing labels cannot be generated (e.g. Unicorn libraries and non-network libraries). In addition to the improvements mentioned above (reduce the emphasis on the regional designation, increase the size of the destination location, use a code for the destination, make sure the destination code is located at the top of the slip and is always visible), the regions should consider providing self-adhesive routing labels (available in post-it note style pads) for their libraries. This way, the routing label can be placed on the front of the item without requiring tape or rubber bands and is always easy to see for the sorting staff. Such custom labels can be printed at a cost of approximately $.02/label and come in pads of 25 or 50[2].

Sorting Environment

It is very difficult to sort efficiently in a library back room, at the circulation desk, or on a van. While many library staff feel compelled to do as much presorting as possible to help

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[2] Estimated pricing based on informal quote from ShowYourLogo.com.

the couriers, it generally isn't a good use of library staff time because they can't do the sorting as efficiently as sorting staff can.

In some cases, presorting to one or two locations that can be delivered along the route makes sense but otherwise it is best for library staff to drop all material for delivery into a single container and for sort staff to sort everything at one location set-up to do the job efficiently and accurately.

To sort efficiently, the number of locations being sorted to needs to be small enough that a bin or tote is just a few steps away.   The CMRLS sort center is configured well for efficiently sorting. Each row allows the sorter to sort to 60 locations without having to move more than a few feet.

A popular layout for sorting is the horseshoe shape which is employed by each of the Massachusetts vendors' sorting operations (to some extent). This enables the sorters to take items out of the delivery totes and sort them into bins (or totes) arranged around them.

Staging area with totes on pallet for moving with fork lift.

In addition to the job of actually sorting individual items, the sorting operation needs to have sweepers and stagers. The stagers bring full totes to the place the sorters work (sometimes a preliminary sort is done by stagers to split the tote between two sorting areas.) Sweepers are responsible for removing totes that are full and ready for loading onto the delivery vehicle and providing another empty tote for the sorting operation.

Staging totes, both incoming and outgoing, is an important aspect of the sort environment. It is important that stacks of totes can be easily placed in the optimum position so they don't have to be carried individually or moved long distances. Forklifts, hand trucks and conveyors are good ways to move stacks of totes into position. None of the operations used any kind of conveyors. Most used hand trucks and two used fork lifts.

Presorting in the back room of an NMRLS library.

Sorting Personnel

Manually sorting library material requires a certain type of worker if it is to be done efficiently. The worker must be able to think and move quickly, work efficiently and be comfortable handling lots of different sized packages; some items are bundled in groups of 2-5, others are contained in jiffy bags, some have rubber bands. Each tote can weigh as much as forty pounds when full (even more when the largest totes are used).

Based on the sorting speeds reported in United States Postal Service operations, manual sorting productivity may vary from 500 PPH -1000 PPH depending on the sorting environment.[3] In the case of the manual sort operations in each of the Massachusetts regions, sorting speeds range from 364 PPH to 557 PPH (according to data provided by each of the regions)

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[3] In a 2003 interview with Richard Pavely (Office Solutions, Mar/Apr 2003), Postmaster General Jack Potter reported that the postal service began using automation for sorting in the 1980's and that this equipment "replaced labor-intensive sorting operations where the productivity is typically 500 pieces per hour or less." Available from http://findarticles.com/p/articles/mi_qa5359/is_200303/ai_n21327617. NISOH Investigator Thomas Hales, MD reported that manually sorted mail at the Denver General Mail Facility was sorted at 1000 items per hour. Available from http://www.cdc.gov/niosh/hhe/reports/pdfs/1992-0019-2188.pdf.

Vendor Issues Affecting Regional Sort Operations

Four regions (Metrowest, NMRLS, BRLS and SEMLS) and the Cross State delivery service use vendors for sorting.

Some sorting features:

Two small routes include some sorting along the way (approximately 15 minutes per day) and the rest is done at the warehouse (approximately one hour per day.)

Courier sorting at Boston Public Library while on the route.

The carrier has set aside a small space for sorting and while it is configured more efficiently than a van, it is still not particularly optimized. The bins used for pigeon-hole sorting are both too high and too low so the sorter has to reach up and stoop down. Also, items cannot be easily placed in each bin because they are only few inches between the shelf above and the top of the bin.

None of the bins themselves have labels on them but the shelf is clearly labeled with the destination location. Each bin must be emptied into a tote for delivery.

Because the sorter is also the driver, the sorter's hourly wage is higher than necessary. However, the driver is a mature, responsible contract employee that is trusted to handle the material in a professional manner.

Other regional sorting takes place in the vendor's spacious and spare warehouse with little space optimization.

One regional sort site is arranged in a horseshoe fashion in three rows: the floor, on tables, and on a high shelf above. In the center of the horseshoe, a worker unloads material from totes and stacks it together. Sorters pick up the stacks and sort the material to the numbered totes in the horseshoe shape. The tables and stacks used to sort material are not ideal insofar as they are not arranged closely together, and are either too high or too low. Also, there is not an efficient way to sweep the full totes away from the sorting environment without getting in the way of the sorters.

One region uses a number system for identifying locations. None of the totes themselves is numbered. Instead, once the tote is full, one of the routing labels is removed from an item and placed inside the lid.

Another sort site is not optimal. Totes are stacked around the sorters in a semi-organized, somewhat haphazard way so that sorters are constantly bumping into each other. A staging table is in the center of the horseshoe but it is too small for the number of people working in the area.

Temporary, easy-to-read location labels are taped to totes but each time a tote is filled up, the label must be removed and put on a new empty. Since the totes are on the floor, there is no shelf to label (which would eliminate the need to keep moving the taped on label). Once the tote is moved to the staging area, one of the routing labels is pulled out of an item and placed under the closed lid.

The courier plans to invest in equipment for optimizing operations. An optimized sort environment will improve accuracy and speed, and reduce damage to material and is in the best interests of the region even if they don't save any money as a result of the changes.

One sort operation is managed closely by a project manager who is responsible for hiring the contract drivers and the contract sorters. The project manager ensures that all contractors are trained, motivated, and supervised. The drivers are contract drivers with their own vehicle. The drivers do not participate in the sort operation. All sorting is done by young, low-wage hourly workers who can work quickly.

The sorters are not as gentle with material as would be ideal. Many items are dropped into totes on the ground or thrown up to totes on the top shelf. In order to reduce the number of items handles, the courier has requested that libraries rubber band items together whenever possible. In addition, many of the DVDs (and some CDs) are wrapped in manila envelopes or jiffy bags in order to protect the media cases from breakage and also to hide the identity of the item (to reduce the likelihood of theft).

Not all AV material is wrapped in some kind of protective package. The decision to wrap AV material is made by individual libraries based on their perception that the material is at risk. One of the drawbacks to using a younger, low-wage, temporary work force is that these kinds of concerns come into play. It is a significant cost for the libraries who wrap up AV material in protective packages out of fear that it will be stolen or damaged. And, even for those libraries that don't share these concerns, they still have to contend with the packaging for items they receive from these libraries.

At one library, staff were observed unloading the delivery material in a painfully deliberate fashion that included the following steps:

1. remove several items from tote and stack on desk
2. remove rubber bands from around material
3. for any media items wrapped in manila envelopes, remove metal prongs
4. place old manila envelope in recycling basket, toss prongs in trash
5. stack groups of returns together

6. scan items to check-in
7. place hold slip in those that triggered hold (hold slip automatically prints out)

The sort operation may benefit from rubber banded and wrapped material, but the added work this creates for each library both in the sending and receiving process suggests that the benefit to the sorters is not worth the cost to the libraries in either time or money. The workers checking in library material from delivery are probably paid more than the sorters at the courier. In addition, the sorters at the courier are probably considerably faster at dealing with the material than the library workers are (partly due to the space restrictions and partly due to the characteristics of the workers in each job).

Rather than focusing on saving sorters' time, procedures should be put in place, which optimize library staff time in both the sending and receiving process.

One region uses a numeric system for designating locations which generally results in faster sorting yet sorting isn't any more efficient than other sorts. The only logical explanation is that sorters have to sort to 73 locations as opposed to a smaller sort for other regions. The time spent looking for the right sort bin from among the 73 options versus the more manageable smaller number of locations could explain the difference in speed.

Because so much material stays within the networks, couriers would benefit from breaking their sort operation into network level sort areas.

Another courier operates a large warehouse organized into three separate sort areas for each of the automated networks. Each sort area consisted of 2-5 sorters. Drivers began arriving around 1pm and unloaded their vans onto pallets which were moved to the appropriate network area. The entire sort operation was completed between 1pm and 6pm each day.

One courier set up two sort areas. Totes are unloaded onto pallets and moved to the appropriate sort area for sorting. The courier uses a sort staging system in the center of each sorting area in which totes are unloaded on a central table so that sorters can grab groups of items for sorting into totes. They have manufactured custom shelving units for holding the totes so that the totes are easily accessible by the sorters. They use a sweep system of moving full totes onto the floor and one person's job is to put new empty totes in place and take away the full ones to the appropriate staging areas.

The courier hasn't used any automation or conveyors to reduce the lifting and carrying involved in sorting and staging material. Workers were observed lifting full boxes of totes over their heads and carrying them to staging areas. Stacks of totes were generally moved with hand trucks or palletized and moved with fork lifts.

Couriers' warehouses do not use loading docks. Some couriers use vans for delivery instead of box trucks. As a result, each tote has to be removed individually and placed on

the ground or a pallet and then taken to a sorting area. With box trucks, stacks of five totes can be unloaded at one time using a hand truck. However, it does require that trucks can back up to a loading dock or are equipped with a lift.

The sort personnel are low wage, young, hourly, contract workers. These workers work quickly. Sorting rates reported range from 600 items sorted per hour; however, based on the number of items sorted per day and amount of time spent actually sorting, the hourly rate varied from 519 PPH , 578 PPH , and 617 PPH, depending on the network. Unfortunately, sorters do not handle material particularly carefully and both library staff and supervisors expressed concerns about DVDs being stolen. Again, both library staff and sort managers expressed a preference that DVDs be wrapped in some kind of packaging.

At one courier, both drivers and sorters are employees with benefits. All sorters work on a part-time basis.

Sorting facility staff commented on the problems they encounter with illegible routing labels and noted that handwritten slips created slowed down sorting and negatively affected sorting accuracy.

Issues Affecting In-House Sort Operations

CMRLS

CMRLS uses their own staff and sorting is done in a large room in the back of CMRLS headquarters. The courier delivers the totes picked up along the route at various times during the day. They may be sorted the same day and delivered the next, depending on their arrival time. Items that arrive late in the day may not be sorted the next day and delivered the second day. Occasional backlogs slow the process further.

Space between shelving units at CMRLS with totes used for staging material in foreground

Sort Environment

The space used for sorting is large enough for staging the incoming and outgoing totes and for setting up an optimized sort arrangement for sorting. As mentioned earlier, the totes are arranged in tilted shelves arranged three rows high. Two ranges of shelving units (holding 15 totes each) are arranged side by side and back to back so that 60 locations can be sorted to in two aisles. There is also an additional range two side by side shelves allowing for an additional 30 totes in a third aisle.

Labels on CMRLS sorting totes

No tables or conveyors or staging area is set-up for unloading items from the totes. As a result, the staff uses book carts or the staged totes for stacking material, grouping items, and selecting it for sorting.

Each sorting tote is marked with the destination locating using brightly colored labels. The colored labels are hard to read because of the background and because they are oriented sideways. Each location is also marked with a clear, black and white label that is easy to read.

Sort Personnel

Unlike outsourced sorting operations, the sorters at CMRLS are trusted, well-known employees. The sorters are older than the sorters at the contracted couriers and are not as

quick in their movements and cannot so easily move full totes around. The sorting operation appeared slower here than at other locations; however actual sorting speed was difficult to determine.

The benefit of using in-house staff for sorting is that material is handled more carefully and the fear of staff stealing material is non-existent. Some DVDs were wrapped in jiffy bags but most were not.

Cost

The per item cost of the in-house CMRLS sort operation is somewhere between three and six cents per item. Data originally submitted to Consultant indicated a sort speed of 165PPH which was consistent with observations of the operation. However, it may be that the data was incorrectly reported because this number has been revised twice by CMRLS staff. The most recently provided information is provided below.

Sorters at CMRLS grouping material before sorting to totes

Table 5: Cost of CMRLS Sort

CMRLS	Region	Hourly Rate	Daily Cost	Annual Cost	Items Sorted Per Day	Sort Cost per Item
	CMRLS	$10	$128.50	$33,417	5,205	$ .025
TOTAL				**$33,417**	**5,205**	

WMRLS

WMRLS maintains an in-house staff and vehicle fleet for delivery and sorting operations. Much of the sorting for the region is done on-route by the drivers. Each delivery van is outfitted with special shelving to aid in the on-board sorting. WMRLS contracts with a courier company to handle some locations in the Springfield area and material picked up by the courier must be sorted inside WMRLS headquarters.

Sort Environment

Sorting on the truck has been very well optimized. Three rows of shelves have been installed in the back of the trucks that hold 11 totes. The shelves tilt back to keep them from sliding off the shelf and this makes them easy to sort into. The truck is also set-up with a little staging surface that the driver can set the tote on while sorting individual items from the tote into the shelved totes.

The ceiling of the truck is made of a translucent material that allows the sun to come through so drivers can easily see the material while sorting.

Each tote has to be carried into the back of the truck for sorting. No ramps are used. Instead, the driver utilizes a step on the back of the truck (which was custom installed) to load individual totes into the back of the truck. Each driver has a system for organizing the totes for the route they are running. Each day's route is slightly different so the totes must be arranged accordingly. While there are labels on each tote, it appeared that the drivers did not rely on the labels as much as they relied on their memory and the routing labels inside each item in the tote.

At headquarters, a covered area has been built that is customized for the work of unloading and loading the WMRLS delivery trucks. The ramp is the right height for the trucks which have an

Slanted racks of totes on WMRLS trucks

Unloading WMRLS trucks to dollies

assigned slot. Totes from one truck that need to be moved to another truck (for the next day's delivery) are placed on the ramp. Each driver unloads his material onto dollies so that the drivers can easily move stacks of totes between trucks.

Totes from the courier handling the Springfield route are sorted by WMRLS staff. While still on the loading ramp, each Springfield tote is presorted into two totes, each of which is on a book cart so it can be moved easily, into either an A-L tote or an M-Z tote.

Sorting area inside WMRLS warehouse

The presorted totes are then wheeled into the warehouse where they are sorted to each location. Inside the warehouse, the shelves are arranged in two rows so that the A-L material is one aisle and the M-Z material is in the next aisle. Using this system, two people can sort from the presorted totes to the individual locations without bumping into one another.

The shelves used inside the warehouse are not ideal insofar as there are some shelves that are too high, some too low and they are more spread apart than is ideal. Also, the bins used for sorting material must be emptied into totes before loading into the trucks so this creates an unnecessary extra step for delivery staff.

Most of the sorting bins have a label on them but the labels are attached in different places so it isn't easy to see, at a glance, where to sort an item. As with other sorting operations, the sorters rely more on their memories than the labels when sorting.

Sort Personnel

The drivers/sorters at WMRLS are employees that have been with WMRLS for many years. They approach their job very professionally and are very well-suited to the job. They work efficiently and experiment regularly with different approaches to the work.

Six of the drivers are employed full-time and two additional drivers are used part-time. Depending on other duties and their longevity with WMRLS, the range of driver salaries is $26,400-$40,750 plus benefits.

