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WEEDING WITH ROBOTS: MANAGING COLLECTIONS IN AUTOMATED RETRIEVAL SYSTEMS

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Many libraries, because of space and cost constraints, are considering housing collections in automated retrieval systems (ARS). When building an ARS, much deliberation is given and staff hours are spent preparing and loading the collection into the ARS but collection management and weeding processes are often not considered. This article will highlight some of the special challenges of content inventory and weeding in automated retrieval systems. It will provide an overview of the processes used by two university libraries, the problems uncovered and the successes these libraries have enjoyed as the projects have progressed.

In 2000, Grand Valley State University (GVSU) opened the Steelcase library at its new DeVos Campus in Grand Rapids, Michigan. This library features an ARS that houses its circulating collection. Users browse and request books using the online catalog. When a request is made, the ARS automatically locates and retrieves the item.

Until relatively recently, GVSU's ARS had never been systematically weeded. Three librarians undertook the challenge of weeding three specific collections in the ARS using different approaches.

At the same time, in preparation for eventual weeding, librarians at Eastern Michigan University (EMU) in Ypsilanti, Michigan launched a program to systematically inventory over 500,000 items in its on-site storage facility known as the Arc (Automated Retrieval Collection). The Arc became operational in 1998 as part of a new Halle Library building. Since that time there has never been an inventory of the collection.

Fig. 1 Photo of Steelcase ARS by Amanda Pitts

MOVING AT WARP SPEED: WEEDING THREE COLLECTIONS IN THE ARS

GVSU's ARS, designed by Rapistan Systems (now owned by Dematic) of Grand Rapids, holds up to 250,000 books and consists of 2,600 bins (2 x 4 feet) in a rack structure occupying a secure vault approximately 100 feet long, 15 feet wide, and 40 feet high. A robotic crane extracts bins of up to 350 pounds and delivers them to one of three operator stations. While preparing to load the ARS, the shelves of the main library were scanned by eye using cardboard templates in 10", 12" and 15" sizes to estimate the number of bins that were required for each size. GVSU's librarians worked with a design consultant to configure bin needs. Materials are stored in bins according to size, not call number. The Steelcase Library saves 25,000 square feet of floor space using the ARS.

Because of the ARS, the library's circulating materials are essentially invisible; there are no stacks to wander through, and no browseable physical spaces to go to for particular subject areas. Instead, users search for and request items through the library's online catalog. GVSU's current system is integrated with Millennium ILS from Innovative Interfaces. Upon request, the crane literally swings into action, traveling horizontally along its embedded floor rail at speeds of up to 230 meters-per-minute, and vertically at up to 80 meters-per-minute to large metal bins. The location of the requested item is determined by the system by barcode, not call number or subject areas. As a result, call numbers and subject areas are not co-located, so any given bin holds a variety of subjects and call numbers.

When the robotic arm arrives at the location of the requested item, it pulls the entire bin from the vault and delivers it to the staff member at the operator station. In each bin, books are tightly packed with the spine to the back of the bin and the bottom edge up. A

two-digit identification number (the last two numbers of the barcode) is written on the bottom edge, which helps the staff member locate the requested book within the bin. No other identifying marks (such as the title or call number) are visible.

Fig. 2 Photo of bin in Steelcase ARS by Patricia Bravender

When books or other materials are returned to the library, they are not placed in bins from where they were retrieved; instead they are put in the most readily available appropriately-sized bin that has space available.

The major effect, in terms of weeding, of the ARS is that items are no longer co-located by subject. Instead, they are stored in completely random locations. Because of this, each book must be requested individually in order to view it. Grand Valley's system houses an extensive circulating collection as well as storage items.

Initially multi-volume sets were loaded into the system together. As volumes were used, the sets were broken up and scattered throughout the ARS. Some sets of items were intentionally divided into separate bins as they were loaded into the system. For example, in the case of government documents and thin pamphlets, locating a specific title for a patron request was less difficult when they were not tightly packed together, so these were distributed through separate bins. Some formats, such as videos and DVDs, were kept in bins specifically designated for those formats. Microfilm is filed in special tiered trays within a bin.

