

## Automating Collection Development of Non-Latin script Materials with Macros

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### Abstract

*Non-Latin scripts pose issues of labor, language fluency, and accuracy for libraries. WorldCat.org already provides multilingual data on many of the world's non-English monographs. With a macro designed to automatically search WorldCat.org it is possible to create lists of materials that faculty and students need for their research, so long as they can provide an ISBN. This is all accomplished with minimal coding knowledge. Compared to manually copying and pasting, this process is 9x faster. The time saved allows librarians to concentrate on complex acquisitions, and other aspects of their professional life such as instruction, outreach, research, and service.*

### Introduction

Automating workflows allows librarians to focus on complex tasks that computers cannot solve. However, automation implies needing to learn to code. This is not always the case, many workflows can be automated by recording the key strokes done to complete a task. This type of automation is known as a macro. Macro recording programs allow librarians without a strong background in coding to automate their workflows. This article shows how a macro was developed to solve a complex problem with non-English non-Latin script materials that can be employed at any institution.

Libraries often collect materials in a variety of languages, some posing greater challenges than others. For those languages that do not use the Latin-based alphabetic scripts, it may not be possible to read or translate without someone fluent in the language on staff at the library. Many librarians, from public services to acquisitions and cataloging, can navigate

through a Romance-language item. However, when materials needed for the collection are in a language like Japanese, librarians may find they cannot read the language at all.

Fortunately, WorldCat.org often provides the vernacular script as well as a Romanized transliteration. Depending on workflows in an institution, there may be a subject specialist librarian with a geographic focus who can read the language, make selections, and pass that information on to an acquisitions unit to prepare purchase orders, as is the case at the University of Colorado Boulder. However, preparing such purchase lists for readability can be time consuming and tedious.

In this article, a process for automating collection development of non-Latin script materials is presented. With a custom macro-enabled Excel worksheet and the macro scripting program AutoHotKey it becomes possible to quickly prepare lists of materials in a multitude of languages to be used across the library by those who may not possess language expertise. [A LibGuide](#) (Lisbon, 2017) was co-created alongside this article for those interested in implementation. The macro takes a time consuming process, potentially hours of work, and reduces it to minutes.

### Literature Review

Articles on collection development for materials in non-Latin scripts need to be considered language by language. Focusing only on Chinese, Japanese, and Korean (CJK), the articles that emerge are only summaries of collections held in the Western world, and how they were procured. Ward (2009) analyzes workflows for foreign language materials at the Rutgers University Libraries, noting that CJK languages create the most challenging set of variables to

acquisition workflows. Other articles are merely announcements of major acquisitions. There is a gap in the literature on automating collection development for non-Latin scripts.

Macros are not unknown to libraries however, and go at least as far back as Chroust's (1993) article on “cleaning up” screens downloaded from FirstSearch to be more human readable in Word Perfect. This theme of “cleaning up” data is common in the few articles available. Identifying individual tasks for automation, as well as summaries of macro tools and how to start using them are also available (Ouderkirk, 1999).

Bregman and Chan (2001) take a holistic approach to library automation with macros. The techniques described are out of date, but the organizational big-picture approach highlights the importance of fitting automation into a larger context. Macro implementation has been considered across many library processes. Yoose (2012) suggests diagraming workflows across technical services units to get the most out of automation, with screencasts to show how to implement macros.

Gutekanst (2001) takes a different approach, tackling the issue of overdue ILL books: providing the macro code to solve the problem. Today such information would be available through sites like Stack Overflow (2017).

While early macro creation programs were created as proprietary software, open source programs like AutoHotKey were introduced to the library community by Jerney (2005).

AutoHotKey is a macro scripting program able to work across multiple programs on a PC. It is available as open source software and designed to be easy to learn. Sandberg (2014) takes a similar hand-holding approach to introducing OCLC Macro Language (OLM).