Cost

The per item cost of the in-house WMRLS sort operation is twice the per item cost of sorting done by vendors. However, because of the on-route sorting, WMRLS had to estimate the amount of time each driver spent sorting versus driving and delivery. More than any other operation, the sorting costs at WMRLS should be assumed to be "very ballpark."

Table 6: Cost of WMRLS Sort

WMRLS	Region	Hourly Rate	Daily Cost	Annual Cost	Items Sorted Per Day	Sort Cost per Item
	WMRLS	Varies	$393	$102,180	6,550	$ .06
TOTAL				**$102,180**	**6,550**	

Sorting Issues Related to Automated Networks

Sorting library material isn't a problem that affects the automated networks very much. To the extent that each network has worked to create a usable routing slip (and holds slip), the networks have been involved. However, because the sort operation is currently a manual process, the networks haven't had to get involved beyond printing a routing slip. This would change should the regions decide to move to an automated sorting system.

Automating the sort can be done in one (or more) of the following ways: develop a readable/scannable routing label (e.g. temporary bar coded routing slip that is visible to a reader), implement RFID tags statewide, use the existing bar code, or some combination of these approaches. The easiest approach to automating the sort is to make a link to the automated network that "owns" the transaction (e.g. an item being sent from Metrowest to another library is a Metrowest transaction). Using a SIP2 connection to the network, the sorter is able to read the status of the item (either it is filling a hold or being returned) and the destination of the item (home library if a return, pickup location if it is filling a hold).

However, establishing these connections to the network servers is no small task. It would take considerable effort on the part of each network in coordination with the sort vendor. It is not likely non-network libraries would provide SIP2 access from the system to a central sorter. It would be too expensive for the server license, telecommunications, and support required. It would also get too unwieldy to have numerous SIP2 connections coming into one sorter.

Another approach is to have the networks standardize on a customized routing slip that included a "routing bar code" that would contain nothing but the next destination location for each item going through the delivery system. The sorter would sort based on this routing bar code (and wouldn't require the SIP2 transaction). In order for such a process to work, the routing bar code would have to be visible on the outside of the item while obscuring the permanent item bar code. Developing software that could generate a routing bar code is also no small task. Given the limitations of most ILS systems, this approach is not recommended.

Given the fact that some libraries are part of large automated networks and some libraries operate stand-alone systems, it is likely that a combination of more than one approach will be required.

Automating the Sort

Using automated sorting systems for library materials is becoming more common but because of the expense and the difficulties associated with communicating with library systems, most libraries don't believe they can afford to automate. However, automating the sorting process can yield significant long-term savings because of the ability of the systems to handle increasing larger volumes without requiring additional staffing.

With a manual system, the sort staffing requirements increase in direct proportion to delivery volume whereas with automated sorting, the staffing stays relatively flat even as volume increases dramatically. This is because the human component is limited to the staging of material (totes) and feeding (inducting) items into the sorter. Adding a single induction point (and staff position) can increase the throughput of a sorter dramatically (assuming one person can induct 30 items a minute) without coming close to the sorter's limits (per FKI Logistex, mechanical capacity of a sorter can be over 200 items per minute). The bottleneck of most sorting systems is at the induction point which is a manual process that requires staffing.

Induction speed can be very fast when RFID tags are used instead of bar codes. With bar codes, each item must be placed on the conveyor belt with the bar code visible and in the best position for the sorter to read it. If the bar code cannot be read, the item will be ejected into an exceptions bin and will need to be inducted again. In addition, the bar code doesn't contain the information the sorter needs to do the sorting. The sorter must read the bar code and then make a connection to the library system to find out the status of the item (based on that bar code) and to identify the item's target destination. This process requires the sorter to have a SIP2 connection to the library system that owns the item being sorted.

With RFID tags, the sorter interrogates the tag in order to determine how to sort it. RFID tags can be interrogated by a reader through the cover of the book or inside the DVD case and it doesn't matter if the item is upside down or sideways. This means the items can be inducted faster. The RFID tag can be encoded with a bar code number (so that it acts like a radio-based bar code), and RFID tags can be encoded with other information that can be very useful during sort operations.

Most early adopters of RFID tags for library material only put the bar code of the item on the RFID tag as a way to address privacy concerns. However, standards are in the works for addressing those privacy concerns while simultaneously leveraging the power of RFID tags. The new standards (still in development) will define a space on the tag for interlibrary delivery information such as "next destination." In fact, some libraries have already begun using tags this way.

Sorters based on RFID tags that use a "next destination" field can sort the item without having to make a SIP2 connection to the originating library system. Eliminating the need

for a SIP2 connection to the library system simplifies the system considerably. It eliminates the need for building the SIP2 communication interface and it eliminates the need to have a permanent connection to the library system's SIP2 server. In some cases, it may eliminate the need to pay the library system vendor an additional SIP2 license as well.

Despite the advantages, RFID tagging of library material is expensive (at least 42 cents per tag) and time consuming and the standards are not yet in place. Therefore, undertaking a statewide initiative to apply a permanent tag to all Massachusetts library material for the purposes of delivery is not recommended. However, it would be possible to incorporate re-usable RFID tags that could be slipped inside the book (much like a routing slip is now) for libraries that have material in the system but do not have a SIP2 connection to the sorter (e.g. all non-network material). Programming an RFID tag (e.g. one embedded on a bookmark) for a destination would be an excellent way to ensure that the sorter could work quickly for all material whether it was by reading a bar code and connecting to the appropriate SIP2 server or by reading the RFID tag placed in (or on) the item.

Induction Staffing

Induction staff are responsible for removing items from the totes and placing them on the conveyor belt to be fed into the system. Sort vendors have varying ideas of how fast material can be placed on the sorter. One vendor suggests 800 items per hour is a reasonable estimate while another estimates 1800 items per hour. To determine the number of induction stations that need to be staffed, we need to determine how many items need to be sorted each day and how fast the operators can place items on the conveyor.

For estimating purposes, we assume 70,000 items need to be sorted each day (this is approximately 20% over the 2006 data provided). Let's further assume that the sorting process must be completed overnight (10 hours) so that the current delivery schedules can be maintained. To sort 70,000 items, the induction staff must be able to induct 7,000 items per hour. Using the high induction speed estimate of 1800 items per hour, we can determine that 4 induction stations would need to be staffed the entire 10 hours (6 induction staff). If we use the low induction speed estimate of 800, we would need 9 induction stations and 13-14 staff.

Table 7: Induction Speed and Related Requirements

Items per day (20% over 2006 volume)	Operator Items Per Hour	Induction Stations	Induction Staff Needed
70,000	1800	4	6 FTE
70,000	800	9	13-14 FTE

Automatic and Semi-Automatic Induction

When enough same-sized material is moving through a system, it is possible to incorporate automatic induction systems for feeding the material onto the conveyor belt. While most books are too varied in size, it may be possible to utilize automatic induction for CDs and DVDs. The automatic feeders provided by GBI Data and Sorting Systems can induct material onto the sorter at the rate of one item per second. Using automatic feeders would require all CDs and/or DVDs to be pre-sorted by library staff or would require sort staff to do the presorting at the sort center.

Semi-automatic feeders consist of slower moving belts that actually feed the material onto the conveyor at the next available position. Induction staff still need to remove material from the totes and place them on the semi-automatic feeder; however, it is more likely that all positions on the sorter will be used (and therefore sorting will be optimized) because it doesn't require the induction staff to be working as fast as the sorter.

SIP2 Controller

The bar code alone does not tell the sorter how to sort an item. In order to get that information, the sorter must communicate directly with the SIP2 server associated with the item. SIP2 communications are standardized and are used for many transactions between the library system and third party products such as self-check machines and reservations stations for public computers. Once communication is established, the exchange of information happens in milliseconds so it need not slow down the sorter operation. The trickiest part of the SIP2 transaction is building the software program that communicates between sorter and library system (or their SIP2 server) and establishing the physical communication system (e.g. VPN over the Internet).

It is possible for the sorter to make more than one SIP2 connection at a time (one sorter with several SIP2 connections to different networks) but because 90-99% of each network's delivery volume stays within the network, it may make sense to treat each network's delivery as a separate sort operation with one SIP2 connection to a network at a time. Items that move out of the network could be set aside and incorporated into a secondary sort related to the network into which the item is moving. Once one network's delivery is sorted, the next network's material is moved into position and the SIP2 connection to that network initiated.

If the control unit was able to maintain SIP2 connections with more than one automated network at a time, and if enough sort locations could be established to accommodate the material coming into the system, it would be possible to run material through the sorter in whatever order it arrived to the warehouse without working through it network by network and without having to reset the sorter for each network. This would be accomplished by setting up a SIP2 controller that would maintain connections to each automated network and the SIP2 controller would interact with the sorter. This is a complex software component to develop but it allows for more flexibility in the sort operation.

Dynamic Allocation of Sort Locations

One way to leverage the power of a sorter is to use a sorting algorithm that dynamically assigns sort locations. This means that a sorter could be installed with fewer sort locations than there are sort destinations. In Massachusetts, WMRLS has the most delivery destinations at 122 since WMRLS has a single network and can not divide their locations by automated network as can be done in SEMLS which has 156 separate sorting locations across three automated networks. A sorter without the ability to dynamically allocate sort locations must have 122 sort destinations to handle sorting for all of the regions. However, many of the WMRLS libraries get very few items per day. Dedicating a sort point for a library that will only get 4-5 items each day is expensive. However, if it is possible to change how a sort discharge is used based on the material being sorted, a sort discharge can service several delivery locations.

In order for dynamic allocation of sort discharges to work, the material needs to be able to recirculate until a position has opened up for it. For example, if an item came into the sorter destined for Worcester Law Library (which is a low volume CMRLS location, in 2006, it averaged 2 items per week) the sorter could be programmed to hold that item off to the side (and if additional items for that location came through the sorter would keep track of them and set them aside as well) without allocating a tote to the few items that are likely to come through. Once the sorter finishes up the high volume CMRLS locations CMRLS, then the lower volume locations could be brought back online. Having kept track of the number of items for the low volume locations, the sorter would know when to discharge the Worcester Law Library tote rather than leaving it online until it was full.

Secondary Sort

An alternative to dynamic allocation of sort locations is to do a secondary sort. As material is fed into the sorter, anything that doesn't have a sort destination available gets routed to trolley for re-induction in another wave. The sorter would be configured such that certain destinations were sorted in specified waves so that the primary sort would route items to the proper trolley for re-induction during the correct wave. The benefit of this approach is that the sorter can be much smaller. The drawback is that some percentage of the material needs to be re-inducted. However, the amount of material being re-inducted can be reduced by ensuring that high volume locations are represented in the early waves.

Given the network-centric nature of the Massachusetts materials movement, this approach could prove beneficial because a 72 bin sorter would only require a secondary sort for three of the networks' material (WMRLS, CMRLS, and SEMLS). The other networks have few enough locations that a secondary sort wouldn't be required with a 72 bin sorter.

Tote Staging and Storage

Besides inducting material onto the conveyor, the next biggest staffing requirement relates to staging totes. This includes getting appropriate totes ready to induct into the sorter, removing full (or complete) totes from the sorter and putting new empty totes in place, and staging material for outgoing delivery. The warehouse space must be big enough to hold a full day's delivery volume for the state which could be as many as 2500 totes. Depending on how the sorter is designed, it may be important to keep stacks of full totes separate so that processing can occur in the proper sequence. Totes that have been sorted and are ready for delivery must be kept separate from totes that are incoming. The space required is significant and will need to be calculated with the sort vendor selected.

In addition, the prospect of moving around 2500 totes every night is daunting. Stacks of 4-5 totes can be moved at a time with a hand truck but it is likely that even larger groups of material will need to be moved around using pallets and forklifts. Organizing the area for the workflow required will take considerable planning. Spaces should be established for each purpose and areas clearly marked.

An alternative to manually moving 2500 totes around the warehouse is to use an automated storage and retrieval system (ASRS) that interfaces with the sorter. In this scenario, whatever strategy for sorting material is used (e.g. single network at a time, WMRLS material first, highest volume locations first, etc) is programmed into the combined sorter/ASRS system and the system itself is responsible to bringing the appropriate totes to the induction areas.

Automated Storage and Retrieval System (ASRS)

An ASRS that is integrated with a sorter provides a number of benefits. Rather than stacking totes all around a warehouse and relying on people to move pallets or hand trucks loaded with totes, the ASRS can be used to efficiently store totes and retrieve them in the order that is most appropriate for an efficient sort operation. The sorter and the ASRS become two components of a tightly integrated system for managing the entire sort operation from induction to delivery.

The ASRS system is configured with a tote induction operation that allows drivers to unload their totes using hand trucks. A stack of four totes are delivered to the ASRS at a time and the bar code off each tote is read into the ASRS. The ASRS places each tote into the storage unit and records its location so that each tote can be extracted at the proper time. Rather than unloading a truck and placing it somewhere in the warehouse until it is ready to feed into the sorter, and then moving it into position again, the totes are unloaded and placed in position once. An example of such a system is in use at King County Library System.

Depending on how the sorter is set to run (in waves based on networks, some kind of secondary sort, or via dynamically assigned sort locations), the ASRS pulls the appropriate tote out of the storage unit and delivers each tote to the induction team positioned at the sorter. Induction staff remove items from the tote and placed them on the sorter for sorting.

Full totes are placed on a take-away conveyor by staff managing the sorter. The take-away conveyor takes the full tote out of the sort area and delivers the tote back into the storage unit until the tote is recalled by a driver loading his truck the next morning.

Loading delivery material into trucks from the ASRS is optimized because each route is preprogrammed into the ASRS system. The driver pulls up his truck, punches in his route number and the ASRS extracts the totes, in reverse order (so first deliveries are at the back), and delivers them to the driver in stacks of four for easy loading into the truck by hand truck.

Tote Check-in Capability

One advantage of automating the sort is the ability to provide tote check-in capability at the libraries. The sorter records the bar code number of each item that goes into a tote and associates the tote content with another bar on the tote itself. When the totes are delivered to the libraries, they are able to scan the tote which kicks off a batch process of checking in each item to their local system.

Tote check-in requires software at each library to be installed at check-in stations and this software (provided by the sorter vendor) interacts with the library's local system via SIP2. It represents a significant piece of work for the vendor and for the local libraries to set-up, the advantages are obvious: rather than scanning hundreds returned items each day, library staff will scan $1/40^{th}$ of them (assuming an average of 40 items per tote). Depending on how holds are processed, libraries may still need to scan individual items being delivered to their location to fill holds.

Each tote will need to have some kind of label on it so that drivers know the destination of the tote without having to scan the bar code. This should be applied after the tote is full and the manifest has been created. Depending on the sorting vendor, this may be a manual process or it could be incorporated into the automated process.

Holds Processing

It is possible to have holds processed at the central sort center but this may not be feasible for an operation of this complexity and speed. Theoretically, the SIP2 connection can get the information needed to print a holds slip. At least one vendor (Envisionware) has developed a way to print the holds slip and stick it to the front of the book during sorting (centralized holds processing). However, it may not be possible to utilize this system and still operate the sorter at the speeds necessary to accomplish the entire day's sort at a single location.

It may be possible to batch upload the holds just like the returns. This would require some experimentation to see how practical it is because many issues are involved: It requires creating a batch process that works with each library system, integrating the batch process with the custom holds printing software, and developing a printing process

that sequences the outputted holds slips in a way that the operator can easily match with the items in the tote.

Holds processing is something that can be improved with automated sorting but how it is improved will depend on the vendor selected.