The Steelcase Library houses collections that support the University's professional programs. Three librarians at the Steelcase library decided to weed three of these collections: business, law, and social work. Each librarian took a different approach with the unique collection with which she was working.

THE BUSINESS COLLECTION

GVSU's significant business collection was not sufficiently weeded before it was loaded into the ARS. Once in the ARS, it was quickly out of sight, out of mind.

As Diane Young (2009) notes "most of what holds us back from weeding is psychological." Fortunately, Rick Lugg from R2 Consulting spoke to all GVSU liaison librarians just before the business collection weeding process started. He mentioned the Ithaka Faculty Survey (Schonfeld & Housewright, 2009) and quoted Susan Gibbons, Vice-Provost and Dean for Libraries at the University of Rochester, on "user-driven collections" as opposed to a "just-in-case" collections. Lugg pointed out the needs and opportunities for a legacy print collection. He made a strong case for de-selection. In the Kent study, 40% of the books did not circulate at all if they had not been checked out within the first two years after being added to the collection. If a book had not circulated within six years, the potential for use was 1 in 50.

According to Young (2009), in the weeding process librarians also discover the selection mistakes they have made. This can be a guide to making better decisions for future additions to the collection. Lugg emphasized that space and maintenance costs must be a consideration for retaining books that do not circulate. Armed with the information from Lugg's talk, the business librarian found it easier to do the weeding and not give in to the temptation to retain everything.

When faced with the overwhelming task of looking at everything business related in the 2660 bins of storage, the business librarian decided to approach weeding one small, targeted collection at a time. A request for a file from GVSU library's Systems and Technology department generated a list of call numbers, titles, authors, publication information and circulation data for the business collection. The columns in an Excel spreadsheet were sorted to keep the most needed information readily accessible. Next, another file in Excel was created that pulled out the first targeted call number range which included over 3000 items. Arbitrarily a year (1967) was selected to focus on in order to begin the weeding process. For this call number range and year, 20 items were listed. Each of those titles were reviewed and pulled out of the ARS. The number of circulations per title was a helpful indicator when working with the collection. Many of the books were in absolutely pristine condition, an indicator that the book had never been touched, much less circulated. It was exceedingly rare to find a book in this group that had circulated more than three times.

In the next group of books brought out of the retrieval system, the books that had never circulated at all were called out first. The decisions on these books were easier and the process went faster. However, it was disconcerting to remove books from the collection that looked like they could be good resources. According to Stanley J. Slote (1997), author of *Weeding Library Collections: Library Weeding Methods*, "Weeders are torn between keeping the books people want and the 'good' books." In an effort to make sure that the collection retained the "good" books, even if they were not used, the librarian checked the business titles retrieved from the ARS against Bowker Book

Analysis for relevance to the collection. Some titles were also checked against the Web of Science database for number of times they were cited.

Other considerations included whether the books were by major authors or from important publishers in the field, whether other libraries held a title (as verified in World Cat), the condition of the book, and the cost of replacing the book if it were ever needed in the future. Books from a later time period will also be checked against *Choice Outstanding Academic Titles*.

The process of weeding the business collection is slow when considering each individual title and bringing the actual item out of the ARS. The project is ongoing with no immediate end date in mind. Based on this experience of weeding, it is apparent that weeding needs to be an active practice incorporated into a daily or weekly schedule with acceptable time limits for each weeding session. This approach is more sustainable than tackling a project and weeding for days on end. Given these routine practices are upheld, the business collection will be weeded slowly but thoroughly, and will result in a collection that will benefit GVSU's business collection users.