The potential for automation has not escaped the attention of the East Asian studies librarian community. The Committee on Korean Materials created the K-Romanizer, a project chaired by Hyoungbae Lee. The K-Romanizer program was built with Autolt, an open access program for creating macros. It automates transliterating Korean hangul and hanja into [ALA-LC compliant Romanization](#). For those in East Asian librarianship, and indeed in any discipline focusing on regions that do not use a Latin-based alphabetic script, the workflow processes are inherently more complex. Romanizing by hand while cataloging is tedious and prone to typos, but an automated process can potentially reduce these issues. This does not mean that automation is not without its problems. As Blansit (2008) points out, there are hazards associated with automation and programming in general that any would-be programmer has to think about carefully.

Chen and Chen (2015) observed that most East Asian studies librarians “hold more job responsibilities, such as acquisitions and cataloging” in addition to their subject librarian duties. Therefore, East Asian studies librarians need automation processes to better balance their professional duties. Nearly all the literature points to saving time, less error prone output, and even the ergonomic benefits of not doing repetitive motions (Bregman and Chan 2001), as reasons for adopting macros and automation in general. Further, it allows librarians to focus their time on complex and sophisticated work that automation does not lend itself to.

Finally, it is worth an anecdotal mention that articles, presentations, and discussions about automation occur throughout the library world outside the peer-review process. Barnes (1997) discussed how to automate library budget tracking within Excel. In current contexts this

includes Yoose's 2012 blog posts. Message boards, Reddit threads, Q&A support threads for automation products all act as diverse sources for discussions on automation.

### Issues in Collection Development for Non-Latin Scripts

Libraries and vendors have well established means of collecting and acquiring English language materials. Libraries use many automated tools and services provided by monographic vendors, as well as the benefit of communicating in the same native language with similar culturally constructed expectations for conducting business. For non-English Latin-script languages, such as Spanish or German, acquisitions staff may not be able to translate the meaning of the language, but the script is still readable, enabling the identification of titles, authors, and other bibliographic information needed to prepare purchase orders and communicate with vendors. However, for non-Latin scripts it becomes unrealistic for libraries of all sizes to maintain a linguistically diverse staff that can read the world's non-Latin script languages: from other alphabetic languages like Armenian (հայերէն) and Cyrillic (Кириллица), to character-based scripts like Chinese (中文) and Japanese (日本語). Adding to these challenges, most of these scripts have "classical" variants and other historical changes. Languages spoken across national boundaries may be written in different scripts. For instance, Azerbaijani is written in Cyrillic if spoken in Russia, Latin letters if spoken in Azerbaijan, or Perso-Arabic if spoken in Iran.

Then there is the technical challenge of setting up operating systems to type in non-Latin languages with either Microsoft's *IME* (Input Method Editor) or Apple's *Input Sources*, introducing another layer of challenges. There are also barriers to communicating: how do you

accurately convey to both your acquisitions team and vendors the materials you are seeking? Submitting lists of requested materials only in the non-Latin vernacular script means colleagues cannot read purchase orders. However, if the materials request list only includes the Romanization, vendors may not know what materials are being requested, especially if the Romanization system in the English-speaking world is different from the one used in the country of origin. The safest approach is to do both: provide titles, authors, and publishers in the vernacular and again in transliteration. This is time consuming work that takes away from other responsibilities: instruction, outreach, reference and research consultations, committee work, campus events, professional development, or time that could be spent working on more complex collection development work that automation could never handle. In the author's own experience, preparing a material request for acquisitions that has an accurate and complete WorldCat record takes at least 6-7 minutes when done manually.

### Macros and Workflows

The workflow presented in this article deals with one specific part of collection development: preparing material requests from faculty and students for purchase by acquisitions staff who do not possess reading knowledge of non-Latin script languages. The librarian acts as the liaison between the two groups, assuring that the materials needed are accurately conveyed in a format that is easy for acquisitions staff to work with. The process here takes a set of ISBNs provided by users and creates a spreadsheet with bilingual bibliographic data that can be used by acquisitions staff to communicate accurate order information with vendors.

Because macros are inherently recursive (Bregman and Chan 2001), performing the exact same set of steps in a static environment, they need to be narrow in scope. ISBNs that users provide are collected through a GoogleForm which is designed to be as simple and user friendly as possible (see Appendix A for a screenshot). It only requires a control number, typically an ISBN. If there is no ISBN, users can still provide a title, author, or other bibliographic information. Creating a standard way to receive item requests, especially one that emphasizes providing an ISBN, can save time and labor. Focusing on providing the ISBN saves time for both the librarian and the user who needs the item. The librarian receives a user-generated list of ISBNs, while the user only needs to provide one piece of data instead of providing various bibliographic data in the vernacular and transliteration.