Separating Media from Holds and Returns

Packing and unpacking AV material (CDs and DVDs) takes a lot of time. This is done to protect the material from damage and to reduce theft. One of the benefits of the automated sorter is that material is only manually handled when it is removed from the totes and placed on the sorter. With manual sorting operations, sorters can hold onto a DVD for 30-40 seconds while they read the destination on the routing slip and then find the appropriate bin to sort it into. If the DVD is tempting, it is easy enough to set it aside so that it "gets lost." While it is unclear how often this actually would happen if the DVDs weren't wrapped, it is this fear that drives the policy to put jiffy bags on all the DVDs.

Another reason libraries wrap the media in jiffy bags (and staple them and/or rubber band them) is because they get damaged by bigger, heavier material in the same tote. Heavy books dropped into a tote can break CD and DVD cases. CDs and DVDs tossed into a tote can also be damaged when their case pops open. Wrapping the media in jiffy bags helps ensure the media stays protected.

If the central sort is configured with enough sort locations, it is possible to separate out material for the libraries in a number of ways. As mentioned, returns should be separated from holds so they can be delivered to the appropriate staff person in the library for processing and to support the tote check-in feature. Media items can also be placed in dedicated totes so that material need not be wrapped in bags for protection. Because all the material is similar, and because automated sorters can handle material very gently, jiffy bags would no longer be required to protect the material. In addition, because the manual handling of library material is limited to unpacking totes and placing material on the conveyor, it is less likely that induction staff would be tempted to steal anything. Items will have been picked up and sent on their way long before the decision to "borrow" it can be made.

Tote check-in can be configured for media-only totes but some of the benefit is lost because each item needs to be checked anyway. If clear cases could be used for media so that library staff could verify the contents without opening each case, media check-in could be done with a single scan of the tote, just like the non-media returns.

Recommended Plan for Statewide Delivery

The proposed vision for library delivery in the state of Massachusetts is based on state-of-the-art automation, standardization, and inter-regional sharing and cooperation. Automation should be used to perform highly repetitive operations that can be carried out by machines much more efficiently and accurately than humans. The standardization recommendations span a variety of areas, including labeling, packaging, delivery vehicles and reporting. Recommendations related to inter-regional sharing and cooperation provides methods for supporting many of the changes in standardization and automation. By implementing the range of recommendations provided, the State of Massachusetts will be able to lay claim to one of the most effective and efficient systems in the country.

All regions will see a 1-2 day turnaround on every item sent through the delivery system, whether intra-network or cross-state while saving money in staffing and delivery. Existing investments in equipment will be leveraged and library staff will be freed from some of the clerical tasks associated with processing delivery so they can provide more high-value services to customers.

Statewide, sorting accuracy will approach 100% system-wide and the delivery system will be able to handle increased volume. Resource sharing can be promoted without fear that the delivery systems will not be able to handle the activity generated from improved resource sharing systems.

Vendors contracted for delivery service will be able to provide improved service with the use of standard totes, delivery codes and routing mechanisms.

Sort Recommendations

Establish a single, automated, central sort for all regions

The long term recommendation is to move to an automated, central sort operation for all regions. This will require identifying the appropriate vendors and working in partnership with that vendor to design a system suitable for the regional systems. The following recommendations are based on data collected from the regions and from data collected from four sorting vendors (Envisionware, FKI Logistex, Libramation, and Kiva Systems.)

A single, high-speed, circulating sorter with the ability to dynamically allocate sort locations (or configured for secondary sorting) is recommended for the state's sorting needs. The design of the sorter can be done in one of two ways, the regions can contract with a vendor to design the desired system and then take the design to bid, or the regions can issue an RFP from vendors to propose both the design and building of the system. In addition, it is recommended that the regions include the cost of outsourcing the operation of the entire sorting operation.

The following recommendations are provided for consideration in the development of an RFP for establishing a sorter operation:

- The system must be capable of manually inducting no less than 1000 items into the system per hour with a mechanical capacity of not less than 10,000 pieces per hour.

- Sorter must be able to read existing bar codes on outside, front of material.

- Sorter must be configured to maintain SIP2 connections with all automated networks.

- Sorter must be configured with enough induction points to ensure 70,000 items can be fed onto the sorter, and sorted, within 10 hours.

- Sorter must be configured to read routing labels on non-network items (routing labels should be designed in consultation with the sort vendor).

- Sorter must be capable of sorting material to 700 locations over the course of the sort shift

- Sorter should be capable of separating material into dedicated holds, returns, and media totes for any location where volume to that location justifies it.

- Sorter must provide tote check-in capability for all network systems.

- The sorter must be configured to automatically take away full totes and move empty totes into position for placing on the sorter.

- The sorter must be able to label each tote once full (or complete) with the sort location.

- The sorter must be configured with a system to gently handle placing all material types into totes.

- Sorter must be able to defer delivery of material into full totes (by recirculating material during swapping of totes) and provide warning to operators when totes are reaching capacity.

- Sorter must be able to accept standard totes such as the totes used by Metrowest, NMRLS, WMRLS, SEMLS, and cross-state delivery.

- Pricing for vendor staffing and maintenance of the entire operation should be included (if that is something the vendor offers).

Incorporate Automated Storage and Retrieval System (ASRS) into Sort Operation

The system should be configured with an ASRS system to reduce the staffing and space requirements of the operation and to ensure smooth staging of material for induction and for outgoing delivery.

The following recommendations for specifications of the ASRS system for inclusion in an RFP:

- ASRS must be capable of storing at least 2500 totes.

- Totes must be extractable according to delivery route and delivered to drivers in stacks of four totes for easy loading into trucks.

- Totes must be delivered to drivers in reverse order of the selected route so that totes on the first stop are at the end of the truck for access.

- Totes must be extractable for sorting according to induction stations operating and in an order that supports the efficient sorting of all library material.

- Pricing for vendor staffing and maintenance of the entire operation should be included (if that is something the vendor offers).

Utilize existing bar codes on material for sorting for material from automated networks

Using bar codes for sorting requires establishing SIP2 connections to all automated networks. Items that do not come from one of the automated networks will require sorting based on a routing slip placed on the outside of the item. The routing labels should be configured with a bar code (or machine readable code) indicating the "next destination." The routing slip should be designed in consultation with the sorting vendor, and should be easy to generate and apply to the items (with self-adhesive backing).

One of the advantages of making a connection to the automated networks SIP2 servers is that items that trigger holds on their way to being returned can be re-routed from the sort center. Each time this occurs, one trip between sort center and library is eliminated which saves the system money. It also reduces the delivery volume overall and provides for faster turnaround time. So, while an RFID tag that tells the sorter the "next destination" may be faster, an RFID based system without the SIP2 connection doesn't provide this advantage.

Any material that does not currently have a bar code on the front (ideally the front, upper left corner) of the item should be re-barcoded. It may be possible to incorporate the re-barcoding of material into the RFP for a sort vendor (in informal discussions, one vendor offered to provide this service).

Bar code duplicators are not expensive ($2000) and duplicate bar codes can be quickly applied so it isn't a particularly difficult threshold for libraries to meet should the regions decide to make it a library responsibility to ensure bar codes are properly placed. Bar codes must comply with ANSI X3:182. Ideally the bar codes are position in the upper left corner of the item, on the front, and are 9mm high and 7.5 mm wide using Codabar symbology.

Utilize RFID tagged book marks for sorting material from individual libraries wherever possible

While sorting on the bar code and communicating with the library system directly is fast and efficient and offers the latest, most accurate information about where an item should be sent, the next best approach for sorting is on an RFID tag. For this reason, whenever possible, re-usable RFID tagged bookmarks that can be programmed and slipped in an item are recommended.

In order to support such a system, every non-network library on the system would need a stack of RFID tagged bookmarks to use in the system and they'd need a workstation that could be used for programming the tag. Alternatively, pre-programmed tags could be used.

For libraries that couldn't reasonably support such a system, paper routing labels (see Develop standard regional routing label) will still need to be used and these items will have to be manually sorted at the sort center.

Establish sort operation at one of the existing warehouses

Taking advantage of the existing warehouse spaces is likely more economical than finding a new space dedicated to library operations because the spaces used by these large logistics vendors can be used for more than one purpose. The spaces are also optimized for moving pallets of material around, have easy in and out access, and are close to transportation hubs.

The location of the current vendor warehouses is ideal for servicing most of the state's delivery and provides an excellent choice for the sort operation.

Outsource the sort operation

Managing a high-speed sorter and overseeing an operation like the sort center requires ongoing workflow analysis to work at maximum efficiency and oversight to ensure quality control. Managing a massive sort operation is best done by experts in the business. It requires warehouse and logistics training to keep all physical systems running smoothly. It requires mechanical and engineering expertise to keep the sorting system optimized. For this reason, outsourcing the entire sort operation is recommended.

Part of the process of selecting a sort vendor should include exploration of establishing the operation as public-private partnership with the sort vendor. FKI Logistex has established such partnerships with libraries (e.g. Kolding Public Library, Denmark) and the arrangement seems to benefit all parties because any savings resulting from improved efficiency pays dividends to both partners. The warehouse and workflow expertise of the sort vendor can be applied to design of work area and the library partner (in this case the regions) remains actively involved as part owners of the operation.

Route Recommendations

This project scope did not include evaluation of delivery routes. Consultants reviewed a report provided to the Massachusetts Regional Library System that included discussion of route optimization options. While the report title is "Route Optimization: An Evaluation of The Massachusetts Regional Library Systems' Carrier and Routing Solution," it provides a protocol for pursuing RFP respondents for separate sorting and transportation components of delivery was recommended.

Continue to use couriers for deliveries

Current courier vendors are primarily logistics companies and not sorting companies, and would most likely be relieved to be able to focus on their core service of delivery even if they were no longer responsible for sorting.

The courier services provided by the vendor(s) should include deliveries to BRLS, Metrowest, NMRLS, CMRLS, and SEMLS libraries as well as a long haul route to WMRLS.

Establish a long haul route to WMRLS HQ and continue to use WMRLS fleet for library deliveries

WMRLS has made a significant investment in a delivery fleet and covered loading area with easy access to the warehouse. The current delivery routes begin and end at WMRLS headquarters and could continue to operate the same way even if sorting occurred in Woburn. Rather than sending the WMRLS fleet to Woburn or replacing the WMRLS fleet with new couriers, it would be best to retain the investment made in the fleet and in

the driving staff. All of the drivers have been with WMRLS for several years and provide excellent service to a tricky delivery area. The library staff know the drivers and systems are in place to keep the routes operating very effectively. However, on-route sorting, even when efficient, is less efficient that a centralized sort operation and it adds significantly to the time it takes to run each route. Each route could be completed much more quickly if material was simply moved in and out of the libraries in totes. More material could also be stored on the trucks. The additional capacity is important because volume has been increasing and without some kind of change, WMRLS would soon require larger vehicles to accommodate the volume. The additional volume may have required adding a new route which would mean adding another vehicle and another driver. Either way, WMRLS is on the brink of sinking more money in their delivery operation unless something changes.

Removing the on-route sorting makes is possible for WMRLS to continue with their existing fleet without requiring an additional purchase and without requiring more staff. Sorted material could be delivered from the sort center to WMRLS headquarters where it would be loaded into the existing trucks and delivered to each WMRLS library. As delivery volume increases, WMRLS may wish to reconfigure their trucks to provide more tote storage space after on-route sorting has been decreased significantly.

Optimize routes based on centralized sort operation

Conduct a route optimization study that assumes a single sortation center in Woburn with long haul route to WMRLS Headquarters and delivery to all library locations. For some regions this will mean a change in the sort location and therefore a new starting place for each route. The timing of the sort may affect routes in other regions. WMRLS will need to re-think their routes when the drivers are no longer sorting on-route at the level they have in the past.

Route analysis should also assume a standard vehicle size (i.e. 15 foot box truck) and tote size (i.e. 15" x 9" x 21"), and take into account the actual volume of material picked up and dropped off at each delivery location.

Establish working group for "scoping" and "grouping"

Establish working group of delivery representatives and automated network representatives to identify ways to take advantage of the "scoping" and/or "grouping" features of the library system. Depending on the system, it may be possible to encourage a downstream flow of library materials which, if presorted by the libraries, could be delivered the same day.

The best organization would be to have separate groups for each automated system. Each group should have representatives from the delivery service (region) as well as the networks. The Consultants believe that one working group or Innovative Interfaces sites,

one for SirsiDynix Unicorn, one for Dynix Horizon and one for ExLibris Endeavor would be ideal. Gathering the network expertise on a single system from across the state together will give each group the best chance for tapping all of the functionality available within each automated system. The delivery service representatives would be responsible for helping to guide discussions in ways that would improve these services through the use of the automated system.

The "scoping" and "grouping" capabilities of the automated systems could be used to back up the current routing structure to ensure that the system is working closely with the physical realities of delivery. Placing group hierarchies for libraries downstream on a single route can help to move the requests to libraries that will automatically provide a faster turnaround time.

Utilize "scoping" and "grouping" functionality for determining pre-sort locations

"Scoping" and "grouping" also creates an environment which facilitates a limited amount of presorting for libraries downstream. Only those libraries with available space for pre-sorting should be selected for this activity. Limited presorting combined with configuring the library system to create pull lists based on the established presorts provides several advantages:

   a. same day service for some material;
   b. eliminates the need to insert routing labels into each item;
   c. reduces delivery volume;
   d. reduces sorting volume.

Labeling Recommendations

Automatic lable printing is inconsistently implemented across the state. The ability to produce labels is dependent on the automated library system in place and the customization options available in each system.

Create standard delivery code system across the state

Create a standard system for library delivery codes. The Consultants would suggest the creation of alpha-numeric codes. The standardization of the codes used will mean less sorting errors and therefore faster delivery of all items. The abbreviations for the different libraries and communities within the state are confusing, not used consistently and cause issues with library, sorting and delivery personnel.

For example, utilize a single letter to designate the region (B, C, M, N, S, W), followed by a three digit numeric code. Networks within each region should be assigned a specific numeric range. For example, in NMRLS NOBLE libraries could use N001-499 and MVLC libraries could use N500-999. Although this type of system does not allow for a mnemonic for the library, people quickly memorize the codes for the libraries which they

use frequently in the delivery process. This type of system is flexible and is also easily understood by both automated and manual sorters.

Develop the capability for all systems to automatically print standard routing labels

Regions and automated networks should work together to develop the capability of printing standardized routing labels from every automated system utilized by libraries in the state. Networks without automated printing could work with the networks which have already implemented an automated printing solution. MVLC has implemented automated printing for their Horizon system and NOBLE and MLN have implemented a solution for their Innovative system. The solutions will vary by system and could include:
   a. Customization of existing templates within the system;
   b. Creation of macros which can be accessed while in a client module;
   c. Creation of new templates by the system vendor;
   d. Creation of mapping tables which interact with the printing mechanism to enable systems to print the appropriate delivery code on each label (especially for OCLN and SAILS).

Create custom hold slips for each local system which are automatically printed

Create hold slips which are automatically printed from each local system that mimic the format of the routing labels and can be utilized as the routing slip but also has the appropriate hold information printed on the same slip. This would allow libraries to utilize the hold slip as a routing slip and would not require the printing of two slips for hold transactions.

The hold slips could be customized to provide the routing/delivery location information on one end and the customer information at the other. This would mean that the routing information could be displayed as the item was transported to the appropriate library. The receiving library could then turn the hold slip around an place it on the shelf, ready for customer pick-up.

Develop standard regional routing label

The routing labels used by the regions should be standardized across the regions using the statewide system of delivery location codes. To the extent possible, routing labels should be automatically printed when holds are triggered or items are checked in. When preprinted routing labels cannot be generated by a network or library, it will be necessary for library staff to circle the destination. Handwritten labels should be avoided wherever possible.