THE LAW COLLECTION

The necessity to weed the law collection was born out of a unique situation and history. The Steelcase Library reading room was built to hold fewer than 10,000 volumes, and was to include the reference collections for all of the professional programs. It was planned that the majority of GVSU's 3,000 volume law collection would be shelved in the reading room. During construction of the Steelcase Library, the Grand Rapids Bar Association (GRBA) and GVSU reached an agreement that would move GRBA's 35,000-volume law collection into the new library. The combined collections of almost 40,000 volumes far exceeded the planned shelf space for legal materials in the reading room. As a result, the vast majority of the volumes were eventually stored in the ARS.

GVSU agreed to accept the complete collection of the GRBA library which had existed since the 1880s. There was some overlap between the two collections and much of that was eliminated before they were merged. For the most part, however, GVSU did not weed the GRBA collection before it was integrated into the GVSU system. For seven years following the merger, GVSU continued to supplement the law collection by purchasing many additional law treatises and series.

In early 2007, based on declining use, duplication in online services, and the skyrocketing cost of legal publications, GVSU decided to downsize the law collection. GRBA did not want to reestablish its library so GVSU and GRBA reached a new agreement that allowed the GVSU Libraries to significantly reduce the now very large and very expensive law collection. Subscriptions for many law treatises and series were canceled and GVSU began the process of disposing of a large portion of the law collection. This was done in four steps.

Step 1: Identifying and evaluating GRBA titles

Because of the foresight of the GVSU library's cataloging department, it was possible to identify the materials that GRBA donated to the GVSU collection. When these materials were initially combined with GVSU's holdings, a note indicating their origin as "GRBA" was added to a notes field in each record. Technical services was able to generate a list of the GRBA donated titles using this field. The resulting list was carefully reviewed by the legal services librarian. All materials that were to be retained in the GVSU collection were deleted from the list. The GRBA titles that GVSU did not want to retain were offered first to a local law school library and then to GRBA members.

The law school library and some GRBA members requested a number of titles on the list which consisted of many multi-volume sets. Library staff had never removed a significant volume of titles from the ARS during a limited time period so a system was developed for recalling the selected materials from the ARS.

Using the list of titles that had been requested, the legal services librarian recalled the requested titles from the ARS and placed them on designated shelving for further processing. If a title was multi-volume (as was often the case) the librarian would request only one volume of that series. That volume would be placed on a holding shelf and, as time permitted, circulation staff would pull the remaining volumes of that title from the ARS and place them on designated shelving. Pulling was usually done during low patron activity times, such as evenings or weekends. After all volumes of a title were pulled, be it one or 100, the cataloging record would be deleted from the GVSU catalog and OCLC records.

During low use times, when a patron requests a book using the online catalog, the book will be available for pick-up by the time the patron walks to the circulation desk. This process can sometimes take longer if there is heavy use of the collection in the ARS or significant patron activity at the circulation desk, but requesting and retrieving books for patron use and circulation is by no means an onerous task. However, when large numbers of items are requested, the amount of time it takes to simply retrieve the books from the system becomes significant. Because each volume must be requested separately, to retrieve a set of 200 volumes can potentially take over three hours if each volume is located in a different bin. As discussed earlier, volumes of multi-volume sets frequently became separated in the ARS.

Other factors upon which the process of retrieving books were dependent were the availability of staff and student workers to retrieve the items from the ARS and shelf space availability in the work area to store the items while they were being de-accessioned from the collection.

Once the titles had been completely pulled and removed from the GVSU library holdings, the requesting party was contacted to make arrangements to pick up the materials they had selected.

Step 2: Removing canceled and outdated material from the law collection

Canceled and outdated items became the next priority for weeding. The legal services librarian requested that technical services create a list of treatises and series that were no longer being updated. This list included titles originally purchased by GVSU as well as GRBA titles that had not been selected by the law school or GRBA members. Working from this list, the canceled and outdated titles were pulled according to the procedure described above. In accordance with GVSU policy, these materials were then shredded.

These first two steps lasted approximately six months and resulted in the weeding of over 14,000 volumes from the Steelcase ARS.