For items requested by Japanese studies faculty and graduate students at the University of Colorado Boulder, 80%-90% of Japanese books requested are already on WorldCat. The macro can retrieve vernacular and transliterated bibliographic information quickly, swapping back and forth from a Google Chrome browser window to Excel. Older items without ISBNs need to be searched manually by someone with vernacular language skills such as the subject specialist. Items that are not found in WorldCat usually require specialized knowledge to locate. The final spreadsheet is reviewed by the subject specialist or someone with vernacular language skills for occasional errors. The spreadsheet is submitted to acquisitions where the details are used to create purchase orders and communicate with vendors.

### Making the Macro

The acquisitions macro is actually two separate macros. The first one is the “data collection” macro. Working at the operating system level across multiple programs, it collects



bibliographic data from WorldCat.org and populates an Excel spreadsheet. The macro itself is just a complex set of keystrokes (see Appendix C for the full keystroke command of this process). When this series of precise keyboard commands is run as a macro, it looks at an ISBN in Excel, copies it, and uses it to run a search on WorldCat.org and extract essential bibliographic data that an acquisitions department needs to place a purchase order for non-Latin script materials: author, title, and publication data both in the vernacular and Romanized scripts.

These keyboard strokes are recorded with the program Pulover's Macro Creator (Pulover). Using Pulover requires no knowledge of scripting or programming. Pulover's main purpose is only to record the macro, not run it. Pulover can also record mouse clicks but they were avoided entirely because this macro was designed to be used on multiple computers, which often have monitors with different screen resolutions. This means that the XY coordinates of the mouse clicks change system to system and would introduce a point of failure because the XY coordinates on two different screens would not "click" in the same location.

Pulover can export the recording as an AutoHotKey (AHK) file. AHK is another open-access program for creating macros, but requires programming knowledge to create them. Using Pulover circumvents the need to learn to program in AHK, while still creating an executable macro that can be activated anytime data needs to be collected.

To run the "data collection" macro, it needs to be activated first. This is very much like opening a program. When the macro is "open," it will only run when a certain combination of keys are typed. For the macro described here it is ctrl+shift+0 (zero). It can also be stopped with the F8 key. The other two macros in Excel are more straight forward. The custom spreadsheet

that works together with AHK has two buttons built into it. Each one runs a separate macro to help clean up the data.

This Pulover/AHK data collection macro was designed to be used specifically in Google Chrome. It was tested in Firefox, but because of slight variations in how Chrome and Firefox function, it cannot work in the latter. Chrome was specifically chosen because it is relatively easy to create multiple profiles (Google 2017). Users can create a separate profile for collection development where the custom Adblock Plus filters (see Appendix B) are always active.

The second macro cleans the data that was pulled from WorldCat.org into Excel by the data collection macro created with Pulover/AHK. This “data cleaning” macro was made entirely in Excel through the “Developer” tab, which is hidden by default, but can be revealed by changing settings in Excel’s options menu. Excel, like Pulover, features a recorder that can generate a macro with no programming knowledge. Unlike Pulover, mouse clicks can be used to record macros in Excel because the cells that are activated are recorded, not the “click.”

The “data cleaning” macro performs three important tasks. First, it normalizes the ISBNs that users submit, removing spaces, hyphens, and ensuring the cells in the ISBN column are formatted correctly. Second, it removes all formatting from the data copied over from Worldcat.org. Finally, through a series of carefully sequenced “find and replace” commands, it cuts out the “garbage” html from Worldcat.org and leaves behind only the human readable information: the title, author, etc., of the work in both vernacular Japanese and transliterated Latin-letters. Figure 1 diagrams out how these find and replace commands work for the title of a Japanese book:

### Figure 1: Find and replace commands to remove Wordcat.org HTML from Japanese titles

String of HTML copied and pasted from WorldCat.org into Excel:

```
h1 class="title"><div class=vernacular lang="ja">越境する 漱石文学 /</div>
```

```
find: _/<*
```

```
h1 class="title"><div class=vernacular lang="ja">越境する 漱石文学 /</div>
```

```
replace with: nothing
```

```
h1 class="title"><div class=vernacular lang="ja">越境する 漱石文学
```

```
find: *lang="??">
```

```
h1 class="title"><div class=vernacular lang="ja">越境する 漱石文学
```

```
replace with: nothing
```

```
越境する 漱石文学
```

\* = wildcard

? = one character

\_ = represents space in a text string in the find/replace command

### Creating Macro Friendly Environments

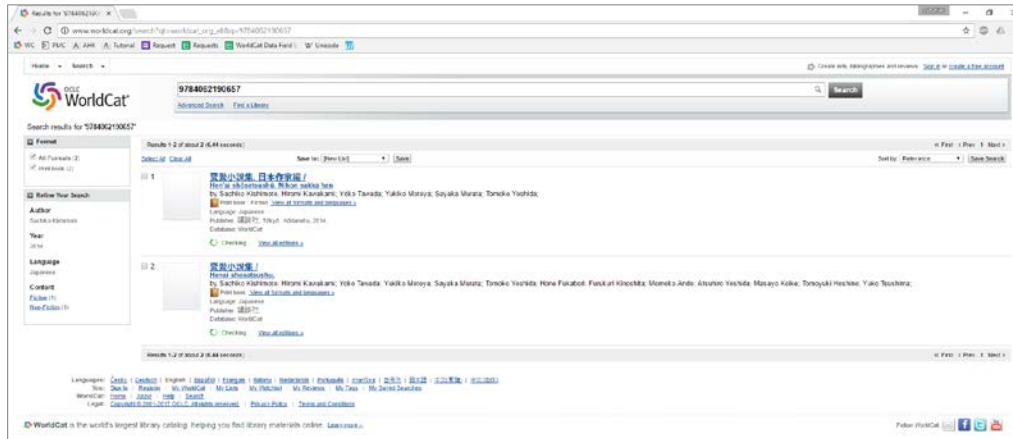
Macros rely on consistent environments to run optimally, and the “data collection” macro needs to hit the tab key exactly two times to move the cursor from WorldCat.org search bar to the first result after a search results page loads. WorldCat.org presents a challenge because it provides contextual information with its search results. For example, searching the ISBN 9784062190657 gives two results for the same book (OCLC 2017) and WorldCat generates a facets menu on the left. This is problematic because the facets menu increases the number of tabs needed to focus on the link to the first search result and thus becomes a “point of failure” for the macro.

To fix this, another piece of software is used to make WorldCat render in a minimalistic way. The browser plugin Adblock Plus is a common open-source plugin that suppresses obtrusive advertising on websites. This plugin can also be used to suppress any webpage element. With a custom set of filters in Adblock Plus (see Appendix B), the WorldCat homepage,

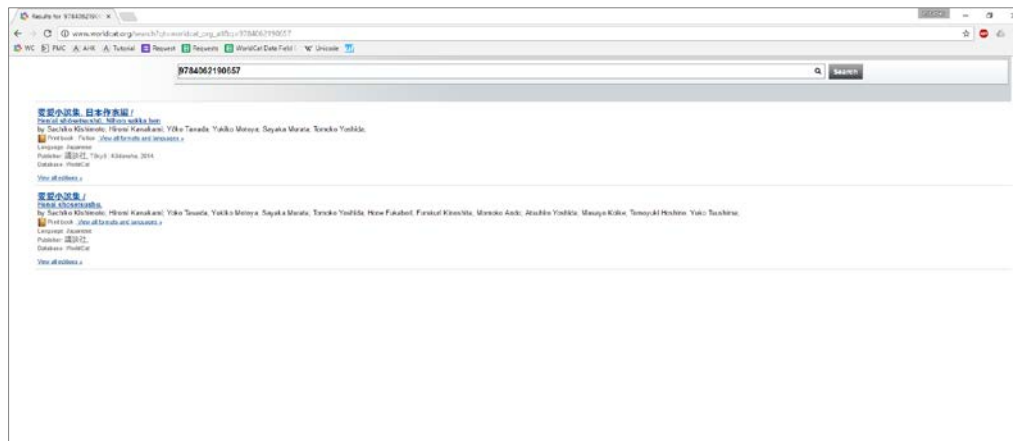
search results, and item record page only load the web elements needed for the AHK macro to run. Figure 2 shows comparative screen captures of the default WorldCat pages and the same pages with the custom Adblock Plus filters active.