Develop standard inter-regional routing label

Develop a standard label for inter-regional delivery to facilitate intra-state deliveries. The current statewide label has small lettering, is confusing and does not contain all of the information needed to quickly and effectively move items from the owning location to the borrowing location and back again. See Appendix E for an example of the cross-state labels in use during the Consultant visits in 2008. The new label should have obvious markings regarding where the item is to be delivered.

Clear and uncluttered labels cut down on sorting and delivery errors, whether being done with a machine or manually. The Consultants heard a number of complaints from libraries as well as delivery vendors about the difficulties they have with the cross-state form. A redesign, making delivery location more prominent would go a long way in helping to get these items to their intended location quickly and correctly.

Develop standard misrouted item slips

In order to assist regional and state delivery administrators provide oversight of delivery and sorting operations, they need to know when, where and how things get misrouted and lost. Providing a standard form for libraries to fill out with all the pertinent information (e.g. date delivered, library receiving item, owning library of item, category of material is was with, i.e. returns or holds or media) will help administrators track down problem areas in the system. The information slip can also be used to remind library staff about the proper procedure to follow when misrouted items are received (Recommendation: Re-route and report misrouted items immediately.)

Packaging Recommendations

Packaging practices vary widely across the state. The Consultants witnessed several extreme cases of packaging requirements such as multiple layers of padding in conjunction with padded envelopes. The packaging of this material not only takes a great deal of staff time, but it also requires libraries to purchase and store the required packing supplies. If automated sorting equipment is implemented, there will be a greater need for standardization in the area of packaging.

Standardize tote size to 9x15x21

It is recommended that the smaller totes be utilized for delivery, specifically 9x15x21 size. Several of the regions already employ this size of tote. Smaller totes make ergonomic sense and they would also reduce the amount of damage experienced with CDs and DVDs. Although media materials may utilize even smaller totes with an automated sorting system, the 9x15x21 size totes for the other materials will mean less heavy lifting for library and delivery personnel. Standardizing totes across the state would open up the possibility of statewide deals for materials handling equipment such as tote handling equipment which could be placed into all libraries.

Reduce or eliminate DVD/CD packaging

The Consultants recommend that all of the regions reduce, if not eliminate the extra packaging for AV material. If libraries are not comfortable going without packaging for AV material, it is recommended that each region determine the minimum amount of packaging desired and then make that a region-wide guideline or rule. Specific rules can be put into place, such as "no staples" which can help libraries spend less time on the delivery processes.

Delivery Recommendations

Each region provides a slightly different combination of totes, vehicles, drivers and protocols for providing delivery of material to their region. This section will address issues that are pertinent to each of the delivery methodologies employed.

Extend delivery hours

Ways to expand the window within which couriers can deliver material to libraries include: providing foyer access to libraries after hours by providing keys to couriers, coordinating deliveries with janitorial staff who can supervise after hours delivery, implementing lock-boxes. For low-volume libraries with limited hours, lock-boxes are a particularly effective option. Issues with traffic volumes are mitigated when deliveries to high traffic areas are made during off-hours.

Provide Saturday and Sunday delivery options

Provide delivery on Saturdays and Sundays. For libraries that are open on Saturday and Sunday, delivery services should be provided to even out the flow of material that needs processing. Many libraries reported that it took a day or two to catch up from the Monday delivery. Beginning the week with a backlog creates problems the rest of the week and should be avoided wherever possible.

Create guidelines for stacking and preparing totes

Totes should be stacked no higher than four totes high to ensure that library staff can easily remove the top tote. Totes should be stacked in a compact fashion in the location designated by the library. The delivery location should be where the material is initially processed and should not require being moved again by library staff.

Provide alerts for items in transit too long

Automated networks should provide daily lists to regional administrators reporting on items that have been in transit more than 4 days so that they can be located and/or holds can be transferred to another item.

Deliver and pick up totes to each library with minimal interruption to library staff

Ideally, couriers use box trucks equipped with lift gate for delivery so that stacks of totes can be carried in an out of trucks and delivered efficiently and with minimal interruption to library staff. Bringing in totes one or two at a time should be avoided. Outgoing totes should be staged in stacks of 4 to ensure quick and easy pick-up for couriers.

Enforce strict delivery service guidelines for all providers

As a contracted service, couriers should be expected to perform their work in a way that supports the work of library staff. It is not the job of library staff to accommodate their workflow to the couriers. It is important to identify performance measures that courier contractors must meet as well as the cost of not meeting these measures.

The following performance measures are recommended for inclusion in any courier contract:

- Deliveries should be provided per an agreed upon schedule with each library. Any variance to the schedule beyond one hour should result in a penalty to the courier providing the service.

- No delivery schedule changes should be made without providing the library adequate time to re-adjust staffing to coordinate with the new delivery times.

- No totes should be left behind by couriers at any library. Failure to pick up all totes should result in a penalty.

- All totes should be delivered to each library on each delivery day. Failure to deliver all totes should result in a penalty.

Receiving Recommendations

Optimize the receiving workspace

The workspace in the receiving area should include a desk mounted scanner and sensitizing equipment (ideally one combination unit) as well as a computer workstation with access to any modules necessary to process incoming items. The person receiving the item should be able to scan the item in and prepare it for the hold shelf or reshelving. Shelving carts should be placed in a semi-circle around the person checking material in so they can be rough sorted to the cart(s) that will be used for shelving (e.g. Adult and JV on one cart, Children's material and media on another cart, and holds on a third cart). How the shelving carts are used should be determined by evaluating volumes of material received in each category and the most efficient means for returning material to shelves.

Provide height adjustable surfaces for unpacking totes at a comfortable level for library staff while standing or sitting.

Until such time as holds, returns, and media can be delivered in separate totes, all delivery material should be checked-in in one work area. Each person working on delivery processing should be authorized in their local system to handle all of the incoming materials. This helps to keep the number of times an item is handled down to a minimum since items do not need to be distributed to various staff around the library for hold or other special processing.

Re-route and report misrouted items immediately

Items delivered to a library that are missing a routing slip and belong to another library in the region should be scanned to identify the correct destination and rerouted in the next day's delivery to ensure the customer receives the item in a timely fashion.

All items that are mis-routed or which are delivered without the appropriate routing information should be reported to the regional administrator so they can follow up with the delivery and sorting vendor.

Items with no routing slip from an out-of-region library should be re-routed to a designated contact person who can identify the correct destination. A Misrouted Inter-regional Slip should be included in the item indicating the day it was delivered and to which library it was delivered. This will assist regional and state delivery administrators

identify problem areas. See [Assign a contact person(s) for materials lost when traveling across the state](#).

Recommendations Related to Filling Holds

Optimize pull lists

Automated networks should work with library representatives to generate optimized pull lists for pulling hold items. The lists should provide all the necessary pieces of information library staff need to identify specific items and their location. Automated network staff should work with library representatives to design the report that will work best.

Provide guidelines for generating pull lists

For some library systems, generating a pull list report causes holds to be triggered for items available at the library. How holds are triggered can be controlled by planning the time of day that libraries will generate their pull lists. It may be worthwhile to provide guidelines to libraries about the time that they should be generating their pull list as a way to control which libraries are handling more of the volume, or to ensure that pre-sort arrangements are optimized.

For example, a large library that is the first location on a route should be filling more hold requests for other libraries along the route so that the items can be presorted and delivered the same day whenever possible.

Recommendations Related to Preparing Outgoing Deliveries

Sort into as few totes as possible at libraries

All outgoing material should be sorted into as few totes as possible to save space in the libraries and to save the time of library staff. Presorting to specific libraries should only be done when the library is down route (receiving delivery later in the route by the same driver) and when there is adequate volume to justify it (2 or more totes per day to that location).

Full totes should be moved out of the work areas in order to keep the back room areas clear. Full totes should be stacked (in stacks of 4) in a location convenient for the courier to pick them up but out of the main flow of traffic.

Label presorts clearly

Totes of presorts should be clearly labeled with laminated 5x7 cards that hang on the tote. Once full, a routing label clearly designating the tote a "Presort to Destination" should be taped to the top and front of the tote.

Ergonomics Recommendations

Due to the many sizes and shapes of library facilities, the space available for incoming and outgoing totes and for material processing is varied, but limited in almost every case. The different special arrangements mean that a single ergonomic solution will not be feasible. Almost every library in Massachusetts could be improved in one way or another to make the delivery process less physically stressful for library staff.

Create task force to aid in the optimization of library delivery workspaces

The Consultants recommend that a task force be created for providing an ergonomic review and recommendations for each library possibly in consultation with a LEAN[4] practitioner. The task force could be sent for LEAN training and then provide the expertise to libraries throughout the state or a LEAN practitioner could be contracted with for the evaluation of current practices and implementation of new ones.

Use equipment designed for the task in delivery processing areas

Delivery check-in areas should have adjustable height tables free of supplies so that material can be slid out of delivery totes onto the work surface for check-in. The goal is to reduce the amount of grasping of individual or bundled items, and the repetitive bending and lifting actions. In some locations, simply changing the height of the tables in the delivery processing area and providing more surface space will improve ergonomics for the library staff.

The following specific recommendations are provided in the areas of ergonomic equipment:

- Totes should be moved with tote handling equipment such as the FKI Logistex Ergo Cart (http://www.fkilogistex.com/library/solutions.aspx) or Envisionware Ergo Tote Lift.

- Other less expensive options can improve tote handling such as storing items on simple dollies so stacks of totes can be easily moved.

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[4] For more about LEAN, see http://lean.org/. Organizations use LEAN principles and practices to deliver services with a minimum of waste and maximum degree of quality.

- Book carts with a flat top shelf should be used for staging material for outgoing delivery; only the top shelf should be used to eliminate bending and reaching down.

- Eliminate hand held scanners wherever possible and use desk mounted scanners/desensitizers with enough room on the desk that material can be slid under the scanner without having to lift each individual item.

Eliminate or reduce the use of rubber bands around material

Putting on rubber bands and removing them gets very repetitious when done hundreds of times a day. With an automated sort operation, rubber bands will no longer be needed to hold routing labels nor to protect the material.

Until such time as the sort is automated, it is still recommended that the use of rubber bands be reduced or eliminated. If items are packed properly in each tote, there is no reason that sort staff cannot also be expected to handle material appropriately. Proper handling during sorting should be monitored by regional administrators or sorting supervisors, it is too time consuming and ergonomically problematic to use rubber bands for this purpose.

To the extent that rubber bands are used to hold routing labels in place, it makes sense to use them. But bundling or wrapping two rubber bands on a item to ensure it doesn't get damaged during sorting should be a signal to the regional administrators in charge of sort vendors that their sorters need better supervision.

Recommendations Related to the Statewide Catalog and inter-regional Deliveries

The addition of the MassCat libraries in the statewide catalog will impact the volume of delivery requests across the state, not only within all regions but also across regional lines. Many of the libraries visited by the Consultants mentioned issues with the statewide catalog in public access search and discovery functionality as well as the staff interface which lacks integration with many of the local systems. The impact of this expansion needs to be considered when forecasting delivery volumes for each region.

Recommendations are provided that focus on integrating statewide requests with each of the automated systems in a more seamless way. This can be accomplished by choosing a different resource sharing products or by moving to a different statewide catalog.

Use state-of-the-art system for statewide catalog

The URSA system utilized in Massachusetts should be upgraded to the most recent version available (SirsiDynix URSA 4.1). The system allows preferred lending groups or tiers be set up, provides automatic emails to customers and allows users to request directly through the system and select their own pick up location. The state may also wish to investigate the Reciprocal Borrowing Solution from SirsiDynix which facilitates direct lending from one library to another library's customer.

Evaluate alternative resource sharing products such as AGENT Resource Sharing and Worldcat Local.

Consider moving to an open source catalog product that integrates better with the local library systems, is inexpensive, and provides greater control (e.g. Koha or Evergreen).

The goal should be to find a system for the statewide catalog which can integrate requests with the most automated library systems.

Assign contact person(s) for materials lost when traveling across the state

Items lost or misrouted during a inter-regional delivery can take weeks to get back home or to their intended destination. It is relatively easy to reroute lost items so there is no reason they should float around the delivery system more than a day or two. In order to quickly address lost inter-regional items, the state or region should establish a designated person who can access all the networks (or can follow-up with all network systems) in order to track down the intended destination of an item. The designated person's job would be to identify the owning library of the item. Based on ownership, the automated network can be identified. The designated person should then contact the network (or do their own lookup if possible) to determine the intended destination. Depending on how long the item has been in transit, it may be that the item should be returned to the owner rather than sent out to the fill a hold.

Any item that comes into a library that is from another region and is missing a routing slip should be forwarded to the designated person in the next outgoing delivery. All such lost or misrouted items should be accompanied by a Misrouted Item Slip.

Resource Sharing Recommendations

Many of the resource sharing initiatives in place across the state affect the volume of materials sent through the delivery services. Examples of these initiatives include network, region and statewide discounts for electronic and audio books and group purchases of equipment or materials.

Pursue statewide or regional deals for ebooks and audiobooks

Statewide or at least regional deals should be made with one or more e-book/audio book vendors. The more libraries entering into a deal, the lower the cost-per-library will be. By putting together a statewide group for this kind of purchase, even small libraries have the ability to increase their collection size at a very low cost. Each ebook and audio book utilized by a customer potentially reduces the number of hard-copy items sent through the delivery service. The result of a statewide electronic book purchasing program will be to reduce delivery volume across the state.

Regions should work with libraries to promote use of ebooks, audiobooks and other electronic versions of material to help reduce delivery volume.

Pilot test floating collections within region

A regional floating collection would keep items within a region but it would also decrease delivery volumes. When an item from the floating collection is requested by a customer, the item is delivered to their selected pick up location. If it is part of a floating collection, the item will be kept at the library where it is returned and not sent back to an "owning" library. The system keeps track of the locations of these floating items and then when another request is received, it is sent to the library that currently has the item on the shelf.

This type of initiative can start with a small pilot project which gives all of the libraries the opportunity to closely observe the circulation patterns of the items maintained in the floating collection. The pilot project could be limited by specifying a particular format and/or genre (e.g. biographies). Since the CLAMS network has already had a successful experience with a floating collection, they may be a good candidate for a small pilot project..

Standardize purchase alerts reports and procedures

Evaluate the current state of purchase alerts which are provided by each network. When useful purchase alert reports are made easily available, each library can utilize these reports to determine when to purchase more copies of a specific title. This allows more requests to be filled by the home institution and cuts down on the need to move as many high-interest titles through the delivery service. Consultants recommend that a standard set of purchase alert reports and procedures be developed which can be implemented in every region, keeping in mind the functional differences between automated systems.

Cost Allocation Recommendations

Continue to manage courier contracts at regional level

Providing courier services for library delivery is not straight-forward. Each region, each system, and each library poses its own unique challenges. Concerns about access and security vary from place to place as do expectations about timeliness and the degree of courier professionalism expected. The regional courier vendors have developed an understanding of the unique aspects of library delivery and have begun to form relationships between drivers and library staff. Maintaining these relationships is in the best interest of the regions and the libraries.

For the above reasons, and also because each region has its own logistical issues and needs to address their own unique issues in the contracts made with their courier vendors, Consultants recommend that courier contracts continue to be managed at the regional level. However, we also recommend that every regional contract include the same standards of service in order to ensure high quality delivery services statewide; see Enforce strict delivery service guidelines for all providers.

Establish fee schedule to reimburse regions for delivery

When a library joins an automated network, it pays a fee for those services. The fee paid to the automated network covers the cost of maintaining the shared system and related services provided by the network staff (e.g. custom holds slip printing, statistics gathering and reporting, data security, hosting, etc).