Step 3: Weeding the remainder of the GRBA collection

The process of weeding the remainder of the law collection continued with the removal of approximately 5,000 volumes from the original GRBA list which GVSU, the law school library, or any books that local law firms did not want. Most of these titles were out-of-date treatises and miscellaneous books that had been in the collection of the GRBA for many years. As time permitted, these titles were pulled and shredded using the same process described above.

Step 4: Weeding the remainder of the law collection

Once the outdated and canceled materials had been removed, the process of weeding the rest of the law collection stored in the ARS began. This has proven to be a time-consuming process. The legal services librarian had no personal knowledge of the content of the original GVSU law collection before it was stored in the ARS. For several years following the relocation of the collection into the ARS it had been actively supplemented.

Unfortunately she could not simply browse shelves to identify materials that were no longer necessary. Instead, she had to rely on a list to review the contents of the collection. This list was generated to include books from the LC classification "K" and the location of Steelcase. This list consists of about 9,000 titles and does not include many titles that are considered to be part of the collection that do not fall within the K and KF classification. Titles such as these are often found when searching law related subject headings and keywords or are occasionally discovered when purchasing new editions of the exact or similar title. Circulation staff members often bring outdated material to the attention of the legal services librarian when they find it.

The process of reviewing the list of titles is ongoing. Usually, the librarian retrieves materials from the ARS to review them before deciding to discard a title or retain it for the collection; occasionally, however, this decision can be made based on the cataloging record alone.

Several important lessons were learned from weeding this law collection. It is important to make sure that cataloging records contain information necessary to isolate and remove distinct collections if the need arises. Multi-volume sets can and will become

separated in the ARS unless measures are taken to prevent it, either through programming of the ARS or by diligent monitoring by library staff when items are returned to the ARS. Also, it is advisable to carefully consider whether high use items and multi-volume materials should be housed in an ARS.

THE SOCIAL WORK COLLECTION

The social work librarian set out with a keen awareness that it was necessary to weed the social work collection. Frequently, records for items that were clearly outdated were found during reference consultations with students. Since these books were not in hand, however, they were not set aside for withdrawal, as may have occurred if the librarian were standing in the stacks stumbling across outdated books ripe for weeding.

Since there is no way to go to the shelves, peruse, and pull the books off one by one, a different method of weeding was necessary. The method that was devised was to create lists of books to deselect based on a set of criteria. It was necessary that these criteria be measurable virtually, rather than physically. This would eliminate the need for physical examination of the books, which, along with co-location, is the advantage to weeding in the stacks.

In order to determine what these criteria should be, Lugg's ideas were taken into consideration. One of the most striking concepts that Lugg talks about is the incredibly low likelihood that books will *ever* be checked out if they are not checked out within the first six years that they are owned by the library. It was decided that this would be the first of several criteria used to determine whether a book stays in GVSU's social work collection or not.

The second criterion was related to the necessity to maintain a core collection. In order to serve users, certain materials should always be readily available, even if they had low (or nonexistent) circulation statistics.

Other factors taken into consideration were whether a book would be extraordinarily expensive to replace or difficult to borrow from another Michigan library using MEL, a consortium of Michigan libraries.

Once a set of criteria was in place, the librarian created a list, starting with all candidates for weeding, and worked through the criteria to systematically remove books from what would become the final list of books to weed. After this list was created, it could be handed over to a circulation staff member who could then remove the books from the ARS and discard them without the need for a librarian to even see the books that were being removed.

First, the library's systems and technology librarian generated a list of social work books that the library had owned for at least 6 years and that had never been checked out. This list was imported into an Excel document, making it fairly easy to manipulate. It began as a list of all the items in the HV range of the Library of Congress call numbers. After the list of HV books had been generated, it had to be narrowed down to the specific

call numbers that are related to social work. This was achieved by ordering the list by call number and deleting sections (such as criminal justice and charities) that belong in other disciplines. In retrospect, it would have been more efficient to generate the list with a more finely tuned set of LC call number ranges.