**Figure 2: Unsuppressed and Adblock Plus filtered WorldCat.org pages:**

Without Adblock Plus Filters



With Adblock Plus Filters



These “stabilized” versions of WorldCat.org allow the macro to be presented with a consistent environment in order to extract the necessary vernacular and transliterated data. By suppressing responsive elements on WorldCat.org and making data display consistently, the macro does not encounter changing environments and will produce better results.

## Non-Latin and Japanese specific optimizations

This macro has two specific optimizations to deal with the unique needs of collecting non-Latin language materials. First, it replaces all composed letters with diacritics with their decomposed equivalents. For example,  $\bar{o}$  and  $\bar{o}$  may look the same, but to the computer they are two different values. The first  $\bar{o}$  is a single character with a hexadecimal value of 0X14D. The second  $\bar{o}$  is actually two separate values:  $o$  and  $\bar{}$ , with hexadecimal values 0X6F and 00AF respectively. These values refer specifically to a Unicode code point (Unicode Inc.) The macron in the second example is a floating diacritic that computers merge with any other character, resulting in what looks like one glyph. These decomposed characters can be searched with a ctrl+f command, because the  $o$  value matches a “regular”  $o$ .

The second optimization deals with Japanese publisher names. WorldCat records provided by Japanese institutions that do not follow the Library of Congress ALA-LC Romanization Tables (2016). This is most noticeable in publisher fields. For example the Japanese publisher *Asahi Shimbun Shuppan* is often written as *Asahishimbunshuppan* with no word parsing or capitalization. At the time of writing, the macro currently fixes this issue with 33 Japanese publishers with more fixes being added as they are discovered. Because of the modular nature of the macro, it is possible to add more lines of code to the macro each time a new issue arises.

## Benefits and Results of Implementation

As the macro is currently implemented, it saves an enormous amount of time. Testing how quickly information can be copied and pasted manually from WorldCat.org to Excel, it takes 6-7 minutes per item. The macro accomplishes the same in about 40 seconds. This is 9x

faster than collecting the data manually. It also has the benefit of protecting against repetitive motion disorders.

It also frees non-cataloging staff from having to learn 19 pages of rules for specific Romanization conventions in Japanese, let alone learning how to Romanize the other 173 languages that have Romanization conventions prescribed by the American Library Association and Library of Congress.

At 6 minutes per item, the 476 requests received in fiscal year 2016-17 would have taken 47.6 hours. At \$20 per hour that would be \$952 spent on this task. In comparison the macro could have accomplished this work in approximately 5.28 hours.

### Points of Failure

The macro does have some specific points of failure. The most significant is waiting for webpages to load. The macro waits 10 seconds for WorldCat.org search result pages and item record pages to load. Because the macro cannot “sense” when webpages are finished loading, it will continue with outputting keyboard commands regardless and produce “garbage data.” Another point of failure is ISBNs that produce multiple results. The first item is not always the “best” choice, and may be completely wrong in some cases. The macro will only pull data for the first search result which necessitates human review of the Excel file. This typically manifests as a book in the wrong language and is easy to spot.

The final point of failure is ISBNs that produce no results in WorldCat. This is usually because the item is too new and no records have been added to WorldCat yet, or the item may be so old that it was published before Japan started using ISBNs. In these cases, the macro will run and leave an empty row in Excel. When materials are brand new, the bibliographic data can

be obtained manually from a website like Amazon.jp or Rakuten.co.jp, though they do not provide Romanized data because they are commercial sites selling Japanese goods to the Japanese consumer market.