A key benefit of joining a network is the expanded resource sharing opportunities related to being part of a shared system. Understandably, whenever a library joins a network, the delivery requirements of that library dramatically increase. The cost of the increased delivery is currently not accounted for in the automated network's membership pricing structure. Instead, the burden of the added volume sits squarely on the regional systems.

A better system would take into account the increased costs of delivery related to adding libraries to one of the shared networks. Part of the membership fee paid to the networks should include an allocation of funds for the region that will be providing delivery to the library. This will ensure that resource sharing will continue to be encouraged and can be adequately supported by regional delivery systems.

Establish pool of funds for statewide initiatives

Establish a statewide fund which is replenished annually and specifically designated for delivery services. The fund could be used for any initiative which provides services or equipment statewide. Examples include:

- central sort and automated storage and retrieval systems;
- training for LEAN task force or payment for a LEAN consultant;
- purchasing new, standard sized totes;
- programming support to create automatic label printing for all systems;
- tote handling equipment, adjustable tables, other ergonomic hardware and furniture;
- route optimization study;
- upgrade to URSA software or implementation of new system;
- funding for floating collection pilot studies;
- purchasing re-usable RFID tags.

Implementation Recommendations

There are many possible approaches to the recommendations provided in this report. The following recommendations are provided as just one way to move forward. Although many of the recommendations can be acted upon simultaneously, there are a few which should be treated as one initiative.

Establish recommended working groups

Establish a statewide delivery committee which includes representatives from all regions and networks, representatives from different types and sizes of libraries, as well as representation by the Massachusetts Board of Library Commissioners. The group should establish long and short term goals and objectives for the committee. The group should initially determine how decisions will be made in the group, how they will communicate and any budgetary needs. The committee could oversee the implementation of the current set of recommendations as well as provide a mechanism for the ongoing monitoring of delivery services statewide.

A workflow/ergonomics task force is recommended to develop a plan for assisting libraries with optimizing workflow and procedures, selecting equipment, and designing work areas. This task force could be used to determine the optimal strategy for implementing LEAN principles and could organize the initiative for libraries across the state. The task force should be made up of people with knowledge of the delivery operations within libraries.

A routing label and holds printing team could be used to bring the benefits of automated holds and routing label printing to all libraries on a library system that could not

otherwise implement it.   This should be done in conjunction with establishing new location codes and redesigning routing labels. The group should be made up of regional representatives, network functional specialists, representatives from a variety of libraries and a representative from the Massachusetts Board of Library Commissioners. The group may be split by type of automated system for some implementation tasks but will need to act as a whole when working on the new label designs. Note that the implementation of automated holds and route label printing is a technical and training issue so personnel will need to be involved for both purposes.

Establish contract with logistics vendor to provide warehouse space and courier services

Consultants recommend entering into talks with existing carriers about utilizing warehouse space for the new automated sorting and automated storage and retrieval system. Both spaces are large enough and the location of the facility is one of the few locations in the state which can service the entire state for the central sort site. Other warehouses in the area could be contacted; however, contracting with an existing courier who can then begin their routes from the sort center is very advantageous.

Part of the discussions might include transitioning all courier services for the regions to a single company (with the exception of WMRLS, at least for the time being).

Develop RFP for centralizing sort operation in contracted warehouse space

Use the Sorting Recommendations included in this report as a starting point for creating an RFP for establishing a sort operation and automated storage and retrieval system. The RFP should require each respondent to design a full system and provide pricing for that design. In addition, the RFP should include an option for outsourcing the operation of the sort center.

Alternatively, the regions could opt to work with a vendor to design the system (a design/build contract) and then issue an RFP for the building of the design and possible outsourcing of its operation. Rough estimates for a design/build contract are $30,000-$35,000.

Re-barcode library material as needed

Although bar codes specifications are provided by NISO, it is recommended that the libraries wait to re-barcode material under after a contract has been established with a sorting vendor. The work of standardizing on bar code placement and re-barcoding library material as needed could be left to individual libraries but a better approach is to establish a SWAT team that moves from library to library doing the work. This ensures that the work is done consistently and efficiently (and that it really gets done).

Depending on time constraints, each region may have to establish a SWAT team for their own libraries.

Optimize delivery routes

If outside couriers are used for all deliveries you may not want to invest in optimizing the routes but you'll still want to ensure that routes are developed in cooperation with the networks so that pull lists are defined as desired, limited presorting is supported, and volume is distributed as needed across libraries (in terms of how much each library is lending).

Transition to central sort network by network

The transition to a central sort operation should begin with one network at a time in order to ensure that SIP2 connections are functioning as anticipated and to get procedures in place and all the kinks worked out. Each network will pose its own unique challenges and tweaking of the sorting program will likely be required, workflow adjusted, timing of deliveries modified, and personnel reallocated. The first region, and the first network in the first region, should be selected based on its ability to work with the disruptions associated with making such a transition.

Before starting any of the migrations, it will be important to establish buy-in at the library and network level to ensure that the transition happens smoothly. Before each network and that network's libraries move to the central sort operation, they should be involved in planning and preparing their libraries for the changes that will occur. It is not unreasonable to assume that the transition could take six months or more to get every network onto the new system.

Manual Sorting Recommendations

Because all the regions currently operate a manual sort system and the move to a central sort operation will take at least one, if not several, years to implement, recommendations are also provided for improving efficiency and accuracy in the current sort operations.

1. At CMRLS, reduce number of totes each sorter is working with to 20-30 by incorporating a pre-sort system (either in the libraries or at the sort center).

2. At CMRLS, decrease amount of space between aisles and set-up staging table that sorters can easily reach for picking up pre-sorted material for locations in their aisle.

3. At CMRLS, set up sorting staff to include one stager who unloads material from totes and stages it for sorters who work in one aisle. Each sorter should work within one aisle.

4. At CMRLS, eliminate the extra aisle with 30 totes and instead place those at the end of the existing two aisles so each aisle is arranged in a horseshoe with three sides.

5. At courier services, separate networks into separate sorts, use teams of 3-5 sorters and 1-2 stagers. Stagers unload totes and place items in presorted stacks within reach of sorters working a section of the sort (e.g. one stack for the sorter sorting to A-L locations in SAILS, one sorter for M-S locations, and one sorter for T-Z locations). This will reduce the amount of walking sorters need to do and they won't have to negotiate moving around all the other sorters.

6. At WMRLS, optimize shelving in warehouse area so that totes are neither too high nor too low to easily sort into and so that totes span a shorter distance.

Cost Benefit Analysis

Moving to the recommended system (automated, centralized sort operation with ASRS) while maintaining contracts with couriers provides the regions with more efficient and accurate processing of material, reduces the workload related to receiving deliveries and preparing outgoing delivery, provides next day turnaround for all libraries receiving daily delivery, saves money, and leverages existing investments in staff and equipment. In addition, the system will ensure that all regions are well position to handle current as well as increasing volumes of material, and can seamlessly incorporate additional delivery locations into the sort process.

Reduces Sort Staff Costs

Based on preliminary estimates, the staffing requirements for the sort operation could range from 12-18 FTE. This number is calculated by determining the number of induction stations that will need to be operating during sort hours in order to complete the day's delivery. If we assume the sort operation must be completed in a 10 hour shift, we can be assured that material arriving at the end of one day will be ready to go out early the next morning. Assuming operators can place 1000 items on the conveyor per hour (and all the bar codes are facing up and readable by the sorter), we will need 6 induction stations operating during sort hours. If the sort shift was longer, we could get by with fewer induction stations but will need the same number of FTE. A higher number of induction stations are recommended to provide maximum flexibility for handling peak volumes.

Table 8: Induction Time and FTE Required

Items per day	Operator Items Per Hour	Sort Hours	Induction Stations	Induction Staff Needed
70,000	1000	10	7	10 FTE
70,000	1000	16	5	10 FTE

Assuming an ASRS system is used, very few additional staff will be required for staging and loading totes into trucks. Drivers will enter their route number into a system when they are ready to load and the ASRS will deliver their totes (in stacks of 4) to them in reverse delivery order.

Staff will be required to remove full totes from the sorter and place them on the take-away belt that will carry them to the ASRS system for storage. Staff will work on both sides of the sorter (inside and outside the circulating conveyor belt). Approximately 4 FTE will be required remove full totes and put new empty totes in place.

One manager of the system is required to maintain the system and make sorter and ASRS configuration changes as needed.

Table 9: Daily Savings in Sorting Staffing Required

Proposed Sort Staffing	Daily Hours Needed	Hourly Pay Rate	Cost Per Day	Cost Per Item (based on volume of 70,000)
Induction Staff	70	$14	$980	$ .02
Sorter Personnel	40	$16	$640	$ .009
Manager	10	$25	$250	$ .004
Total			**$1870**	**$ .03**
Current Sort Staffing				Cost Per Item (based on volume of 57,591)
Metrowest			$563	$ .01
NMRLS			$447	$ .06
WMRLS			$393	$ .01
CMRLS			$256	$ .004
BRLS			$30	$ .001
SEMLS			$385	$ .01
Total			$2074	$.04
Adjusted Total	Assuming volume is increased to 70,000 items per day at $.04/item		**$2800**	
DAILY SAVINGS	Proposed Sort Staffing – Current Sort Staffing			**$930**

Staffing the automated sort operation with ASRS, and assuming that 70,000 items per night must be sorted costs approximately $1870 per day. The cost per item of the recommended system is 3 cents per item. According to current estimates, the current cost of sorting material is $2074 for 58,000 items per day. The cost per item of today's sort operation is 4 cents per item. Extrapolating the per item cost of today's sort operation to the volume anticipated in the next year or two (20% over the 2006 volume) would cost $2,800 per day (for a daily savings of $930).

Automated sort system is readily expandable without associated increases in cost.

The recommended system provides enough induction points and staff for sorting 70,000 items in a ten hour shift. Even as volume increases, the recommended sorter and ASRS system will be able to accommodate it, it will just need to be run for a longer shift. For example, if daily volume increased to 100,000 items per day, the only change would be in

the number of hours inducting material (100 person hours instead of 70 person hours) which could be easily addressed by extending the operation of the sort center to 14.5 hours (no additional equipment would need to be added).

With a properly sized sort system, the "per sorted item" savings of the automated system over a manual system will become more dramatic as volume increases.

More Efficient and Accurate Processing

Moving to machine-readable bar codes for sorting ensures near 100% accuracy in sorting operations. Mis-sorts can occur when sorter chutes are jammed but this happens very rarely and staging staff are recommended for monitoring the sorter and discharge locations to ensure jams are cleared immediately. Mis-sorts can still be introduced by humans for material that relies on routing labels placed in items (paper or RFID tagged). This material will only come from non-network libraries and represents a small percentage of overall delivery volume.

Reduces Workload Related to Receiving Deliveries

Returns and holds will be delivered in separate totes so that totes can be taken to the proper area of the library for checking in. Returned library material will be manifested so that the bar-coded return totes allow for one scan of the tote to check in all 40 returns. This will dramatically decrease the workload at every library in the state.

If we assume one third of all material moved through the system each day (70,000 items per day for purposes of this analysis) are returns (21,000) and that it takes 10 seconds to check in each item, we save 57 hours per day (system-wide) by scanning one tote for every 40 returns. This amounts to a total daily savings of $796 (assuming a pay rate of $14/hour).

Table 10: Daily Savings from Tote Check-in of Returns

Savings From Tote Check-in of Returns	
Seconds used to generate, apply and remove holds slips	10
Items thru system per day	70,000
Percentage daily volume that are returns (low estimate)	30%
Returns thru system per day that will no longer need to be checked in	20,475
Seconds spent checking in returns per day	204,750
Hours Per day	57
Pay Rate of person doing this ($ per hour)	14
Savings per Day	**$796**

Holds and media material can also be segregated in separate totes so that holds can be delivered directly to the person responsible for processing holds. It may be possible to

manifest the holds totes to perform batch processing of holds as well. This will depend largely on each automated networks' capabilities.

Media material should be sorted to separate totes whenever possible[5] to reduce the damage to this type of material and to eliminate the need to wrap up individual items in jiffy bags and other protective material that is very time-consuming to apply and remove.

Provides Next Day Turnaround

Providing a system than can sort the entire state's delivery volume within 10 hours ensures that all material that comes into the sort system can get out to the libraries the next day. Even in the case of WMRLS which will require the additional step of transferring totes from the sort center to WMRLS delivery trucks will have plenty of time to run their routes and get material back to the sort center.

Every library receiving daily delivery through the system can be guaranteed next day delivery.

Reduces Workload and Space Required for Preparing Outgoing Material

Outgoing material at each library will not require any kind of presorting because everyone will receive next day delivery (as long as they are on a daily delivery schedule). There may be occasions where presorting provides enough benefit to be worthwhile, but this will be rare. It is easier for the libraries to drop all outgoing material into a tote without consideration as to where the item is going. This way, they only need room for one tote (or one stack of totes) near their work areas rather than a row of several totes for several different libraries. All full, outgoing totes can be placed in the back where the courier will pick them up. For some libraries, this will free up a considerable amount of space.

Sorting on bar codes at the sort center means that no routing labels are required. Items for delivery just go in the tote. It doesn't matter whether they are provided to fill a hold or are being returned to an owning library. This distinction is determined at the sort center when the bar code is read.

The savings associated with eliminating routing labels is considerable. If we assume that only 12 seconds per item are saved by not having to generate, apply and remove routing labels on 70,000 items sent through the system each day, the daily savings is $3,267 (assuming the worker doing the work is paid $14/hour).

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[5] The size and configuration of the sorter will determine how many additional sorts can be provided per location. It should be possible to provide additional sorting without increasing sort locations because with dynamic sort allocation it isn't a 1-1 relationship.

Table 11: Daily Savings from Eliminating Routing labels

Savings From Eliminating Routing labels	
Seconds used to generate, apply and remove holds slips	12
Items thru system per day	70,000
Seconds spent per day generating, applying and removing holds slips	840,000
Hours Per day	233
Pay Rate of person doing this ($ per hour)	14
Savings per Day	**$ 3,267**

Leverages Existing Investments in Staff and Equipment

WMRLS has a long established staff of drivers who have good relationships with library staff familiar with the challenging Western Massachusetts routes. In addition, WMRLS has a big investment in a fleet of vehicles. It benefits everyone to keep those drivers and trucks working for WMRLS. Providing sorted WMRLS material to WMRLS headquarters where it would be transferred to route drivers provides an efficient solution for taking advantage of the resources readily available while moving into a new delivery model.

Positions all Regions for Increases in Volume and Additional Delivery Locations

With the recommended automated sort and ASRS system, it is possible to add delivery locations (currently deliver to 548 locations but with dynamic allocation of sort locations this can be easily changed) and to handle increased volume (current volume is 58,000 items per day but envisioned system is designed to accommodate 70,000 per day). Adding delivery locations and handling increased volume becomes primarily a courier, rather than a sorting, consideration. It is likely that increases in both volume and numbers of libraries receiving delivery will occur over the next 1-2 years (especially if MassCat libraries begin receiving delivery as part of their migration to Koha).

Provide Delivery Service Consistent with Today's Consumer Expectations

Libraries will receive quicker delivery service which, when combined with efficient processing in the libraries, will yield turnaround times for the customer that rival other services consumers use (Amazon, NetFlix, etc).

The library customer will be able to rely on the libraries throughout the state to provide consistent interlibrary loan services. No matter where they live, every customer will be able to receive materials in a timely manner.

Provides Improved Library Service to all Massachusetts citizens

Implementation of the recommendations will result in excellent delivery service throughout the state of Massachusetts. All libraries in the state will see improvements in service and this translates to serving all of the citizens of the state with an exemplary service.