Periodicals and duplicates were also removed from the list. Removing duplicates proved to be a mistake; the library owned multiple copies of some books, some of which had circulated, and some of which had not. After the list had been pared down, the librarian had to recheck the original list to see how many and which copies of each title to remove, which was unnecessarily time consuming.

After creating a list of books that were specific to social work, the record for each book was assessed using the catalog record. Some books were removed from the list if they belonged in another discrete collection (for example, a collection of distinction of philanthropy materials, and materials in GVSU's special collections and archives). Other items that were removed from the final weed list were reference materials.

The social work librarian's next step was to check this list against a list of core titles that had been compiled from WorldCat collection statistics of *Choice Outstanding Titles* and *Resources for College Libraries*. This list was created by generating Excel spreadsheets of all social services books on the lists, then narrowing this list down to books within the call number range that matched that of the weed list.

The following step was to check to see if each book on the weed list was available through Michigan's statewide library lending consortia. If the book was in the holdings of more than three libraries, it was retained on the final weeding list. If the book was not available from at least three other Michigan libraries, the price of the book was found. If the book could be purchased for less than \$100, the book remained on the final weed list, and if the cost was more than \$100, it was retained in the collection.

Once this list was complete, the librarian handed it off to members of the circulation staff, who retrieved books and removed the records from GVSU's system.

While this method was effective, it was more time consuming than had been anticipated. The time will be reduced in the future, however, now that the librarian is aware of potential pitfalls. Now that the first sweep of weeding is done, the social work librarian plans to repeat the process on a yearly basis, generating a list once a year, then dividing the call numbers of the list in ten sections and weeding one tenth of the list per month. This will be a methodical, manageable task, and one that will not be terribly tedious or overtaxing for the library staff.

Other considerations to be made are whether this method could be easily adapted for other collections. One key to implementing this with any collection would be to start with a finely honed set of call number ranges with which to generate a list. If a particular discipline has call numbers in disparate areas, this could be a time consuming task.

One of the disadvantages of this method is that since it involves no physical contact with the collection, there is no way for the librarian to weed based on condition of the books. This concern can be addressed, however, with the alertness of the circulation staff

members, who note condition on a regular basis as books are retrieved from and returned to the ARS and notify the librarians when materials are in poor condition.

LOST IN SPACE: INVENTORYING EASTERN MICHIGAN UNIVERSITY'S ARC

While the weeding projects at GVSU's Steelcase library were underway, across the state, Eastern Michigan University's (EMU) library was involved in a collection management project of its own. Not unlike a long overdue shelf-reading project, the library, in the spring 2010, launched an initiative to systematically inventory more than 7,000 bins holding over 500,000 items in its on-site high-density storage facility known as the Arc (Automated Retrieval Collection). The Arc became operational in 1998 as part of a new Halle Library building and required two months to complete the initial loading of materials. Since that time there has never been a systematic inventory of the collection. EMU's Arc was designed by HK Systems, which is now owned by Dematic. The Arc is integrated with Voyager ILS from Endeavor and is now owned by Elsevier.

Currently, EMU's library retains the 10 most recent years of monographs and print journals in the browsing collections on the 2nd and 3rd floors. Frequently requested older titles are also shelved in the browsing collection. All other print is stored in the Arc which currently contains 58.3% (525,000 items) of EMU's print collection.

Patrons request Arc materials using the Voyager catalog. The materials are usually available at the circulation desk within 10 minutes of the request. Arc materials are clearly marked with the last 2 digits of the barcode on top, which alerts circulation staff it is an Arc item. For quality control reasons, only managers and one highly trained student assistant may return content to the Arc.

The library considered doing the inventory in 2009, but elected to wait until the \$250,000 software/hardware HK systems upgrade was completed in March 2010. Circulation laid out the procedures for systematically inventorying bins and developed specific instructions on how to move through the inventory process.