While these failure points do not make the macro truly 100% automated, it succeeds in over 90% of cases. This saves a substantial amount of time, allowing librarians to focus on the remaining 10%. For example, in a list of 20 items, 18 of them could be processed automatically. Assuming those 18 items were processed manually at 6 minutes each, it would take 1 hour and 45 minutes to complete a list for acquisitions. With the macro it would only take 12 minutes. The remaining two items, if not particularly rare, could be processed in approximately 12 minutes. Even with points of failure, the cost savings on time more than make up for the 10% of items that cannot be processed automatically.

### Making the Macro Easy to Use for All Area Studies Librarians

Usability is always a concern when designing a tool for a large audience. There are some manual steps that must be performed for the AHK macro to run correctly. After that, users must remember the keyboard command to activate it. For the Excel macros, instead of remembering more keyboard commands, users can press a button instead (See Figure 3).

Future plans to improve usability include [a LibGuide](#) (Lisbon, 2017) clearly outlining how to work with the macros. This LibGuide will cover what software is needed to run the macros, how they work, troubleshooting, etc.

**Figure 3: Usability Features**

★ Macro's in this spreadsheet only clean data up to row 250. <span>Clean Data</span>							
If Rush type "y"	Inform Faculty	Note to Acq	Collection Location	ISBN#	OCLC #	Author (Eng)	Author (V)

### Future Optimizations

Currently, the Excel macros clean away the HTML code around the metadata for the actual author, title, etc. However, they rely on looking for the string *vernacular="jp"* because it is a consistent and unique text string pulled into Excel. The find and replace commands can be edited to look for *vernacular="??"*, allowing the Excel macro to clean the data for any language, not just Japanese. Rigorous testing is needed to confirm there are no unintended side effects from altering the macro. Currently, Korean and Russian materials appear to process accurately. Arabic, Chinese, Hindi, and other non-Latin scripts need further testing.

Even during the writing of this article, the author received advice communicating with the AutoHotKey and Visual Basic communities on Reddit, and given suggestions on how to optimize the macro scripts (“Optimizing Excel Macro • R/Vba” 2017; “How to Identify Correct Program Window • R/Autohotkey” 2017). This process of optimization and improving is iterative. Even within the online discussions mentioned, new technologies were suggested that would likely provide even more stable macros. However, it also moves away from the core goal of demonstrating that automation is possible without detailed programming knowledge.

A key optimization will be an additional macro that can identify incorrect metadata brought over from WorldCat. There are a variety of ways in which this manifests. For example, Japanese WorldCat records do not follow Resource Description and Access (RDA) conventions



used in the US. Japanese books that are part of multi-volume sets have their volume number incorporated into the title of the WorldCat record, even if it is not written in the title page.

Compare OCLC# [704165184](#) with OCLC# [939215521](#) (See Figure 4).

**Figure 4. Comparison of US and Japanese Worldcat.org records for same item**

Worldcat.org Record from US Institutions

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[<< Return to Search Results](#)

[Add to list](#) [Add tags](#) [Write a review](#) Rate this item: ☆☆☆☆☆

**草双紙集 /  
Kusa zoshishu.**

Author: 木村八重子, 宇田敏彦, 小池正胤校注 木村, 八重子 宇田

Worldcat.org Record from the National Diet Library of Japan

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[<< Return to Search Results](#)

[Add to list](#) [Add tags](#) [Write a review](#) Rate this item: ☆☆☆☆☆

**新日本古典文学大系. 83, 草双紙集 /  
Shin nihon koten bungaku taikai. 83, Kusazōshishū**

Author: 佐竹昭広 [ほか]編 ; 木村八重子, 宇田敏彦, 小池正胤校注  
Uda; [Masatane Koike](#)

### Future Directions

The next step is putting the macro into the library community to test how the macro handles unforeseen scenarios. Community adoption and user experiences will create avenues for future developments and improvements, as well as the opportunity to crowdsource specialized knowledge about non-Latin script languages and how to incorporate them. To compliment this initial research, the author has developed [a LibGuide](#) dedicated to automating non-Latin collection development.