Provides for Consistent, Statewide Standards

The recommendations seek to establish certain standards at the state level (e.g. statewide system for delivery codes, routing labels, hold slips, level of service.) The participation at the state level offers greater visibility within the library community as well as with the general public. Customers using multiple libraries within the state will be able to count on the same level of service at all library locations.

Makes Massachusetts a Showcase for Excellent Library Delivery

Massachusetts will be a showcase for other states in the area of library material handling and delivery. Statewide standards of delivery including 24-hour turnaround time and 99.9% accuracy in sorting are goals of most states and if Massachusetts is successful in implementing the recommendations within this report, they will establish themselves as a leader and example that many other library systems will want to follow.

Saves Libraries and Regions Money

Libraries will save money on the staffing required for processing outgoing and incoming delivery. System-wide, libraries will save over $4,000 per day (or over $1 million per year) in staff time related to deliveries processing. This savings generally translates into better service for the library customers because staff can be moved out of the backroom and into the public areas. Delivery staff can be redeployed to shelving tasks so material is back on the shelves quicker and staff are available to provide personal service to their customer.

Statewide Savings of $2.5 Million Over 10 Years

The lifetime of a sorter such as the one proposed is easily 20 years and possibly more if properly maintained. It is composed of software that should be updated regularly by the vendor as part of their ongoing maintenance of the system. All of the parts are modular and easily replaced as long as each component is supported and stocked by the company. Regular maintenance of belts and wheels plus regular software upgrades should ensure that the sorter runs 20 years and more. Maintenance comes to approximately 6% of the system cost (per year).

The cost of the sorter recommended comes to approximately $2,000,000. The cost of the ASRS system recommended comes to $2,000,000. Annual maintenance is estimated at $240,000/year. Amortized over 10 years (and assuming 286 operating days per year), the system costs $2,238 per day.

Table 12: Daily Cost of Recommended Sort System Amortized Over 10 Years

Equipment Costs	Units Needed	Unit Cost	Days operating Per Year	Years Amortized	Daily Cost
Sorter	1	$ 2,000,000			
ASRS	1	$ 2,000,000			
TOTAL		$ 4,000,000	286	10	$1,399
Annual Maintenance & Support (6%)		$ 240,000			$ 839
Total Amortized Daily Cost					**$2,238**

Over 10 years, the savings in library staff time associated with processing deliveries and the savings in sorting staff costs yield a daily savings of $885 over the cost of the system. After 10 years, the total savings comes to $2,531,100.

Table 13: Total Savings Over 10 Years

Costs of Recommended System			TOTAL
	Equipment (amortized over 10 years)	$2,238	
	Staffing	$1870	<$ 4,108>
Savings in Staff Time			TOTAL
	Library Staff	$4,063	
	Sort Staff	$ 930	$ 4,993
Daily Savings			$ 885
Annual Savings (assuming 286 operating days)			$ 253,110
TOTAL SAVINGS (over 10 years amortized)			**$ 2,531,100**

Conclusion

Library delivery services across the country have been struggling with ever increasing volumes of interlibrary delivery. The availability of online library services, the integration of multiple library catalogs, better interlibrary loan systems, and easier discovery of library material have dramatically increased the demand for moving material between libraries. Simultaneously, user expectations have risen due to experiences with online services such as Amazon, Google, and Netflix where material is easy to find and easy to get.

The recommendations included in this report provide guidance in the areas of sorting, route design, labeling, packaging, transport and delivery, receiving, filling holds, delivery preparation, ergonomics, and resource sharing. Some of the recommendations can be implemented immediately while others will require planning and preparation. Both regions and individual libraries will benefit from immediate improvements as the short-term recommendations are implemented. Even greater improvements are possible as the longer-term recommendations come to fruition.

The recommendations include establishing an automated, central sort operation equipped with an automated storage and retrieval system with tote check-in capability, configured to separate holds, returns and media material whenever possible. The goal is to reduce staffing requirements, reduce workload in the libraries associated with materials delivery, and ensure that all libraries can count on accurately sorted material and next day delivery.

In anticipation of ongoing delivery volume increases, the sort operation is designed to sort all Massachusetts library material within 10 hours so that additional hours of service can be added as needed while still meeting the demand of overnight delivery. In order to take advantage of existing capital investments, courier services for WMRLS shall continue to be provided by WMRLS couriers while other regions will continue to use contract couriers. Eventually, it may benefit the regions to consolidate their courier services under one courier contract. Over a 10 year period, the consolidated sort operation (and the savings related to the automated processes) will save over $2.5 million.

Other recommendations are provided which focus on reducing the time, space, and workload required at each library, ensure efficient and optimized delivery service, improve services to library users. The recommendations ensure that all libraries and regions in Massachusetts can continue to promote resource sharing and handle the delivery volume generated from these activities. As conceptualized, the Massachusetts statewide delivery system provides a model for how to provide efficient, state-of-the-art delivery service that benefits library staff and library customers alike.

Appendices

Appendix A: Summary of Delivery Services

Appendix B – Details from Regional Site Visits

Appendix C – Samples of Routing labels Used in Each Region

Appendix D – Samples of Hold Slips Used in Each Region

Appendix E – Cross-State Routing labels Used for Virtual Catalog Requests

Appendix F – Maps Showing Distribution of Delivery Locations

Appendix A – Summary of Delivery Services

Region	Progam Budget for Delivery for 2008	Amount of Delivery Budget for Sorting Services	Number of Locations	Number of Stops Per Year	Number of Items Delivered per year	Size of Service Area (sq miles)	Cost per Item	Cost per Stop	Cost per Location
CMRLS	$285,859	$45,000	97	17,836	1,602,120	1513	$ 0.18	$16.03	$2,947
WMRLS	$405,234		132	15,184	1,578,772	2800	$ 0.26	$26.69	$3,070
SEMLS	$871,439	$110,000	156	35,000	3,231,020	2882	$ 0.27	$24.90	$5,586
NMRLS	$529,000	$151,000	72	16,588	2,444,000	977	$ 0.22	$31.89	$7,347
Metro	$573,450	$161,150	57	13,572	3,340,584	476	$ 0.17	$42.25	$10,061
BRLS	$76,284	$11,253	23	5,876	312,656	96.5	$ 0.24	$12.98	$3,317
Total	$2,741,266			104,056	12,509,152	8744.5	$ 0.22	$26.34	$0

Appendix B – Details from Regional Site Visits

Site Visit Summary

Monday, March 17, 2008	CMRLS
Tuesday March 18, 2008	WMRLS
Wednesday, March 19, 2008	SEMLS
Thursday, March 20, 2008	NMRLS & Metrowest
Friday, March 21, 2008	Metrowest & BRLS

CMRLS

Delivery Vendor(s)	
Sorting	In house (CMRLS Headquarters)
Library Visits	West Boylston Shrewsbury
Automated Network	C/W MARS

Summary of visit:

Consultants met with Carolyn Noah at CMRLS Headquarters. Carolyn gave tour of the sorting facility where they sort for 93 locations. Visited two libraries and then met with Joan Kuklinski, Executive Director of CW/MARS.

- 95% of delivery for C/W MARS is within the 2 regions
- CMRLS sorts for 93 locations (7am – 5pm)
- Courier drivers are bonded and do have keys to libraries
- West Boylston is an online affiliate with C/W MARS and uses Winnebago software for circulation at the library (1-2 totes delivered a day)
- Shrewsbury is a full member of C/W MARS (2-14 totes delivered a day)
- Shrewsbury sorts totes for Worcester and mark the container but not individual items

WMRLS

Delivery Vendor(s)	Self Stop on 5 college delivery service
Sorting	In house WMRLS Headquarters and on-route
Library Visits	Amherst

	Shutesbury
Automated Network	C/W MARS

Summary of visit:

Consultants met John Ramsay and Mary King at the WMRLS Headquarters after visiting Amherst library. Toured the WMRLS facility and were able to observe driver duties which include on-route sorting as well as the central sorting operation for the region. Saw the one room Shutesbury library – very impressive use of space!

- Amherst mentioned automatically printed slips and the time it takes to deal with packaging as their two main issues with the delivery service
- WMRLS has in-house collection which circulates
- WMRLS staff provide mediated ILL for region

SEMLS

Delivery Vendor(s)	
Sorting	
Library Visit	Norfolk
Automated Network(s)	OCLN CLAMS SAILS

Summary of visit:

Consultants met with Cindy Roach and several members of the SEMLS Delivery
Committee at the Norfolk Public Library. Visited the SAILS office and met with
representatives from all three automated networks in the region. Consultants also visited
the courier's sorting operations.

- 98% of the delivery in SEMLS takes place within each automated system group
- OCLN uses SirsiDynix Unicorn and currently does some grouping in the system
  for central libraries and their branches
- SAILS uses SirsiDynix Unicorn and random priority and load leveling within that
  system
- CLAM uses III and basic load leveling within that system
- Norfolk Public uses SirsiDynix Unicorn and their main issue with the delivery
  service is the lack of automated slip printing due to differences in the names of
  libraries between SEMLS and their own ILS
- SEMLS Delivery Committee mentioned automatically printed slips and
  packaging to be two of their main issues with the delivery service.
- Quincy does media ILL for the region (about 9,000 per year)
- Courier staff mentioned printed labels and the use of codes instead of library
  names as well as flexibility in delivery hours as their main issues
- Still has monetary incentives for net lenders in region

NMRLS

Delivery Vendor(s)	
Sorting	
Library Visits	Beverly
	Burlington
Automated Network(s)	NOBLE
	MVLC

Summary of visit:

Consultants met with Ron Gagnon from NOBLE and library staff while visiting the Beverly Public Library. At the Burlington Public Library met library staff and Larry Rungren from MVLC. Consultants visited the courier's sorting facility.

- NOBLE uses III and has automated slip printing (within NOBLE) and uses a random sort for requests in the III system
- MVLC uses SirsiDynix Horizon and has automated slip printing (within MVLC) with custom load balancing
- Beverly does not currently sort for any specific library but could sort for several that are heavily used; biggest issues are turn around time and some driver-specific problems
- Burlington pre-sorts for 5 libraries now; biggest issues were turn around time and improved labeling for pre-sorted totes

Metrowest/MMRLS

Delivery Vendor(s)	
Sorting	
Library Visits	Woburn
Automated Network(s)	Minuteman

Summary of visit:

Consultants met Sunny Vandermark and several staff members at the Woburn Public Library. Met with Susan McAlister from the Minuteman automated system. Visited the courier's sorting facility.

- Minuteman uses III and has implemented the printed slips from this system and they utilize random sort for their requests
- Woburn uses automated slip printing and their biggest issue was the space they had available for the delivery operations
- Wellesley provides mediated ILL for region (about 8,000 per year)

BRLS

Delivery Vendor(s)	
	Boston Public
Sorting	
Library Visits	None
Automated Network(s)	FLO
	Metro Boston (MBLN)
	Boston Public

Summary of visit:

Consultants briefly spoke with Michael Colford at the MRLS Delivery Committee meeting. Visited the courier's delivery/sorting facility.

- FLO uses Endeavor system
- MBLN uses Horizon system

Appendix C – Samples of Routing labels Used in Each Region

BRLS Routing Label

All BRLS libraries use the standard routing label

CMRLS Routing Label

Most CMRLS use the standard routing label (below left), but some libraries are equipped to automatically print a customized Innovative routing slip (below right).

Metrowest Routing Label

Innovative Routing Label by MLN

NATICK/Audiovisual
Thu Mar 20 2008 03:37PM

Received. Belongs at
NATICK/Audiovisual.

TITLE: The best of Three Dog Night [sound re
CALL NUMBER: [CD] Rock/T532B natn
BARCODE: 33016002869177
ITEM STATUS: IN TRANSIT
STAT GROUP: 791
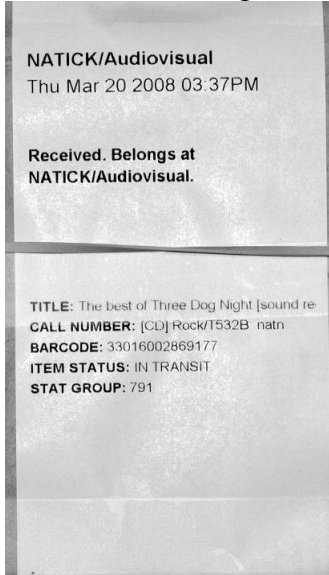
NMRLS Routing Labels

Sirsi Dynix Routing Slip by MVLC

Innovative Routing Slip by NOBLE

SEMLS Routing Label

All SEMLS libraries use the standard
routing label (pre-printed label below,
label printed from SirsiDynix system
on right)

S

VIA:
SOUTH
EAST

TO: NORFOLK

TOWN/INSTITUTION

ATTENTION:

DATE SENT: 18

FROM:
EAST BRIDGEWATER

ROUTE: SOUTHEAST
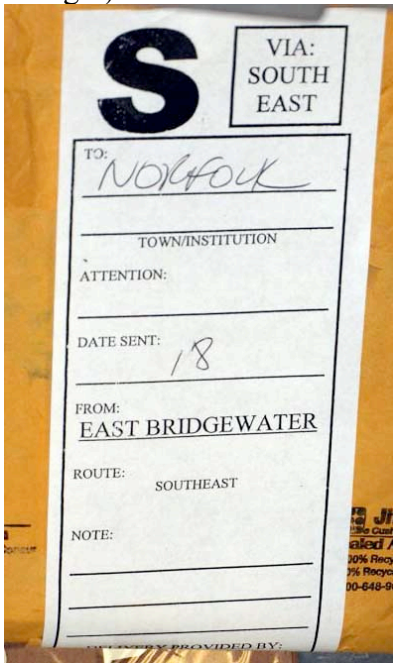
NOTE:

VIA:
SOUTH
EAST

Transit to:
BROCKTON
Transit date:
7/23/2008,
15:05

From: OCLN

ROUTE:
                SOUTHEAST

NOTE:

DELIVERY PROVIDED BY:
MASSACHUSETTS REGIONAL
LIBRARY SYSTEMS

WMRLS Routing Label

All WMRLS libraries use the standard routing label but many libraries print customized Innovative slips (see left foreground).