The inventory addresses several issues:

- Rumors that during the initial load, large number of items were not recorded as being in the bin in which they were placed i.e. not properly linked to that bin
- To verify the title access information shared by the Arc and Voyager catalog is correct
- To prepare for the eventual review/weeding of the Arc collection

PROCEDURE

The HK software is set up in the inventory mode and the next bin to be inventoried from the master list is called up. Once delivered, the section to be scanned is highlighted on the computer screen and the person doing inventory removes and scans the items from the sector. Once the sector scanning is marked completed, the system highlights the next sector to be scanned; this repeats until the entire bin is scanned. The fully scanned bin is then released and returned to the Arc.

Time to complete the inventory varies depending upon the number of items and if problems are found. In general it requires 30 to 45 minutes to process a bin which may contain roughly 65 to 200 items.

RESULTS OF THE TESTING

Inventoried requires attention to detail. The bin sector that is being scanned must be the same as the one displaying on the monitor. Otherwise, the person inventorying will end up "adding" one sector's content to the sector selected to be scanned. This can be un-done, but requires rescanning the materials again. A suggested enhancement would be for the software to alert the user that the scanned item is from another sector of the current bin and this would help eliminate the error.

After taking inventory of many bins, several typical problems emerged, some of which could be corrected by re-scanning the barcode after waiting a few minutes. Others were more serious, such as when items in a bin were not correctly linked to that bin or simply were never linked and therefore not found in the inventory of Arc items. This sampling confirmed that a complete inventory of the Arc will provide an improved understanding of EMU's holdings as well as clear up earlier mistakes.

TYPICAL ERRORS

- Barcode not found:
 - Barcode not linked to bin. To remedy this, the person taking inventory waits a minute or so, rescans, and the system may accept it;
 - If not found, the item is not linked to bin and needs to be processed. The system alerts the user by printing out a receipt.
- Lost in Space:
 - After finishing scanning sector, there are items still listed on the screen as not scanned; these are recorded as 'Lost In Space'.
 - To remedy 'lost in space' items, the person doing inventory writes down barcodes and provides them to circulation managers who will check for the titles in Voyager and see if they are on the circulating shelves. If not found, their records will be suppressed in Voyager and indicated as lost. Titles may show up not linked to other bins as the inventory continues.

LESSONS LEARNED FROM THE INVENTORY

While EMU's library's inventory project is in the early stages, sample inventorying of the Arc collection indicated that there are problems with the Arc items. This is an important first step in providing a more accurate and complete understanding of the content held in the Arc. Proceeding directly with weeding would mean that items never linked to a bin or improperly linked items would be missed. The inventory insures that EMU will have accurate information for the weeding project.

RECOMMENDATIONS AND CONSIDERATIONS

Each collection management project described in this paper resulted in unique discoveries about working with a collection in an ARS. There were also several recurring and overarching lessons that can be gleaned from GVSU and EMU's experiences.

In order to save a significant amount of time, it is strongly recommended that libraries weed collections thoroughly before loading them into the ARS. Retrieving the items from the system is time consuming and can tie up the system.

Before embarking on a weeding project, it may be worthwhile to conduct an inventory of the system in order to do the weeding project and not miss materials.

In any weeding project, whether it is in an ARS or not, it is advisable to weed as part of a process, not as an intensive project over a short period of time. Short term, intense weeding can be tedious and difficult to accomplish given the amount of time it takes from a librarian's schedule, whereas if the weeding is conducted systematically, the weeding becomes a continual, sustainable process that results in a high quality collection.

It would also be advisable to ensure that cataloging records are accurate and that they have necessary information to isolate discrete collections.

Carefully consider whether an ARS is a proper location for any given collection, and as you begin to use the ARS, remember to remain flexible. If it is discovered that there are high use items that are continually retrieved from the ARS, maybe they do not belong there.

Inventorying and managing collections in an ARS can be very challenging. It is impossible to convey to those who have never seen or used an ARS how difficult it is to manage a collection that, as a whole, cannot be seen or touched. Libraries that are considering using ARSs should anticipate weeding and should be mindful of the inevitability of it as they transition to the ARS.

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