## Conclusion

Programming knowledge is of course helpful, but it is entirely possible to create macros without such skill. Since learning to code can be a time consuming process, librarians should consider the use of macro recorders. Macro recorders have their own learning curve, but allow users to become familiar with automation processes with less labor. In addition, working with this type of software may encourage librarians to start learning to program. As Hyoungbae Lee, lead creator of the K-Romanizer points out:

“IT people may be better in programming, but I believe that librarians can define better what kind of workflow can be automated in their own work. That is why I started studying macro languages...”(Lee 2017)

Macro creation is an iterative process, adding features to account for changes and improving task functionality. It allows all libraries a chance to accurately collect non-Latin language data in a systematic and accurate way. Even for larger libraries with dedicated subject-specialists in areas/languages, the time savings are valuable and allow librarians to engage in other projects like managing rare and unusual items, outreach, teaching, etc.

For technical services, the macro enables clear, effective, and accurate communication with vendors and placement of orders without having language expertise in-house. Where staffing resources are limited, technological solutions such as a macro enhance and enable accurate collection development and acquisition of materials across a range of languages, ultimately providing students and faculty with materials that might not otherwise be available.

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## Appendix A:

### Materials request form for Asia related materials:

This form was created in Google Forms. It also uses a special feature to prefill the “Your Name” field. Each faculty member and graduate student receives a custom link that auto-populates their name, removing a small piece of the labor associated with requesting materials for purchase.

**Figure 5. GoogleForm for collecting ISBNs**

The image shows a Google Form titled "Request Asian Studies Materials". At the top, there are tabs for "QUESTIONS" and "RESPONSES" with a count of "1,487". The form content includes:

- A header: "Request Asian Studies Materials"
- A text field: "Order Japanese and/or Korean Studies materials for the [redacted]"
- Instructions:
  - ★★★ ONLY the ISBN is required to order a BOOK, no other information is needed.
  - ★ No fields are required, but providing an ISBN is the FASTEST way to get what you need.
  - ★ Japanese Items: try to provide AUTHOR and PLACE names in Japanese AND Rōmaji
- A text field: "Questions about this form? Email [redacted]"
- A section titled "Your Name:" with a "Short answer text" input field.
- A section titled "Control Number:" with an example: "ex: ISBN, DOI, URL, PURL, etc - ★ Make sure there are NO TYPOS! ★" and a "Short answer text" input field.
- A section titled "Rush Order?" with a checkbox: " Yes (needed in less than 2-3 weeks)"
- A section titled "Other Information (Author, Title, Series, etc.)" with a "Long answer text" input field.

## Appendix B:

### Adblock Plus Filters to Create Macro-Friendly WorldCat.org Pages

To implement these filters in the Chrome browser, you need Adblock Plus. In the options, go to the “options” tab and click on “Edit filters as raw text.” Then you can copy and paste the filters below to alter what elements are displayed on WorldCat.

```
worldcat.org##.ipsign
worldcat.org##.qm
worldcat.org##.scopesummary
worldcat.org###util-links
worldcat.org###util-cont
worldcat.org###soc-cont
worldcat.org###libspot
worldcat.org##.getthis
worldcat.org##.borrow.downpage
worldcat.org##.buyit.downpage
worldcat.org##.showMoreLessContentElement.expanded-content.showMoreLessBox-dark-content-expanded
worldcat.org##.showMoreLessControlElement.expanded-control
worldcat.org###rev-users
worldcat.org###add_tag_signedout
worldcat.org##.soc-util-cont
worldcat.org###div-footer
worldcat.org###div-refinefm
worldcat.org##.faceted
worldcat.org##.results-actions
worldcat.org##.results-sort
worldcat.org###menubar
worldcat.org##.resultsinfo
worldcat.org##.coverart
worldcat.org##.num
worldcat.org##.showMoreLessControlElement.contracted-control
worldcat.org###brand-cont
worldcat.org###cover
worldcat.org##.signin-no
worldcat.org###news
worldcat.org##.tout-mobi
worldcat.org###idnetworkribbon
worldcat.org###genresribbon
worldcat.org###mainfeature
worldcat.org##.contentrow-cont
worldcat.org###librarian
```

worldcat.org##.about  
 worldcat.org##.itemsavail  
 worldcat.org##.yui-nav  
 worldcat.org##.homesrchadvan  
 worldcat.org##.illo

## Appendix C:

### Full List of Keystrokes for Macro to Emulate to Pull WorldCat.org Data into Excel

Macro creation requires a detailed understanding of how a goal is achieved. Writing out each keystroke is like performing an audit on a workflow, and makes it easier to prepare a macro.