Appendix D – Samples of Hold Slips Used in Each Region

CMRLS Hold Slip

CMRLS handwritten hold slips

Metrowest Hold Slip

Innovative Holds slip by MLN
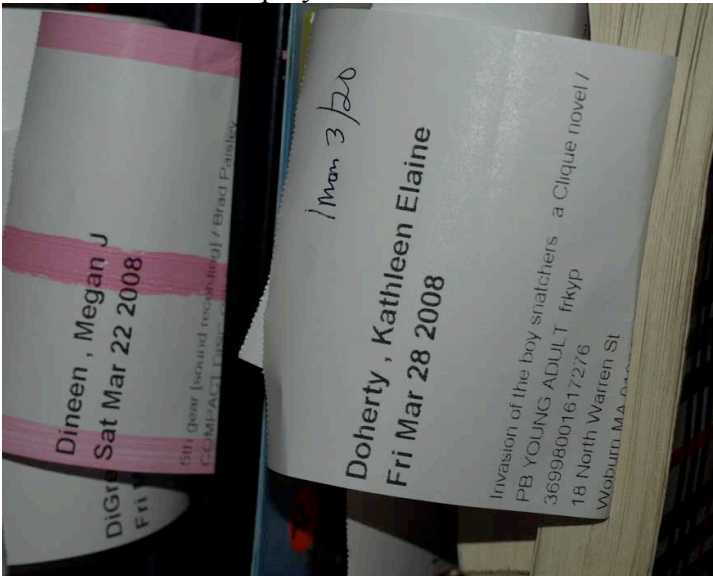
NMRLS Hold Slips

Innovative Hold Slips by Noble

SirsiDynix Horizon Hold Slips by MVLC

SEMLS Hold Slips

CLAMS Hold Slip (printed from Innovative)

```
TITLE       : Living with chickens : ev
erything you need to know to raise your
 CALL NUMBER : 636.5 ROS  eda
 BARCODE     : 00108
 PATRON NAME :
 ADDRESS     :
  Edgartown, MA 02539
 EMAIL       :
 TELEPHONE   : EMAIL
 PICKUP AT   : Edgartown Public Library
```

SAILS Hold Slip (printed from SirsiDynix)

HOLD AVAILABLE

Pickup library:
MANSFIELD
User name: Conrad,
Forrest Paul
Phone number: 781-834-
7036
Call number: PAP MIC
Title: Into the darkness
Expires: 9/18/2009

WRMLS Hold Slip

Standard Innovative Hold Slip
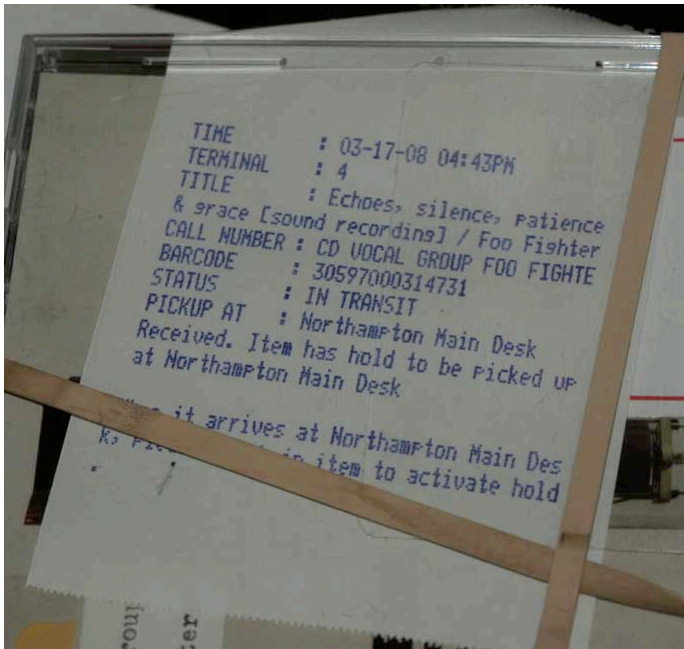
Appendix E – Cross-State Routing labels Used for Virtual Catalog Requests

DO NOT REMOVE THIS BAND

Virtual Catalog

Barcode

Request Number _____

BORROWING PATRON

Please return this item to the library where you received it. DUE DATE:

Sorry, NO RENEWALS on Virtual Catalog items.

Special Instructions

Library Use Only

Borrowing Library	
Lending Library	

Library Actions (optional)

Shipped		
Received		
Notify Patron		
Patron Pickup		
Patron Return		
Returned		
Completed		
Checkin		

E- 4/1/01

Appendix F – Maps Showing Distribution of Delivery Locations

BRLS Region
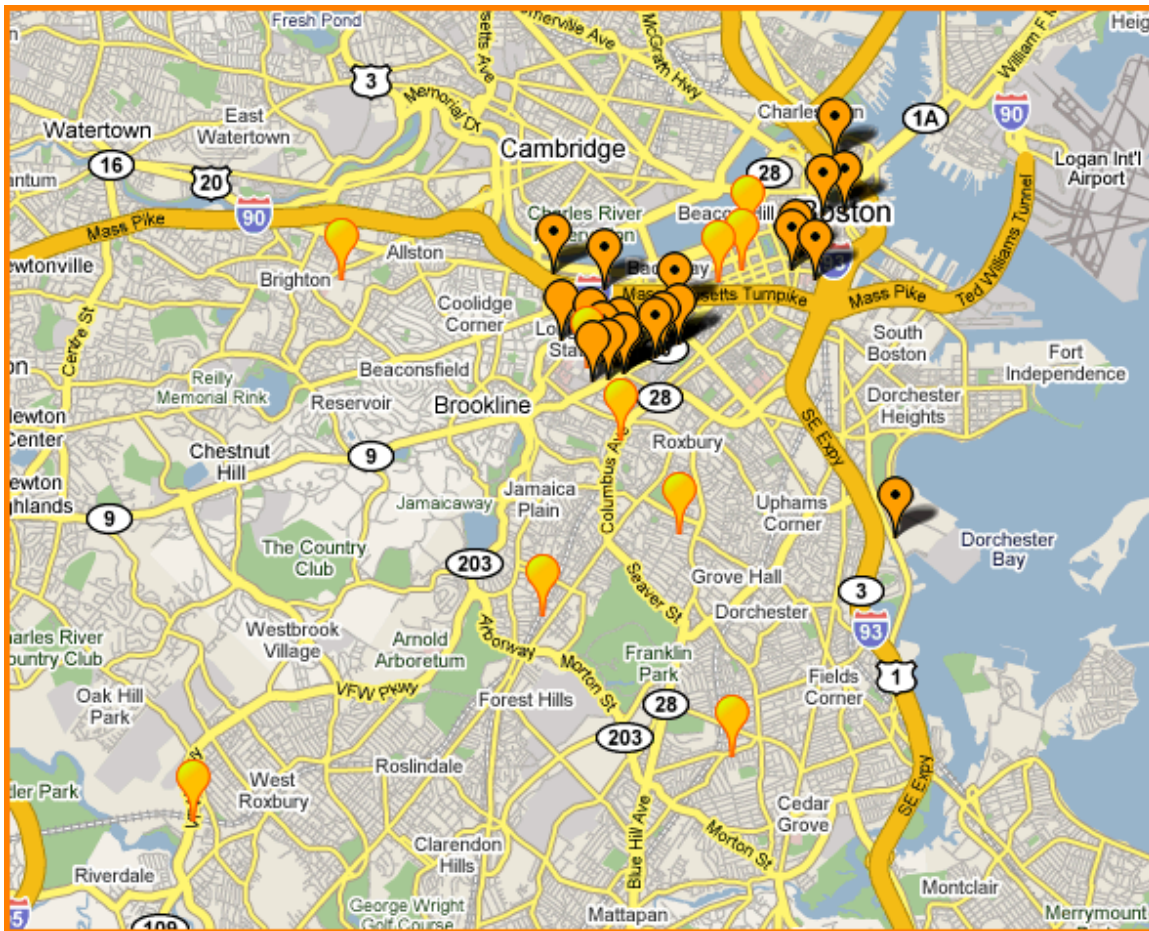
FLO – Dark orange marker
BRLS – Yellow/orange marker
Non-network locations – dark orange marker with black dot
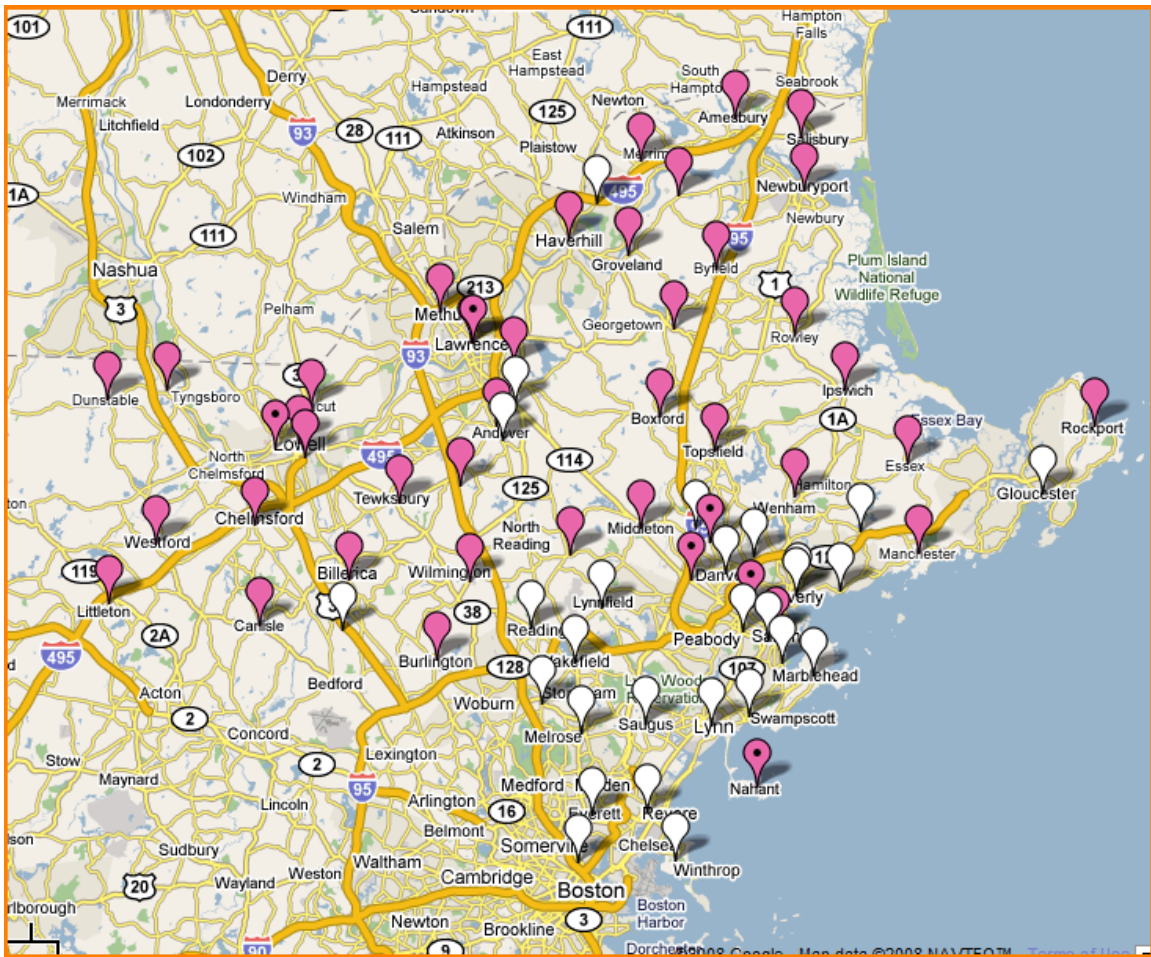
CMRLS Region
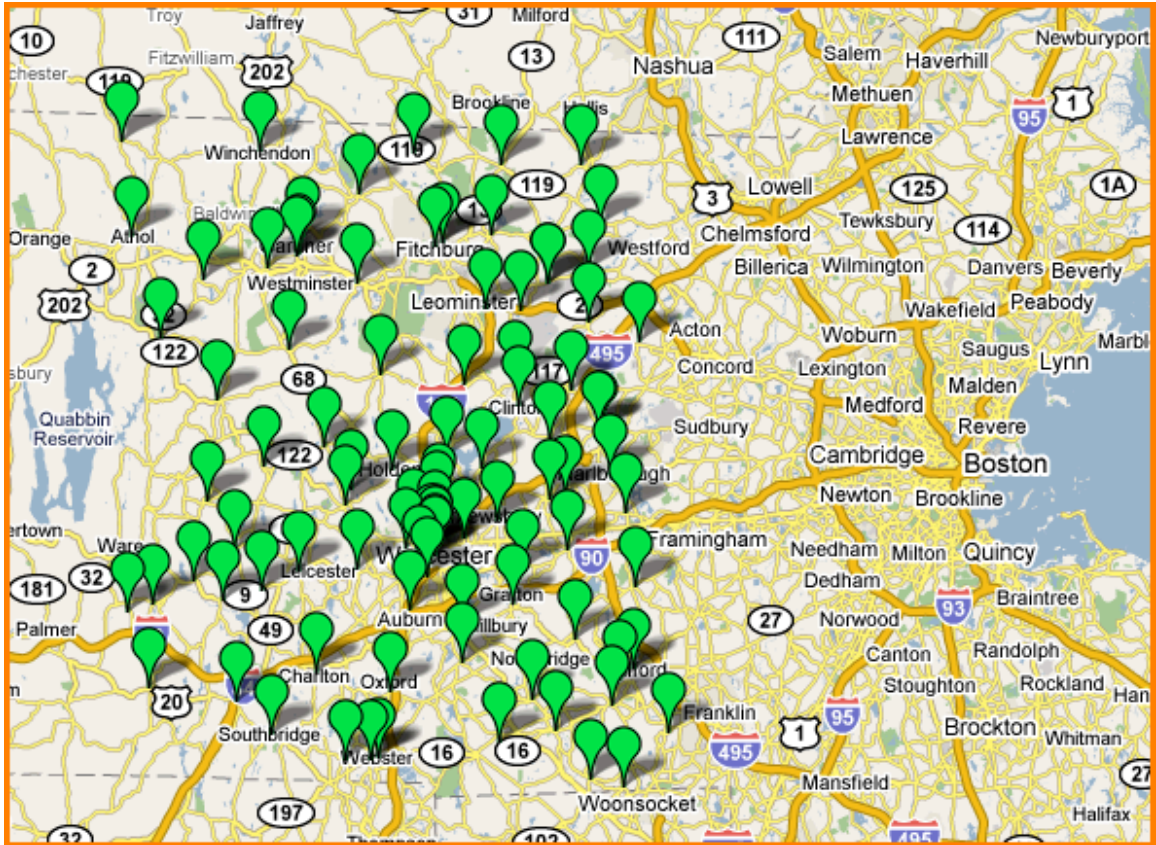
Metrowest Region
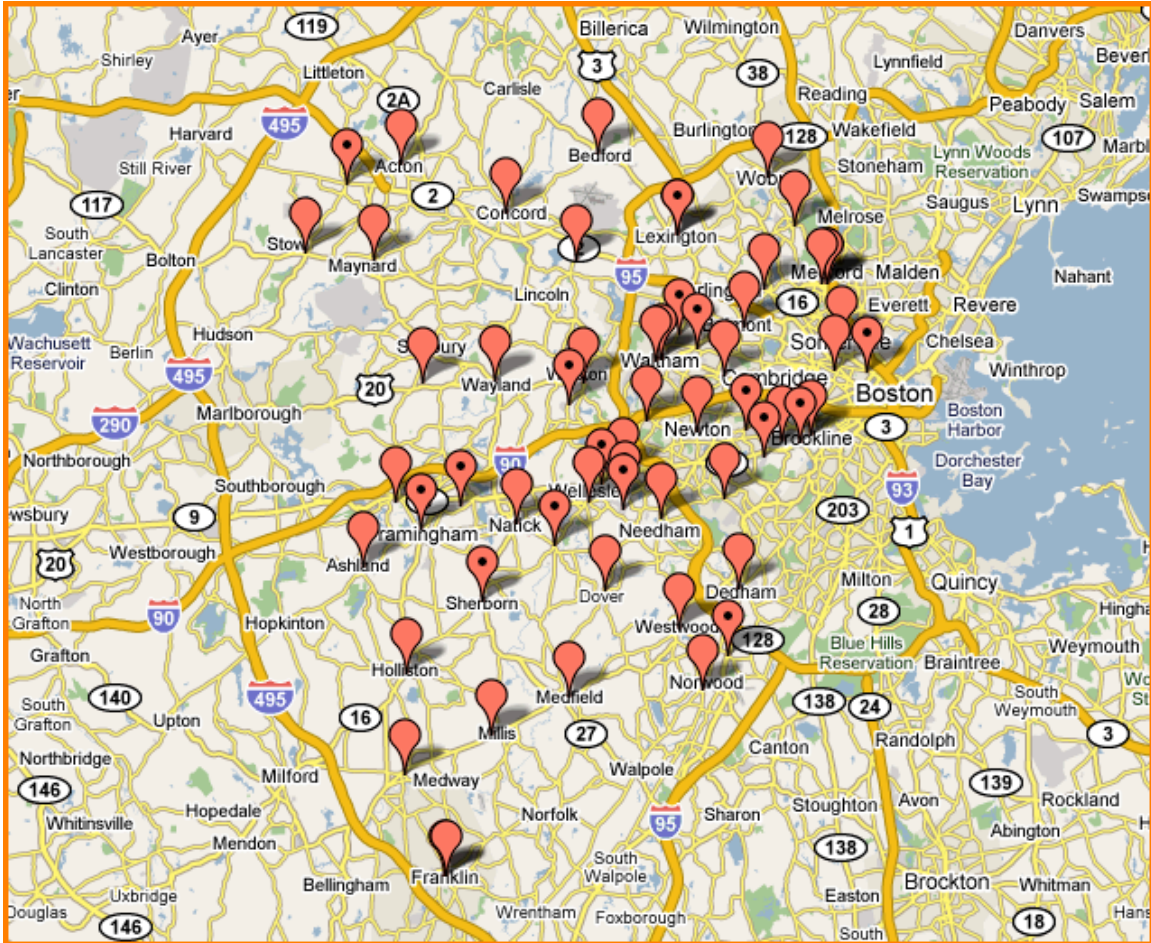
MLN – Red marker
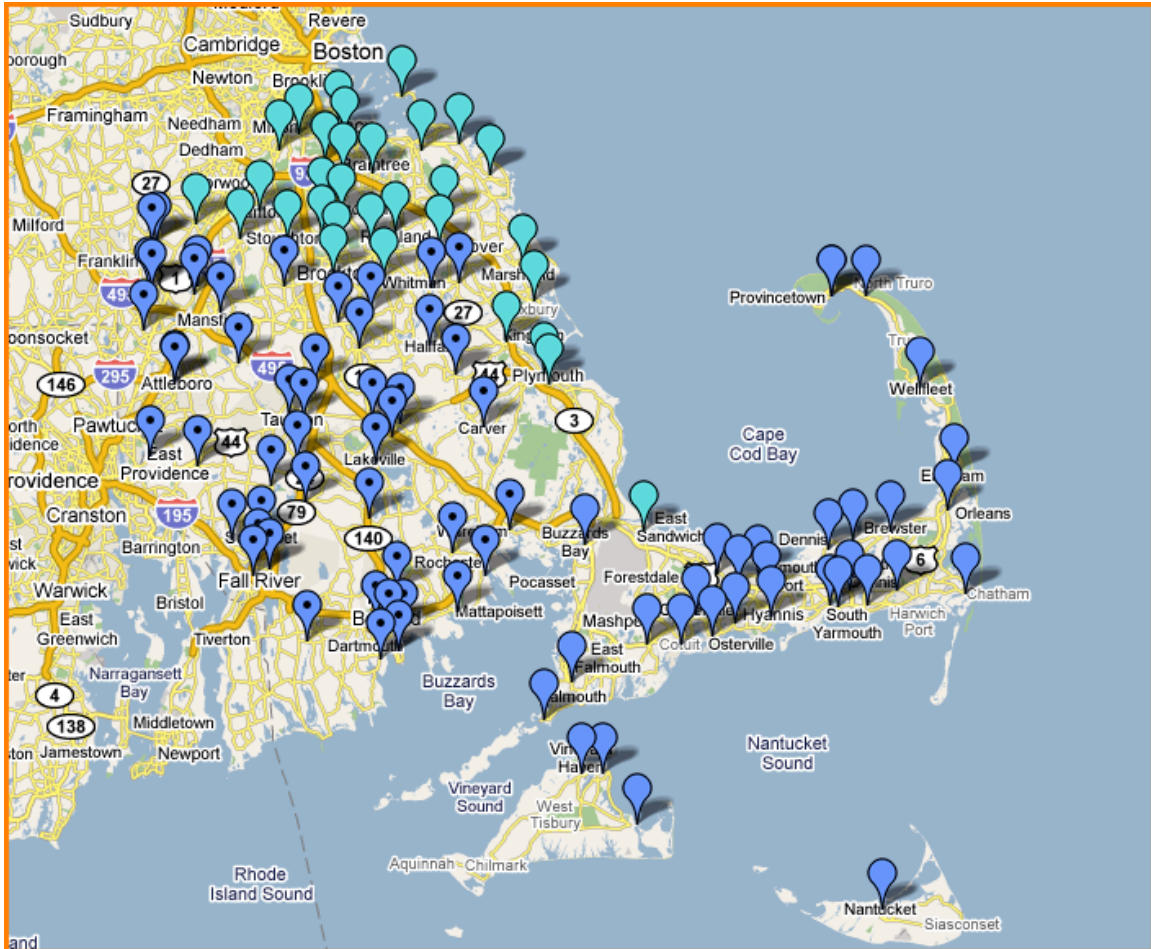Non-network locations – red marker with black dot

NMRLS Region

NOBLE – white marker
MVLC – pink marker
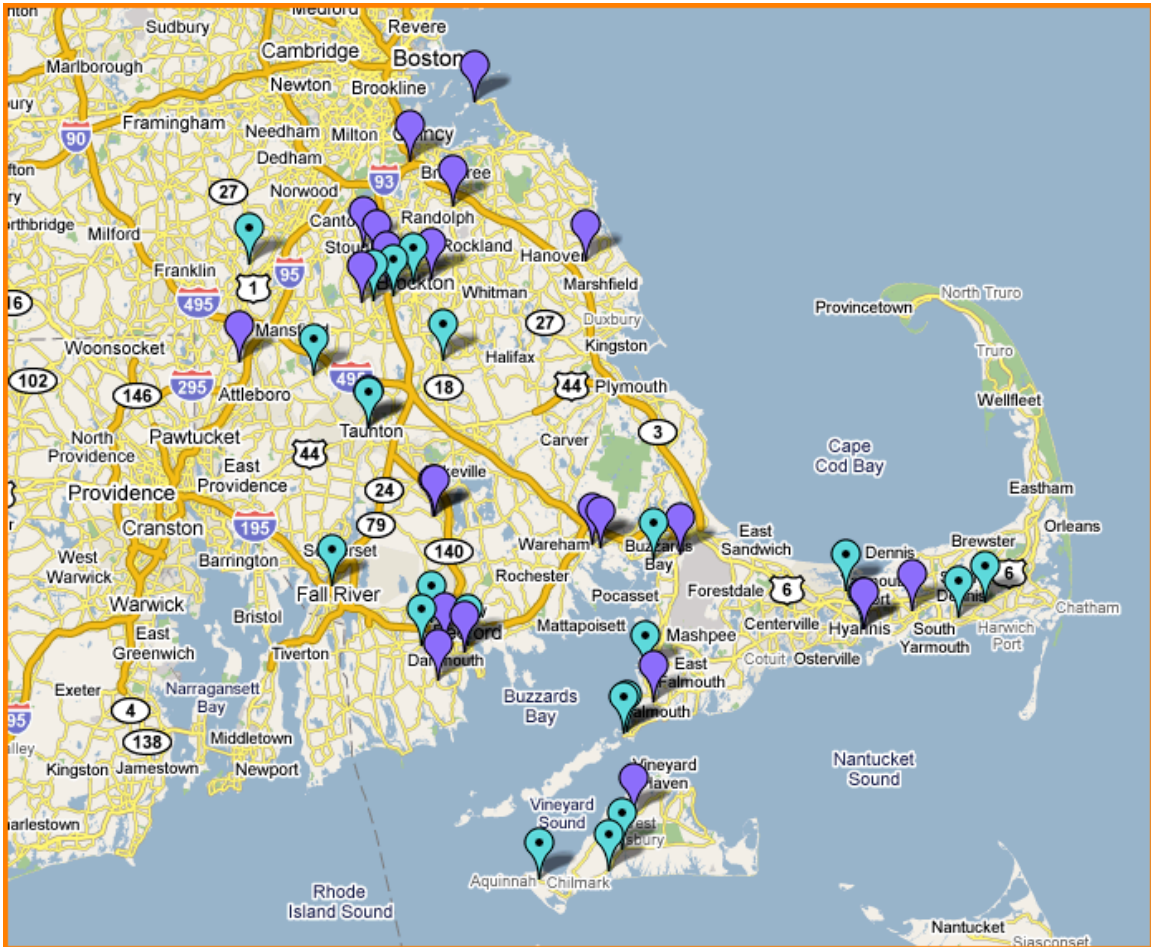Non-network location – pink with black dot

SEMLS Networks

SAILS – blue marker with black dot
OCLN – turquoise marker
CLAMS – blue marker

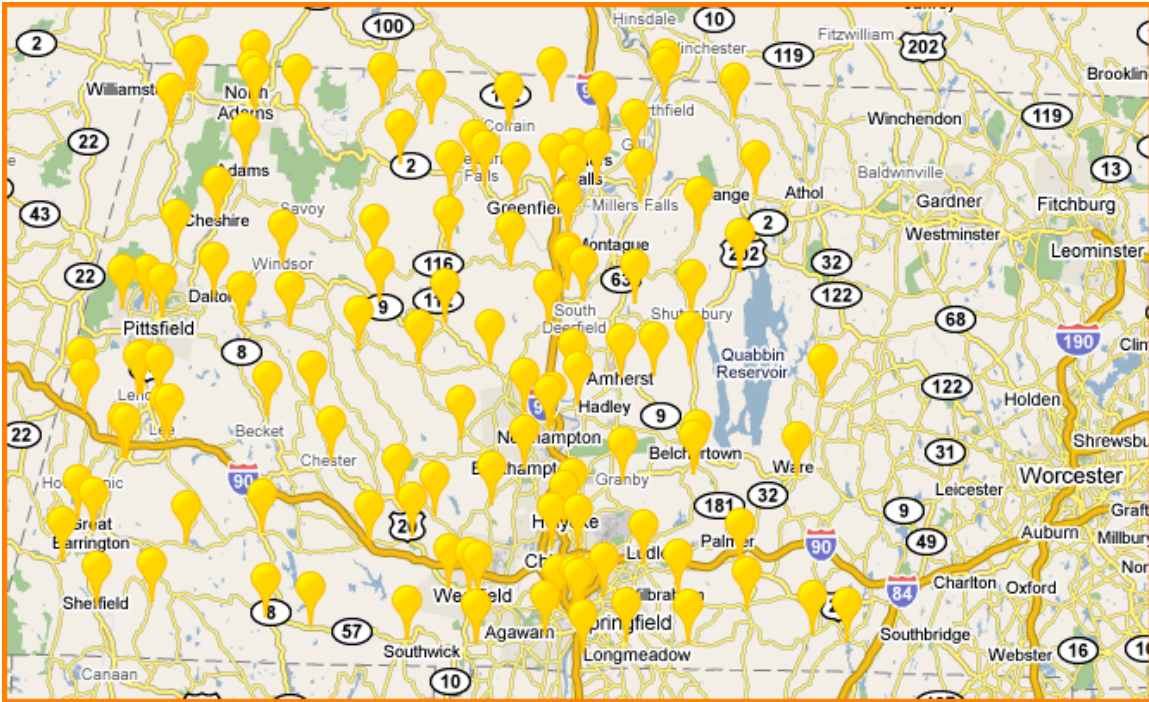Farthest point from Woburn: 128 miles to Provincetown

SEMLS – MassCat and Non-network Locations
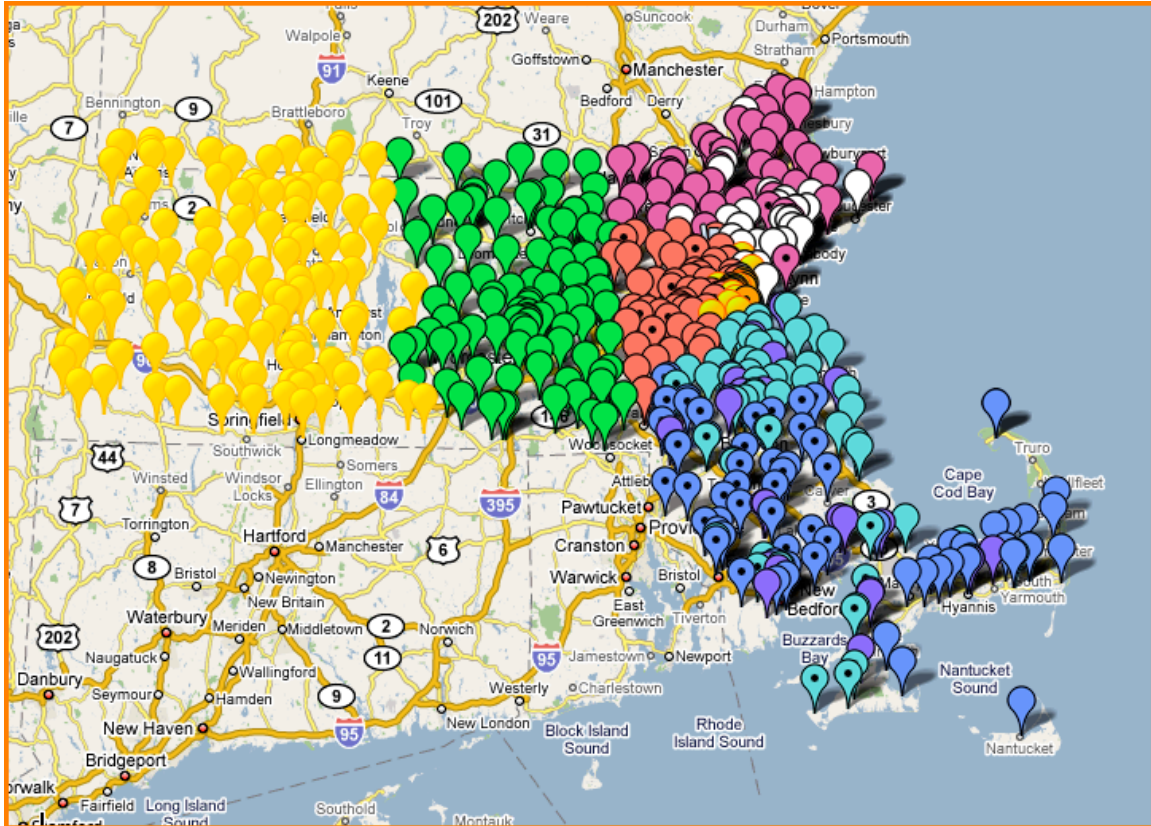

MassCAT – purple marker
Non-network location – turquoise with black dot

WMRLS Region

Farthest Distances to Woburn: Sheffield Bushnell-Sage Library 147 miles (southwest corner) and Williamstown David and Joyce Milne Public Library 161 miles (northwest corner)

Massachusetts Library Delivery System

BRLS FLO – dark orange marker
BRLS Boston Region – yellow/orange marker
BRLS Non-network locations – dark orange marker with black dot
CMRLS – green
Metrowest MLN – red marker
Metrowest Non-network locations – red marker with black dot
NMRLS NOBLE – white marker
NMRLS MVLC – pink marker
NMRLS non-network locations– pink with black dot
SEMLS SAILS – blue marker with black dot
SEMLS OCLN – turquoise marker
SEMLS CLAMS – blue marker
SEMLS MassCAT – purple marker
SEMLS non-network locations – turquoise with black dot
WMRLS – yellow
Woburn – top of blue flag barely visible