STEP	KEYSTROKE(S)	PURPOSE
1	control+c	copies ISBN
2	alt+tab	switch to browser
3	alt+d	focus on address bar
4	tab	move focus
5	tab	move focus to WorldCat search bar
6	control+v	paste ISBN
7	enter	run WorldCat search
8	*wait 10 seconds*	give page time to load
9	tab	move focus
10	tab	move focus to first search result
11	enter	activate link, load page
12	*wait 10 seconds*	give page time to load
13	control+u	open source code
14	control+f	open browser find command
15	text string "oclc:"	unique text string for OCLC#
16	esc	close search command
17	control+shift+downArrow	highlight OCLC# data
18	control+c	copy OCLC# data
19	alt+tab	switch to Excel
20	rightArrow	move over one cell
21	control+v	paste OCLC# data
22	esc	unfocus on cell
23	rightArrow	move over one cell
24	alt+tab	switch to browser
25	control+f	open browser find command
26	text string "bib-author-cell"	unique text string for author
27	esc	close search command
28	control+shift+downArrow	highlight author data
29	control+shift+c	copy author data
30	alt+tab	switch to excel
31	control+v	paste author data (romanized)
32	esc	unfocus on cell
33	rightArrow	mover over one
34	control+v	paste author data (vernacular)



35	esc	unfocus on cell
36	rightArrow	move over one cell
37	alt+tab	switch to browser
38	control+f	open browser find command
39	text string "h1 "	unique text string for title
40	esc	close search command
41	control+shift+downArrow	highlight title data
42	control+shift+downArrow	highlight title data
43	control+c	copy title data
44	alt+tab	switch to Excel
45	control+v	paste title data
46	esc	unfocus on cell
47	downArrow	move down one cell
48	upArrow	move back up one cell
49	control+x	cuts vernacular title data
50	rightArrow	move over one cell
51	control+v	paste vernacular title data in vernacular title column
52	downArrow	move down one cell
53	control+x	cut Romanized title data
54	leftArrow	move one cell left
55	upArrow	move up one cell back to correct line of data
56	control+v	paste Romanized title data in Romanized title column
57	alt+tab	switch to browser
58	control+f	open browser find command
59	text string "items in thi"	unique text string for series data
60	esc	close search command
61	control+shift+downArrow	highlight series data
62	control+c	copy series data
63	alt+tab	switch to excel
64	rightArrow	move over one cell
65	rightArrow	mover over one cell
66	control+v	paste series data in series column
67	esc	unfocus on cell
68	rightArrow	mover over one cell
69	alt+tab	switch to browser
70	control+f	open browser find command
71	text string "bib-publisher-cell"	unique text string for publisher data
72	esc	close search command
73	control+shift+downArrow	highlight publisher data
74	control+c	copy publisher data
75	control w	close source code tab
76	alt+tab	switch to Excel
77	control+v	paste publisher data
78	esc	unfocus on cell
79	rightArrow	move over one cell
80	control+v	paste publisher data
81	esc	unfocus on cell
82	rightArrow	move over one cell

<b>83</b>	control+v	paste publisher data
<b>84</b>	downArrow	move down one row for next ISBN
<b>85</b>	leftArrow	
<b>86</b>	leftArrow	
<b>87</b>	leftArrow	
<b>88</b>	leftArrow	
<b>89</b>	leftArrow	
<b>90</b>	leftArrow	
<b>91</b>	leftArrow	
<b>92</b>	leftArrow	
<b>93</b>	leftArrow	
<b>94</b>	leftArrow	move back over to next ISBN
<b>95</b>	alt+tab	switch to browser
<b>96</b>	alt+d	focus on address bar
<b>97</b>	Text string "worldcat.org"	enter WorldCat homepage address
<b>98</b>	enter	reloads worldcat.org for next search
<b>99</b>	alt+tab	switch to Excel